Academy of Sciences of the Czech Republic

Astronomical Institute, v.v.i.

Activity Report

2007-2008

Ondřejov Observatory
251 65 Ondřejov
Czech Republic

Astronomical Institute
Academy of Sciences of the Czech Republic

2007–2008

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More information on the Astronomical Institute is available at
http://www.asu.cas.cz

I History

The Astronomical Institute of the Academy of Sciences of the Czech Republic is one of the oldest scientific institutions in the country. It is the direct successor of the Observatory of the Jesuit College, located in the tower of the Clementinum in Prague, where scientific observations, principally of meteorological character, were begun in 1722.

Since then, the Observatory has undergone a number of changes, many of which have reflected professional, political and even societal reorganization. After Czechoslovakia gained its independence from the Austro-Hungarian Empire, the institute was renamed the 'State Astronomical Observatory'. In 1940, it was moved as such to an undistinguished apartment building in Vinohrady (Budečská Street) in Prague.

Long before that, in 1898, a private observatory owned by J.J. Frič was built in a small village Ondřejov, located 35 km southeast of Prague. This small observatory was donated to Czechoslovakia state, more specifically, to Charles University in Prague, in 1928.

The site of the Ondřejov Observatory, at an elevation of 500 m, in the relatively unpolluted environs of Prague (see map on the back cover), proved to be very well chosen. After the Czechoslovak Academy of Sciences was established in 1953, it was merged with the State Astronomical Observatory to create the Astronomical Institute, now belonging to the Academy of Sciences of the Czech Republic. At the time of the division of the Federal Czechoslovak Republic into the Czech Republic and Slovak Republic in 1993, the Prague part of the Institute was moved to new premises in Prague-Spořilov. Currently the institute participates in ESO and ESA projects, as the Czech republic became a member state of these organisations in 2007 and 2008, respectivelly.

II Events of the Last Two Years

A first information booklet of this series was published at the beginning of 1995. It described the research activities of the Astronomical Institute during 1993 and 1994. After that, the booklet was published every two years, so this is the eighth issue.

Substantial changes in the Institute structure occurred during the last two years, and namely from January 2007 the Institute became the "Public Research Institution – v.v.i.". This type of institution has the supervising Council of the Institute, which was elected at the beginning of 2007 (its membership can be found on chapter V). The new Council has then elected the Institute director, finally approved by the Academy.

The major event was the 26th General Assembly of the International Astronomical Union, which took place in the Congress Center Prague, from 14th to 25th August 2006. Formal host issuing the invitation was the Czech National Committee for Astronomy, but it was the Astronomical Institute of the Academy of Sciences who overtook the organizational responsibility including all the financial matters. The National Organizing Committee was chaired by Jan Palouš, vice-chair was Jan Vondrák. The Local Organizing Committee was chaired by Cyril Ron. In total, 2412 astronomers participated at the GA, out of which there were 540 students and 115 seniors, all originated from 72 countries. A detailed Final report on the 26th GA IAU can be found at http://www.astronomy2006.com.

The institute was deeply involved in the process of joining the Czech Republic to European Southern Observatory (ESO) in 2007 and European Space Agency (ESA) in 2008. J. Palouš became the Council member of ESO, while F. Fárník serves now as the Czech

representative in the Science Programme Committe (SPC) of ESA. The institute has continued preparations of the project "European Center of Excellence – Center for Collaboration with ESA and ESO". This Center will be proposed for funding from European structural funds for research and innovation. Its main role will be to promote a closer collaboration with these two European research bodies, acting within European Research Area (ERA).

The institute has undertaken an upgrade of robotic control of the 2-meter stellar telescope, as well as 65-cm telescope jointly operated with the Charles University. Both upgrades were performed by ProjectSoft company. On the other hand, Space Devices company has finalized the Czech network of automatic fireball cameras. One such camera was also installed in Slovakia on Lomnický Štít (High Tatras), in frame of our mutual collaboration with the Slovak Academy of Sciences. Finally, further steps were undertaken to develop the Australian fireball-camera network. The same company also upgraded the Polar Zenith Tube telescope. New 50-cm stellar telescope for detecting optical counterparts of high-energy events was put into test operation.

A number of individual awards were granted to the scientists of the Astronomical Institute in 2007 and 2008:

V. Bumba, Z. Ceplecha, P. Koubský, L. Perek and J. Vondrák have been elected as „Emeritus of the Academy of Science of the Czech Republic".

Stanislava Šimberová was co-researcher on a project which received a Directors Award from the Grant Agency of Czech Republic. The head researcher was Jan Flusser from the Institute of Theory of Information and Automation at AS CR, v. v. i. They were awarded for project no. 102/04/0155 „Fusion of digital images in cases of non-linear imaging models" (2007).

Jan Vondrák obtained the František Nušl Prize from the Czech Astronomical Society in 2007 for life-long work in astronomy (2007).

Pavel Spurný was awarded the Kopal Lecture for study of minor bodies of the Solar system. This award is also given by the Czech Astronomical Society (2007).

Jan Palouš was elected corresponding member of the Royal Society of Edinburgh in acknowledgement of his achievement in science (2007).

Michal Sobotka was awarded the degree Doctor of Sciences (DSc.) by the scientific council of AS CR (2007).

Marian Karlický was awarded the prize of AS CR for excellent results in research of an international impact. The prize was given for the discovery of new radio and X-ray emissions in solar flares and their theoretical explanation (2008).

Miroslav Bárta was awarded the Premium of Otto Wichterle from Academy of Sciences of the Czech Republic for his achievements in science (2008).

III Scientific Profile, Research Activities

The research conducted at the Astronomical Institute covers a wide range of topics; from the immediate environs of the Earth to distant galaxies and black holes. The research activities are carried out in four scientific departments divided into working groups.

1. **Solar Physics**
   - 1.1. ***Physics of Solar Flares and Prominences*** (numerical simulations of plasma processes and radiation transfer in flares and prominences, optical and UV spectral diagnostics, X-ray and radio observations)
   - 1.2. ***Structure and Dynamics of the Solar Atmosphere*** (quiet and active regions, sunspots, granules and supergranules, interactions between plasma motions and magnetic field)
   - 1.3. ***Heliosphere and Space Weather*** (magnetohydrodynamic numerical simulations of propagation and evolution of coronal mass ejections and other transient disturbances, solar activity monitoring and forecasting; image processing)
2. **Stellar Physics**
   - 2.1. ***Physics of Hot Stars*** (theoretical and observational studies of binaries, early-type stars, Be and B[e] stars, white dwarfs, stellar winds, moving envelopes in general, and stellar pulsations)
   - *2.2.* ***Two-meter telescope group*** (operation, maintenance and development of the largest telescope in the Czech Republic)
   - 2.3. ***High Energy Astrophysics*** (celestial X-ray and gamma-ray sources, cataclysmic variable stars, analyses of ground-based and satellite data, X-ray optics)
3. **Interplanetary Matter**
   - 3.1. ***Meteor Physics*** (physical properties, chemical composition and spatial distribution of meteoroids, physical processes during meteoroid penetration into the atmosphere, meteor observations in optical region and by radar)
   - 3.2. ***Asteroids*** (rotations, shapes, surface and bulk properties of near-Earth objects, binary asteroids, photometry and astrometry of asteroids)
4. **Galaxies and Planetary Systems**
   - 3.3. ***Astrophysics of Galaxies*** (formation of star clusters and evolution of galaxies; comparison of radio, infrared, optical, and X-ray observations with analytical models and computer simulations of gravitational and hydrodynamic processes, kinematics and physical properties of AGN host galaxies)
   - 3.4. ***Relativistic Astrophysics*** (active galactic nuclei and Galactic black hole candidates; analysis, within the framework of general relativity, of high-energy X-rays; comparison with observations)
   - 3.5. ***Planetary Systems*** (Earth rotation; Earth gravity field; resonances and dynamics of the asteroids, Kuiper belt and exoplanetary systems; creation of an astrometric star catalogue, motion of artificial satellites under the influence of gravitational and non-gravitational forces)

More details about the activities and recent results of the working groups are given in Chapter IX. The structure of the Institute is shown in Fig. 1.

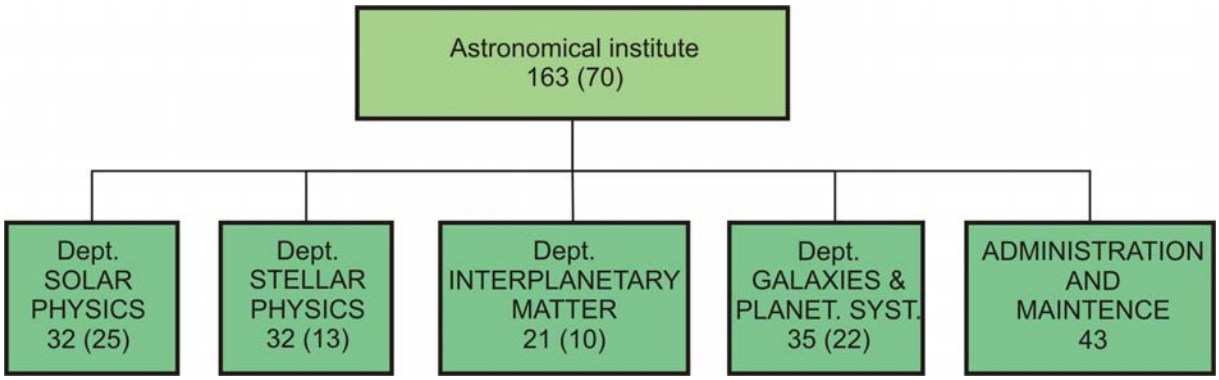

Fig. 1. *The structure of the Astronomical Institute of the Academy of Sciences of the Czech Republic. The total numbers of staff members in the Institute and in the departments are shown. Numbers of scientists are given in parentheses. Valid for the end of 2008.*

IV Executive Staff, Contact Addresses

Director: Associate Professor Petr Heinzel, DSc
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Czech Republic

Internet: http://www.asu.cas.cz/

Fig. 2. *Executives including the heads of departments, the staff of the library, PR and IT (2009). From left to right: P. Sobotka, F. Fárník, B. Král, P. Spurný, P. Heinzel, L. Řezba, D. Pivová, J. Borovička, Z. Večeřová, J. Kubát, R. Svašková, R. Plaček, N. Karlická, K. Soldánová, J. Palouš, M. Jandová, J. Zeman, P. Suchan and V. Karas.*

V Council of the Institution

J. Borovička – Chairman, F. Fárník, P. Hadrava, P. Heinzel, J. Horáček (Charles University, Prague), **B. Jungwiert, J. Krtička** (Masaryk University, Brno)**, J. Kubát, E. Marková** (Úpice Observatory)**, C. Ron – Vice-Chairman, M. Wolf** (Charles University, Prague). **P. Suchan – secretary.**

Starting from 2007, Astronomical Institute, like the other institutes of the Academy of Sciences, gained new legal status of the so called public research institution. According to the law, the Council of the Institute, consisting from 7 internal and 4 external members, was elected at the beginning of 2007 for a period of 5 years. The Council organized a competition for the position of director of the institute. Other tasks of the Council include the determination of the main directions of research, approval of the budget of the institute, definition of internal rules, and approval of agreements between the institute and other organizations.

VI Infrastructure, Personnel and Funding

The Ondřejov Observatory represents a research campus with its own facilities such as a cafeteria, apartment houses etc.. Housing for visitors is also available. The Prague part resides in a building belonging to the Geophysical Institute. Most of the Department of Galaxies and Planetary Systems reside in Prague.

The work of the scientific departments is supported by the library (Head librarian R. Svašková), computer-system and network managers (M. Jandová, P. Řezba), mechanical workshop (J. Zeman), and administration and maintenance (R. Plaček). The administration and maintenance includes a finance section (Z. Ambrožová), personal section (J. Štichová), accounting section (M. Chytrová), operations and supplies (H. Kalibová), maintenance (M. Slezák) and cafeteria (V. Zámyslická).

Fig. 3. *Administration and maintenance staff (2009). From left to right: J. Štichová, J. Nováková, H. Kyclerová, A. Hájková, H. Hanušková, J. Voláková, M. Vávra, M. Dvořáková, M. Slezák, J. Fišerová, P. Ešner, P. Vodrhánková, V. Kocourek, V. Zámyslická, S. Hauzar, L. Navrátil, Z. Pácová, M. Horáková, Z. Ambrožová, S. Bečka, H. Kalibová, J. Bečková, M. Chytrová, M. Procházková, R. Plaček..*

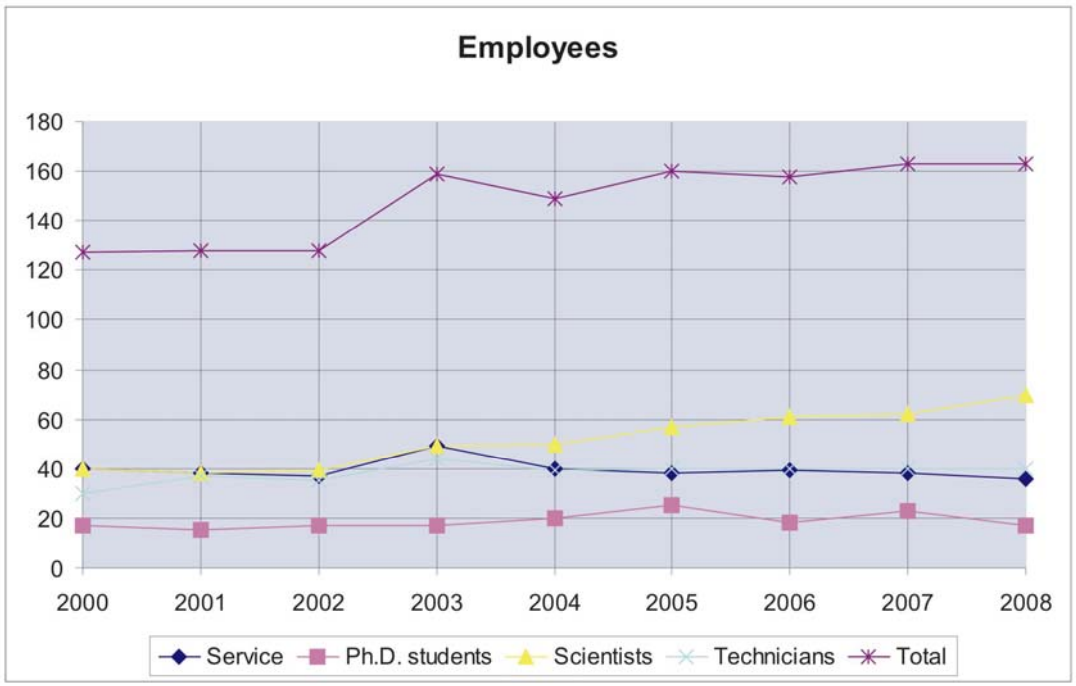

Fig. 4. *Number of employees at the Institute since 2000 (some having part time-position).*

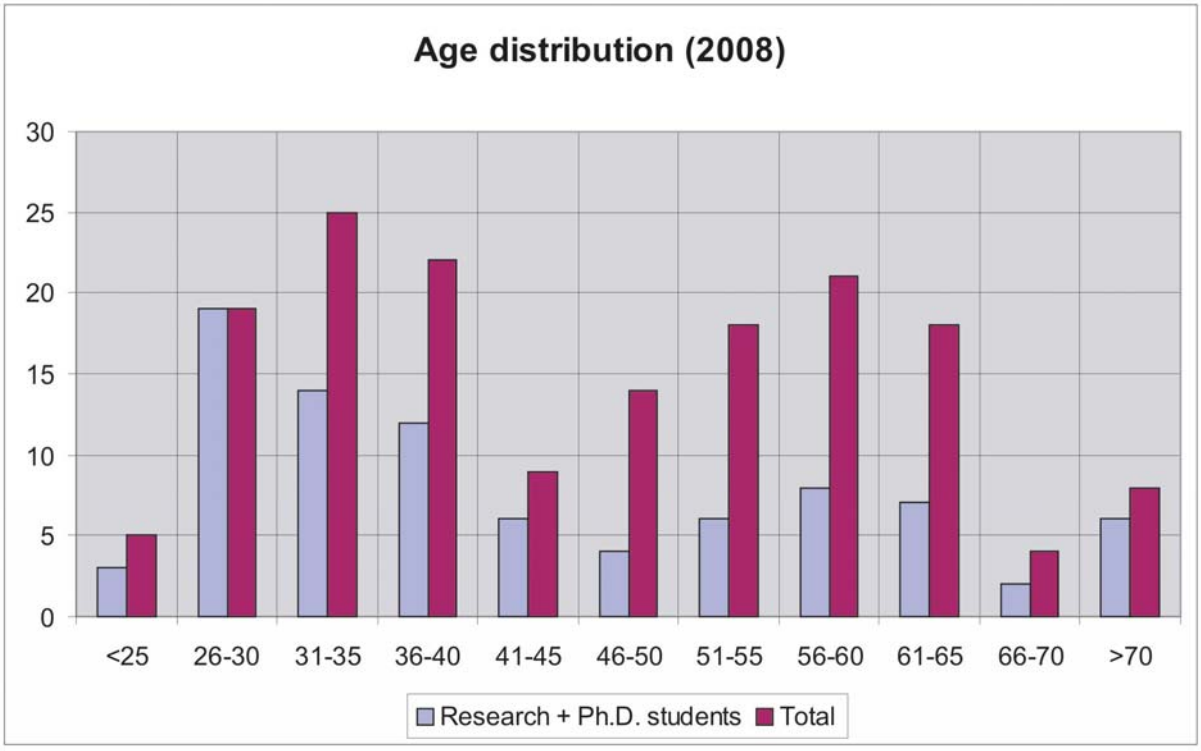

Fig. 5. *Age distribution of all the employees and of those engaged in astronomical research.*

The total number of employees was 163 at the end of 2008, 32 of them were part-time employees. The number of scientists was 70 and there were 17 PhD students. The PhD students are part-time employees. The trend of the number of employees since 2000 is shown

in Fig. 4. The increase in recent years is due to the growing number of young scientists, which is a positive trend. See the age distribution plot in Fig. 5.

Most of the Institute‘s funding comes from the Academy of Sciences. The amount of funding depends on the parliament-approved budget for the Academy of Sciences as well as on the regular international evaluation of the Institute organized by the Academy. Other sources of funding are grant agencies, ministries and other organizations supporting particular projects, including international ones. The expenditures since 2000 are shown in Fig. 6.

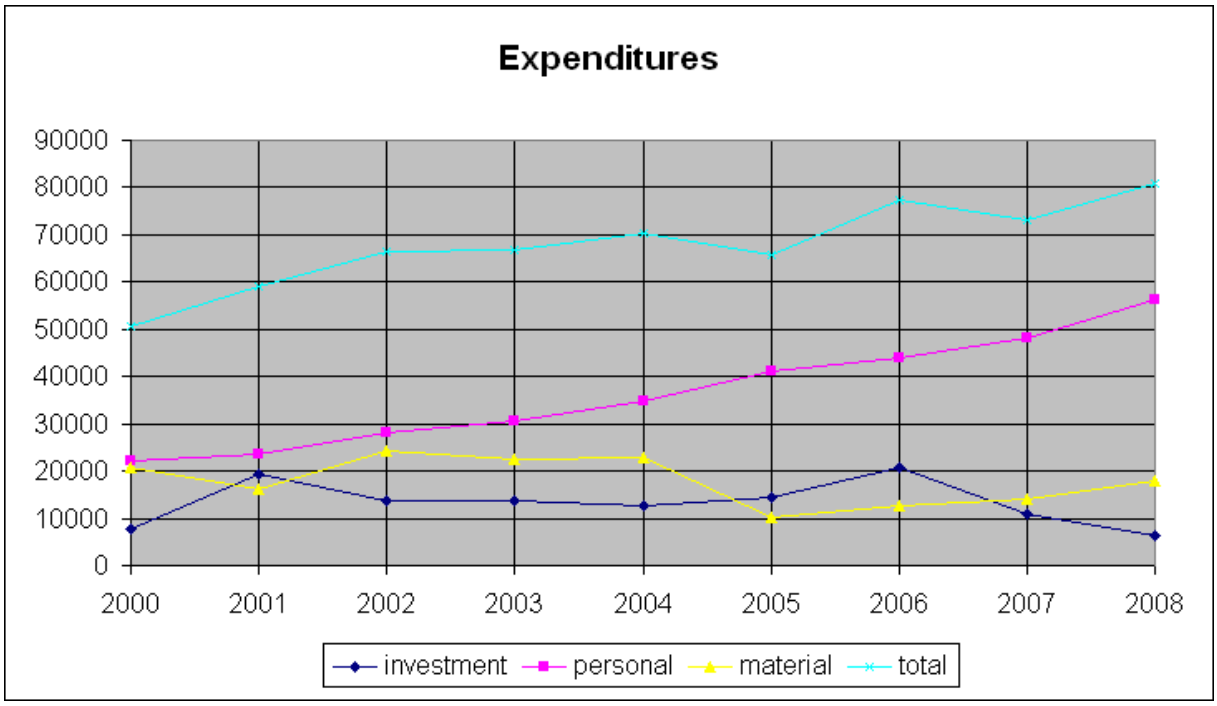

Fig. 6. *Expenditures of the Institute since 2000 (in millions of Czech Crowns). Foreign grants are not included.*

VII Library and Publishing

Head librarian – R. Svašková, Staff – N. Karlická, K. Soldánová, Z. Večeřová

The library’s main function consists in providing information resources and making them available to all employees of the Institution and users from other organisations. The library also serves as a center providing information about astronomical and astrophysical literature for the entire Czech Republic. Its history goes back to the 18th century, books from this period are stored in a separate stock and are not only well preserved, but also benefit from a special care. The library’s historical section contains 253 titles carefully described in a catalogue published in Scripta Astronomica No. 1. (1986) and No. 6. (1994). Twenty-two of the most endangered books from this section have already been completely restored.

Scientific literature is in the largest part represented by periodicals; the library has complete series of many fundamental astronomical journals. Some of these journals date since their first edition volumes and are now available online thanks to the Astronomical Institute's membership of the National Consortium of Springer and Elsevier publishing houses.

The library's monographs are located in a separate building that has been partly renovated in 2006 offering modern technical equipment and a comfortable and calm enviroment for studying. All users can access books catalogued in the world reknowned software Aleph compatible with the entire Academy.

Detailed information about services and facilities offerred by the library is available on the website: http://istar.asu.cas.cz/. The library accepts any request from its clients and obtains the requested articles and documents. In most cases the documents are not the originals, but copied or scanned versions.

The library also keeps connections with many other Astronomical Observatories all over the world and distributes all documents published by the Institute to 249 different locations as part of an international exchange. The Institute had been publishing the so called Bulletin of the Astronomical Institutes of Czechoslovakia until 1992 when this Bulletin became part of an European Journal: Astronomy and Astrophysics. This membership and participation now allows czech researchers to publish their results in a top-level scientific journal with a high impact factor. Besides this journal, the Astronomical Institute published other non-periodical series such as Publications of the Astronomical Institute and the Scripta Astronomica.

IX Principal Results

The spectrum and polarization of active galaxies

Goosmann, R. W., Mouchet, M., Czerny, B., Dovčiak, M., Karas, V., Różańska, A., Dumont, A.-M.: *Iron lines from transient and persisting hot spots on AGN accretion discs*. – Astronomy and Astrophysics 475,1: 155–168 (2007)
Goosmann, R. W., Czerny, B., Karas, V., Ponti, G.: *Modelling time delays in the X-ray spectrum of the Seyfert galaxy MCG-6-30-15*. –Astronomy and Astrophysics 466,3: 865–873 (2007)
Goosmann, R. W., Gaskell, C. M.: *Modelling optical and UV polarization of AGNs. I. Imprints of individual scattering regions.* – Astronomy and Astrophysics 465, 1: 129–145 (2007)

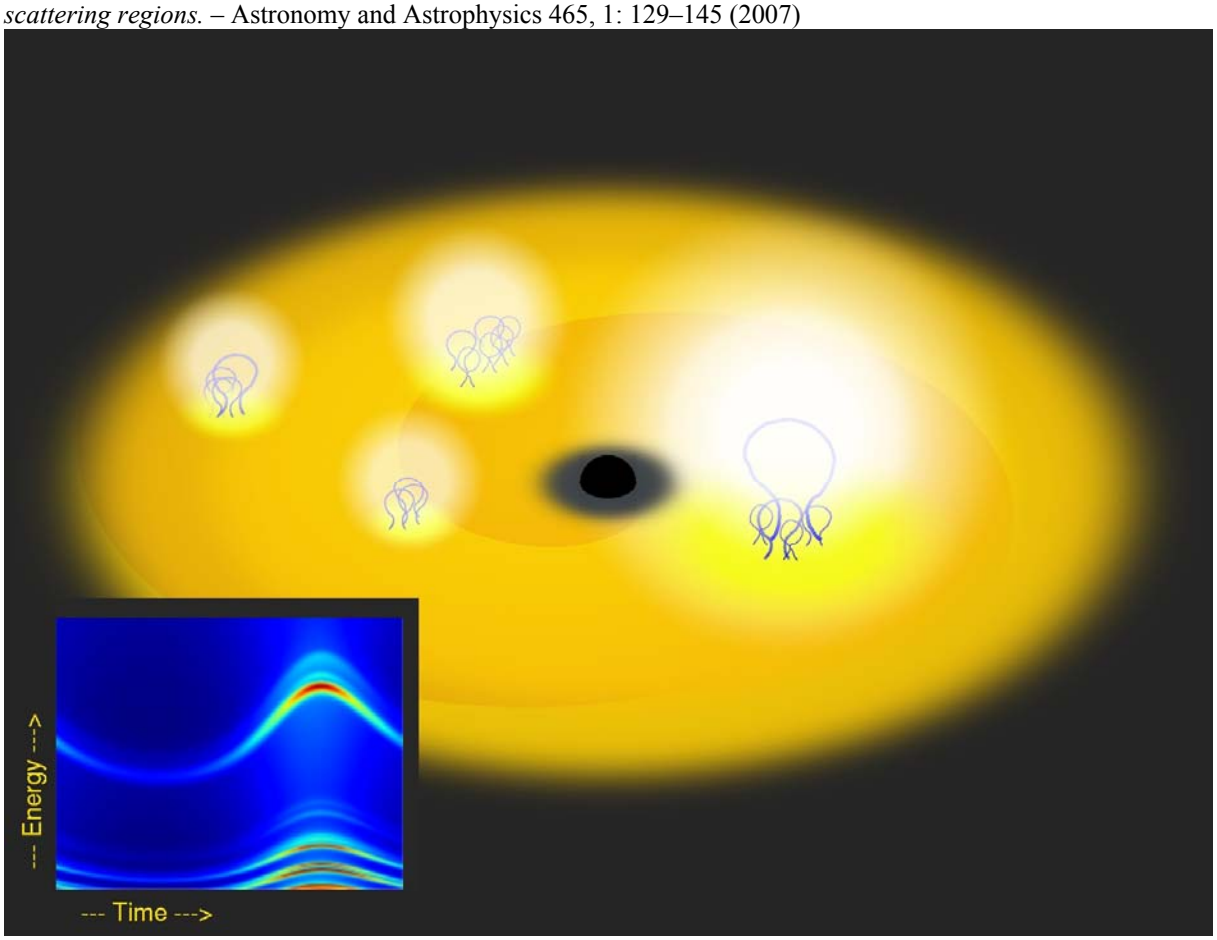

Fig. 7: *The innermost region of an active galaxy (artistic view). A massive black hole is surrounded by a rotating accretion disc. The disc transports gas and dust toward the black hole, gradually heats up, and produces radiation. Magnetic field structures in the disc give rise to powerful eruptions, similar to solar eruptions, and create powerful lamps. They produce bright spots on the disc surface emitting reprocessed radiation with strong emission lines. In the time-dependent spectrum the energy of these lines varies with the spot's motion around the black hole (inset).*

Active galaxies represent a very interesting category of astronomical objects. They emit extremely strong, non-thermal radiation, which varies on all observable time-scales. The powerful emission is caused by accretion of matter onto massive black holes (see figure). Spectroscopic and spectro-polarimetric studies allow astronomers to determine the geometrical structures around the black hole and to define their orientation in space.

A group of authors, lead by R. W. Goosmann from the Astronomical Institute of the Academy of Sciences, investigates, in collaboration with foreign colleagues, the spectral and polarimetric properties of active galactic nuclei in a series of papers published during the last

two years. From these contributions we have selected three cornerstone papers, which appeared in the European astronomical journal Astronomy & Astrophysics.

Goosmann and his collaborators continue to develop a method, which uses the maximum of information in the weak light signal coming from active galaxies. They study mutual time delays of the incoming photons, their dependency on the photon energy, and search for signatures of reprocessing for individual light components in the X-ray and ultraviolet domain. They also investigate the effects of polarization, which is induced by reflection and scattering off toroidal, conical, and disc-like structures surrounding the central massive black hole. These approaches allow the astronomers to indirectly examine the black hole properties and to define the geometry of the active nucleus. A specific example, to which Goosmann et al. applied their method, is the Seyfert galaxy MCG-6-30-15. It represents a mysterious cosmic object investigated by many research teams, especially in X-ray astronomy.

The work of Goosmann et al. is supported by several programs of the Academy of Sciences and carried out in a broad collaboration with researchers from the Copernicus Astronomical Center in Poland, the Observatoire Paris-Meudon and the laboratory Astroparticule et Cosmologie in France, as well as the University of Texas in the USA.

Binary asteroid population: Angular momentum content

Pravec, P., Harris, A.W.: *Binary asteroid population 1. Angular momentum content.* – Icarus 190,1: 250–259 (2007)

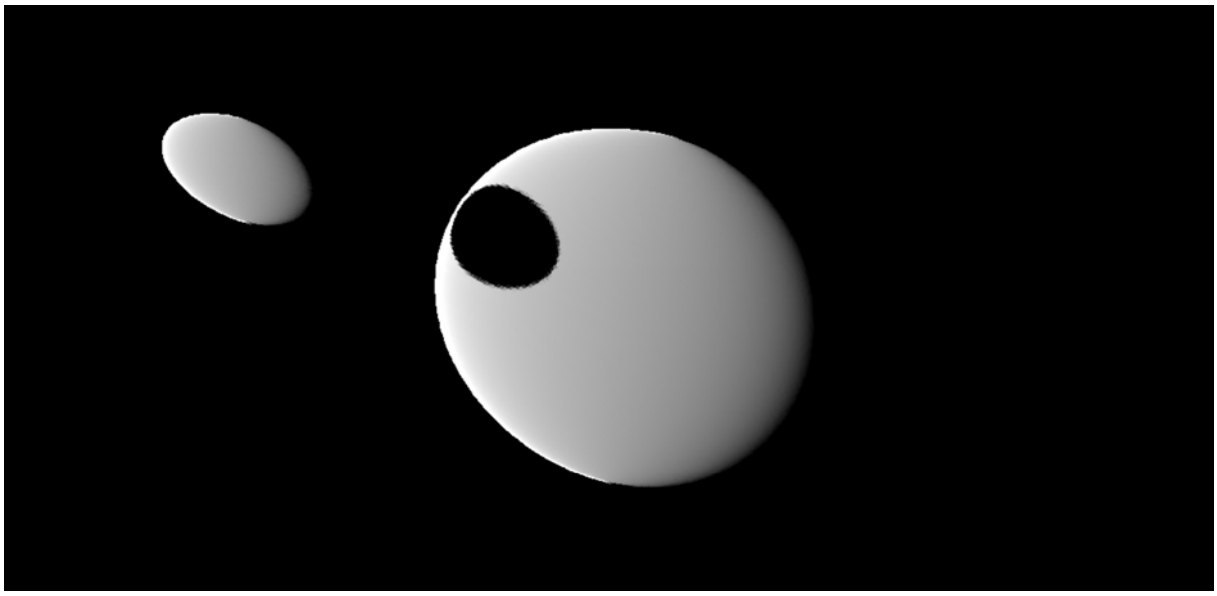

Fig. 8: *Model of a system of binary asteroid. The system is captured in a moment of eclipse, with a shadow of the secondary transiting over the primary. (Courtesy P. Scheirich.)*

Binary systems among asteroids in near-Earth as well as more distant orbits have been known for several years only. Their population is an important part of the vicinity of our planet and it deserves a thorough study. Our aim is to describe the binary population and to find mechanisms of their origin and evolution. Knowledge of the population of binary asteroids is essential for the understanding of processes working among near-Earth asteroids, and it will be needed also for future development of techniques of diverting potential hazardous binary objects.

In the present work, we have studied one important characteristic of binary asteroids, their angular momentum content. We have collected data obtained with photometric and other techniques from our observatory as well as from collaborating stations around the world. We analyzed them and proposed a theoretical explanation for observed distribution of angular momentum in the binary asteroids population.

We have found that binary systems among small asteroids (with sizes up to 10 km) both in near-Earth as well as in main belt orbits have a total angular momentum very close to, but not generally exceeding, the critical limit for a single body in a gravity regime. This suggests that they have formed from parent bodies spinning at the critical rate by some sort of fission or mass shedding. The Yarkovsky-O'Keefe-Radzievskii-Paddack (YORP) effect is a candidate to be the dominant source of spin-up to instability. Gravitational interactions during close approaches to the terrestrial planets cannot be the primary mechanism of formation of the binaries, but it may affect properties of the NEA part of the binary population.

Impact polarization in solar flares

Štěpán, J., Heinzel, P., Sahal-Bréchot, S.: *Hydrogen H-alpha line polarization in solar flares: Theoretical investigation of atomic polarization by proton beams considering self-consistent NLTE polarized radiative transfer*. – Astronomy & Astrophysics 465, 2: 621–631 (2007)
Štěpán, J., Kašparová, J., Karlický, M., Heinzel, P.: *Hydrogen Balmer line formation in solar flares affected by return currents*. – Astronomy & Astrophysics 472, 3: L55–L58 (2007)

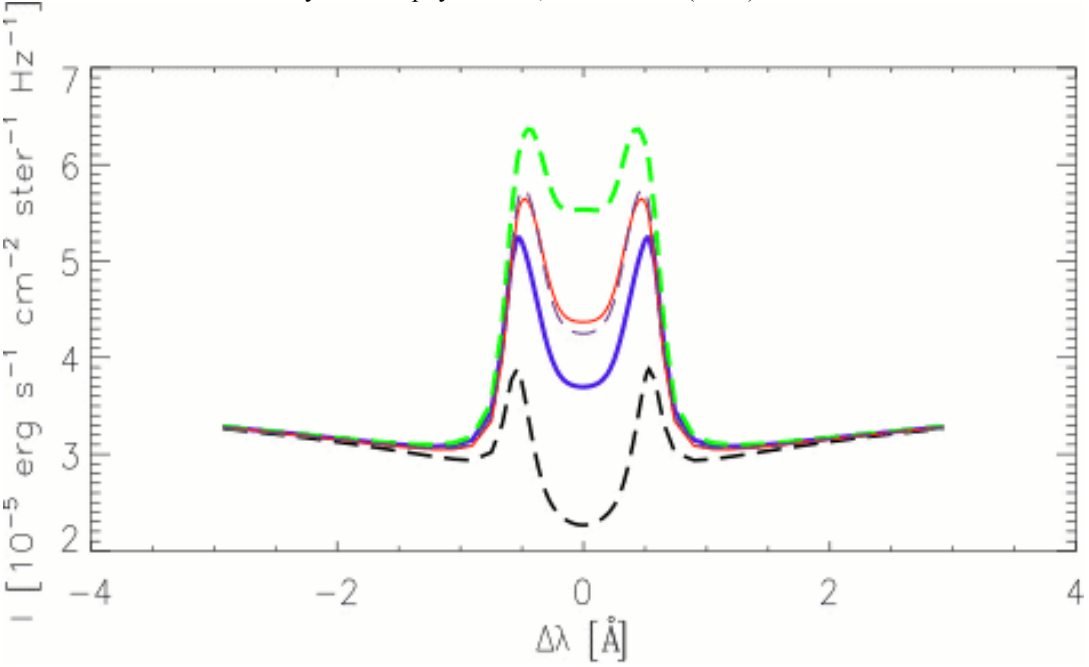

Fig. 9: *The increasing electron flux leads to a remarkable increase in the H-alpha line intensity. The plot shows H-alpha line profile, i.e. the emergent radiation intensity versus the wavelength with respect to the line centre. The lowest profile corresponds to the model without electron beams, whereas the upper profiles represent the model with the beam fluxes from* $4x10^{11}$ *to* $1x10^{12}$ *per second per square centimeter. Substantial differences among the profiles are due to the return current effect.*

There is a controversy over the existence and origin of the linear polarization of the spectral lines in solar flares, particularly the hydrogen H-alpha line. Understanding the processes leading to the spectral line polarization could help us to clarify the flaring mechanism itself and to improve its diagnostics.

Number of measurements made in last two decades indicate the H-alpha linear polarization in the range of 5 to 20 %. It is usually parallel or perpendicular to the solar disc. On the contrary, recent extensive studies show that there is no linear polarization above the noise threshold at 0.1 %. The most likely explanation of the observed polarization besides systematic errors in measurements is the so-called impact polarization mechanism. It is due to anisotropic collisions of hydrogen atoms with charged particles, mainly electrons and protons. Their origin is assumed to be in the coronal magnetic field reconnection site.

The authors made a revision of the previous models of propagation of the proton beams with typical energy of 100 keV and created a polarized non-LTE radiative transfer model. In contrary to common belief, they showed that correct treatment of radiative transfer and collisional depolarization by thermal perturbers leads to a negligible polarization signal. Thus proton beams have been excluded as the potential source of polarization. The authors also studied the effect of the so-called electric return current which forms to neutralize the fast (~> 10 keV) electron beam in chromospheric plasmas. The authors showed that the return current could play an important role in the Balmer line intensities formation. On the basis of these results they consider the return current as the most promising candidate for explanation of the observed polarization.

Hinode, TRACE, SOHO, and Ground-based Observations of a Quiescent Prominence

Heinzel, P. - Schmieder, B. - Fárník, F. - Schwartz, P. - Labrosse, N. - Kotrč, P. - Anzer, U. - Molodij, G. - Berlicki, A. - DeLuca, E.E. - Golub, L. - Watanabe, T. - Berger, T.: *Hinode, TRACE, SOHO, and Ground-based Observations of a Quiescent Prominence*. Astrophysical Journal, Vol. 686 (2008), pp. 1383 – 1396

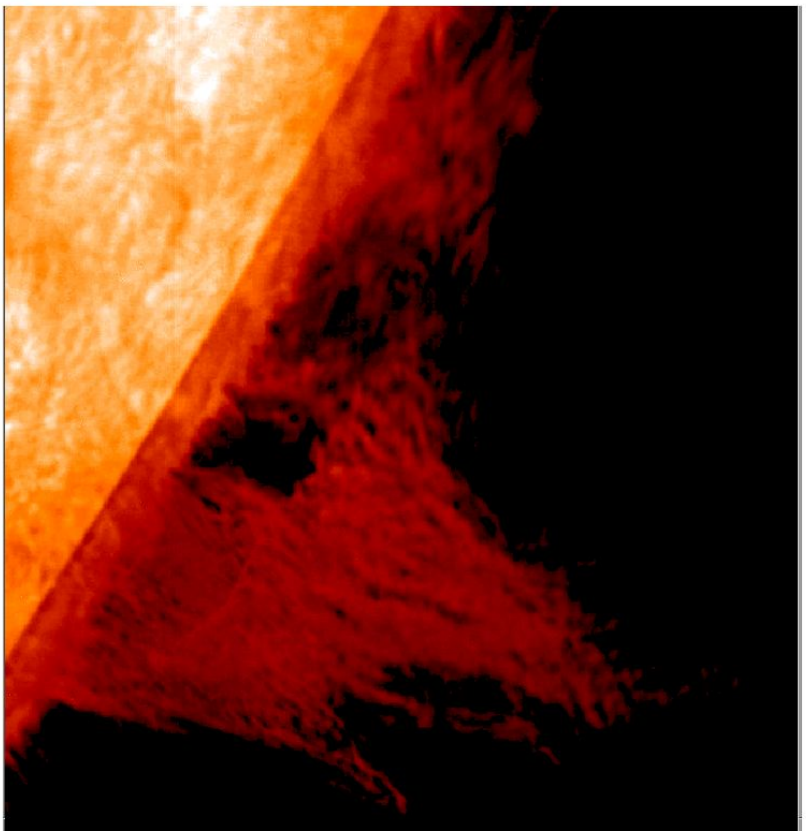

Fig. 10: *Hα narrow-band filtrogram obtained by the SOT telescope onboard the Hinode satellite. Prominence fine structure which is highly dynamical results from a complex interaction between the plasma and magnetic fields.*

A quiescent prominence was observed on 2007 April 25 in the Hα line by Hinode SOT, in X-rays by Hinode XRT telescopes. Simultaneous extreme-UV (EUV) data were also taken by Hinode EIS, TRACE and SOHO (SUMER and CDS) instruments. Moreover, ground-based observatories provided calibrated Hα intensities (Ondřejov HSFA, Meudon MSDP). Dark prominence structure clearly seen in the TRACE and EIS 195 Å images is due to the prominence absorption in hydrogen and helium resonance continua plus the coronal emissivity blocking due to the prominence and its void (cavity). The void, clearly visible in XRT images, was found to be entirely due to X-ray emissivity blocking. On the contrary, no absorption takes place at X-ray wavelengths. We use TRACE, EIS, and XRT data to estimate the amount of absorption and blocking. The Hα integrated intensities provide us with an estimate of the Hα opacity, which is related to the opacity of resonance continua as follows from our previous non-equilibrium radiative-transfer modelling. However, spatial averaging of the Hα and EUV data have quite different nature, which must be taken into account when evaluating the true opacities. We demonstrate this important effect for the first time. Finally, based on this complex multiwavelength analysis, we determine the column densities in the prominence. They represent a crucial parameter in determining the total prominence mass loading, the quantity needed for understanding the coronal mass ejections which follow the evolution of most prominences.

Thermal disc emission from a rotating black hole: X-ray polarization signatures

Dovčiak, M. - Muleri, F. - Goosmann, R. W. - Karas, V. - Matt, G.: *Thermal disc emission from a rotating black hole: X-ray polarization signatures*. Monthly Notices of the Royal Astronomical Society, Vol. 391 (2008), pp. 32-38

Dovčiak, M. - Karas, V. - Matt, G. - Goosmann, R. W.: *Variation in the primary and reprocessed radiation from an orbiting spot around a black hole*. Monthly Notices of the Royal Astronomical Society, Vol. 384 (2008), Issue 1, pp. 361-369

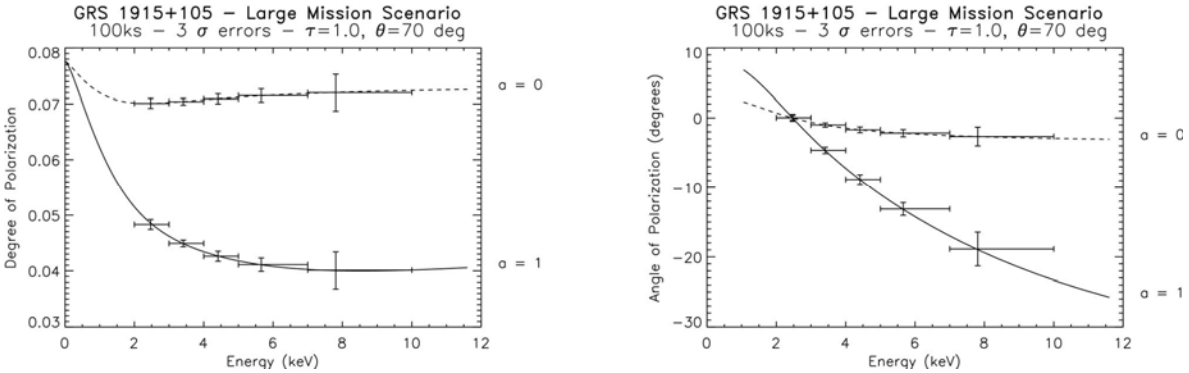

Fig. 11: *Energy dependence of the degree (left) and angle (right) of polarization. The solid curve refers to the case of a maximally rotating black hole and the dashed one refers to the static Schwarzschild black hole. The inclination angle of the accretion disc is 70 degrees. Points with error bars are simulated for a one-day long observation by the large X-ray polarimetry mission (IXO).*

Black hole is created by a collapse of a very massive star at the end of its life when the thermonuclear reactions stop running. Many stars in our Galaxy exist in binary systems and thus a star companion often orbits around a black hole. Currently astronomers have found more than 20 such systems. When the orbiting star is large enough, e.g. it is a red giant, the black hole may suck matter from the surface of the star. This matter creates an accretion disc in the orbital plane because the star circles the black hole. The disc heats up to an extreme temperatures by the action of the frictional forces. As a consequence it strongly radiates

thermal emission in X-rays. The thermal photons are scattered in the disc's atmosphere and originally unpolarized emission becomes partly polarized. The vector of polarization which the observer at infinity measures depends on the velocity of the accretion disc that emits the photon and on the gravity of the black hole that acts on the photon on its way from the disc to the observer.

In our work we compute the polarization the observer would measure as a function of the properties of the black hole and the accretion disc. It would be possible to determine the inclination of the disc or the momentum of the black hole from observed polarization. We performed more detailed computations for the microquasar GRS 1915+105.

Nowadays, we do not have X-ray satellites in an earth's orbit that would be able to measure the polarization. However, several missions are currently being planned that would be able to do it - a smaller Italian mission - POLARIX and a larger one - International X-ray Observatory (IXO). In our work we simulate the polarimetric measurements by these satellites using the anticipated properties of their detectors. Our computations show that it will be possible to measure the polarization from the brightest X-ray sources and it will be possible to determine their properties from the energy dependence of the observed polarization.

Explanation of the formation of meteoric crater in Peru

Borovička, J. - Spurný, P.: *The Carancas meteorite impact – Encounter with a monolithic meteoroid*. Astronomy and Astrophysics, Vol. 485 (2008), pp. L1–L4

Fig. 12*: Meteoric crater near Carancas village in Peru created on 15 September 2007. The crater diameter is almost 14 meters. The photo was taken from internet (author Cis Verbeeck).*

On September 15, 2007, a crater forming stony meteorite fall occurred near the village of Carancas, Peru. The creation of a 13-meter wide crater was an unexpected event and the initial media reports were met with skepticism in the scientific community. An impact crater

can be formed only by a body that reaches the Earth surface with a substantial speed of several kilometers per second. The commonly accepted opinion was that only iron meteoroids produce craters of this size. It was also expected that meteoroid's atmospheric passage would be detectable by modern instruments to large distances. In reality, the recorded sonic waves corresponded to a relatively small body. Several tens bodies of that size enter the atmosphere every year without causing any damage on the ground.

To explain this mystery, we used the records of the passages of large stony meteoroids thought the atmosphere from our own long-term observations. We also modelled the event. All observed meteoroids showed fragmentation into smaller pieces in the atmosphere. Small pieces were easily decelerated and reached the ground with low speed. The fragmentations always occurred under substantially lower pressures than correspond to the strength of recovered meteorites. Our explanation is that the bulk strength of the incoming meteoroids was low because of internal cracks acquired during collisions in interplanetary space. The meteoroid strength was found to vary from case to case. Our modelling showed that the Carancas meteoroid could survive the atmospheric entry without fragmentation and produce the observed crater, provided that it was free of internal cracks and its bulk strength was comparable to normal meteorite strength. The event can be therefore explained by the fact that Carancas was a rare monolithic meteorid. The initial size was in the range from 0.9 to 1.7 meters.

VIII Scientific Departments and Working Groups

This chapter contains detailed information about the staff, scientific activities and additional results of individual research departments and groups. The described structure and staff information reflects the situation at the end of 2008 unless otherwise noted.

1. Department of Solar Physics

Head scientist – F. Fárník. Deputy – M. Sobotka.

Computer assistance: A. Heinzelová
Secretary: A. Chytrová, Phone: (+420) 323 620 146, E-mail: alchytr@asu.cas.cz

The Solar Physics Department studies our nearest star, the Sun, and, in particular, active phenomena in the solar atmosphere. This includes solar flares as well as accompanying heliospheric effects. Large-scale solar activity, evolution of solar active regions, the structure and evolution of sunspots and filaments, flare-energy storage, release and transport are all studied. The research of the Solar Department can be characterized as a combination of computer-controlled solar observations in optical, radio and X-ray wavebands, analysis and interpretation of data, and theoretical research with extensive numerical modelling of the processes under study. All these activities are based on a close cooperation with many institutes in Austria, Croatia, France, Germany, Italy, Japan, the Netherlands, Poland, Russia, Slovakia, Spain and the USA. This cooperation includes exchange of various data and their theoretical interpretation, as well as our participation in some ground-based and space projects.

Fig. 13: Solar Physics Department (2009). From left to right: F. Fárník, P. Heinzel, P. Kotrč, M. Karlický, P. Ambrož, V. Snížek, A. Chytrová, M. Sobotka, E. Dzifčáková, P. Schwartz, H. Meszárosová, J. Jurčák, Yu. A. Kuprjakov, D. Nickeler, J. Leško, M. Zapiór, A. Kulinová, A. Berlicki, J. Kašparová, K. Jiřička, T. Prosecký, T. Vaněk, F. Zloch, A. Heinzelová, M. Klvaňa, S. Šimberová, M. Varady, M. Bárta.

1.1 Physics of Solar Flares and Prominences

Head scientist – M. Karlický. Scientists – M. Bárta, F. Fárník, S. Gunar, P. Heinzel, K. Jiřička, J. Kašparová, P. Kotrč, H. Mészárosová, D. Nickeler, P. Schwartz, J. Štěpán, M. Varady[1]. PhD student – T. Prosecký. Assistants – J. Leško, V. Snížek.

[1] part time

The principal goal of this group is to understand the energetics and dynamics of the very complex plasma processes in flares and prominences, occurring on various spatial and temporal scales. Small-scale processes observed with a high spatial resolution and on sub-second time scales are critical in evaluating the global physical behavior of these phenomena, this being the current trend in solar physics. Two complementary tools are used: (i) optical and UV spectral diagnostics to derive the basic structural and dynamical plasma parameters, and (ii) numerical simulations of plasma processes and radiation transfer. This work is further supplemented by X-ray and radio observations which provide information about hot plasmas.

Observations of the Multichannel Flare Spectrograph (MFS) operating since 1958 have been stopped and the device has been reduced to a one-channel spectrograph. A comprehensive archive of flares and prominences simultaneously registered in three spectral lines: H-alpha, H-beta or He D3 and CaII 854.2 nm and slit-jaw H-alpha pictures is still available. A list of observations since 29. 05. 1998 - 14. 05. 2004, with examples of the data, can be found at the MFS homepage http://www.asu.cas.cz/~pkotrc/index5.html. A large horizontal telescope with a spectrograph (HSFA2) was put into testing operation after extensive modernization. It is fully computer-controlled and replaces the MFS. A new diffraction grating gives a spectral resolving power of 247 000 in the 1st order. The data acquisition system has been changed and the spectrograph was converted from Czerny-Turner into a multichannel one. It works simultaneously in H-alpha, D3, H-beta, CaII K, resp. CaII H

lines. Four out of 5 CCD cameras are placed at these lines and the fifth one in the new slit-jaw system with H-alpha filter. Auxiliary telescopes with cameras provide information about the position of the solar image in white-light and the full disc in H-alpha line. Latest images and other information about HSFA2 can be found at http://www.asu.cas.cz/~pkotrc/2006.html. Most of the observations performed with the HSFA2 are concentrated on high temporal resolution of fast processes in solar flares. Compared to the MFS, the HSFA2 has a larger spatial and spectral resolution. It takes part in collaborative campaigns with observatories in France (Meudon, Pic-du-Midi), Poland (Wroclaw), the Canary Islands and elsewhere.

Solar radio emission is monitored by three radio telescopes. The 0.8-2.0 GHz radio spectrograph with 512 frequency channels was reconstructed in 2006 and now it is used for measuring dynamic spectra with 10 ms time resolution. The 2.0-4.5 GHz radio spectrograph with 512 frequency channels is used with 100 ms time resolution. The 3.0 GHz single frequency radiometer with 10 ms time resolution is used for the monitoring of solar radio activity and studying short-duration phenomena. All instruments are fully automatic, monitoring the solar activity daily, from sunrise to sunset. The goal is the study of fast dynamic phenomena, especially fine structures of solar radio bursts. The list of observed events, as well as pictures of observed radio bursts, are available to interested parties at http://www.asu.cas.cz/~radio/. Information about observed events is also regularly sent to Boulder, Colorado, USA, where it appears monthly in "Solar Geophysical Data".

EUV and X-ray bands represent a fundamental source of information about the state of solar plasma and physical processes taking place in the upper layers of solar atmosphere – the transition region and corona. In these bands, we use top-quality satellite data obtained in broad international cooperation (missions YOHKOH, SOHO, TRACE, RHESSI, etc.), as well as data from our own instrument (HXRS) launched in March 2000.

The optical and UV spectral data are used for quantitative plasma diagnostics, which are performed by means of sophisticated non-LTE techniques. Non-LTE codes have been developed in close cooperation with the Institut d'Astrophysique Spatiale in Orsay (France) and with the Max Planck Institut für Astrophysik in Garching (Germany). Recently, they have been extended to time-dependent and 2D versions. As a result, we obtain information about the thermodynamic structure of the flaring atmosphere or prominence structures, as well as about dynamical processes (velocity fields). Numerical simulations of plasma processes also predict the X-ray and radio emissivity of flares. A so-called 'hybrid code', which consists of two parts, has been further developed: a simulation of accelerated-particle beams and the hydrodynamic part which solves the equations of 1D radiation hydrodynamics. The radiation part is now being calculated using fast non-LTE techniques based on accelerated lambda iterations. Numerical simulations of flare processes extended into interplanetary space, e.g. flare-shock propagation, are also carried out.

Soft X-ray images are used to understand the physics of solar flares (events preceding flares, evolution of hot post-flare loops, etc.) and other active processes in the solar corona (triggering of CMEs, formation of long trans-equatorial loops, etc.). From the diagnostic point of view, the electron temperature and emission measure of hot coronal plasma can be estimated using these measurements. Hard, mostly non-thermal, X-ray emission gives information about high-energy particle beams in the solar corona. Observations of this kind can identify regions of acceleration and thermalization of these beams and could also provide some clue to the still poorly understood physical mechanisms which produce these high-energy particle beams responsible for solar flares.

In 2005 the computer cluster OCAS (Ondrejov Cluster for Astrophysical Simulations, see http://wave.asu.cas.cz/ocas) was built at the Institute consisting of 16 double-processor working nodes (in total 32 AMD Opteron 252@2.6GHz, 64GB RAM) interconnected by the

fast InfiniBand network. The cluster is used mainly for the numerical modelling of basic processes in solar flares (magnetic reconnection, plasmoid ejecta) and prominences (relaxation to the MHS equilibria, radiative transfer) using MPI-parallelised MHD and PIC codes (both 2D and 3D). The codes are extended to calculations of the modelled emission in X-rays, radio and Hα, which provides a connection with our observing facilities. The cluster was upgraded in 2007, now having 64 CPU cores.

1.2 Structure and Dynamics of the Solar Atmosphere

Head scientist – M. Sobotka. Scientists – P. Ambrož[1], V. Bumba[1,2], J. Jurčák, M. Klvaňa[1], M. Švanda.

[1] part time; [2] emeritus of ASCR

Quiet and active regions of the Sun at various atmospheric levels are studied in order to understand interactions between plasma motions and magnetic field. Medium (>2") and high (<0.2") spatial-resolution observations, mostly in the optical region, are used for this purpose. Global and large-scale dynamic properties of the Sun are studied, and horizontal transport velocities of plasma in the solar atmosphere are analyzed.

Observational data come from large solar telescopes located at Canary Islands observatories, solar satellites SOHO, TRACE, and HINODE, from the Ondřejov 50-cm horizontal telescope and spectrograph HSFA1 and the Coimbra spectroheliograph. After an extensive reconstruction, HSFA1 was recently equipped with a new post-focus device SOLSPAN for solar spectra analysis. SOLSPAN will be capable to observe parts of the solar disc in two selectable spectral lines simultaneously. The group took part in the reconstruction of the photographic spectroheliograph of the Astronomical Observatory of the Coimbra University, Portugal, to enable the acquisition of full-disc spectroheliograms using a digital CCD camera. A new software was installed in 2008. Since 2001, the group has been collaborating with leading German astrophysical institutes on the project GREGOR, a development and construction of a large solar telescope with a diameter of 1.5 m. The telescope is now assembled at Tenerife, Canary Islands, and the first light is planned for 2010. Since 2008, the group has been involved in the Design Study of a large 4-m class European Solar Telescope (EST), particularly in the formulation of scientific requirements and in the design of the Auxiliary Full-Disc Telescope.

Sunspots show an ample range of fine structures (penumbral filaments and grains, umbral dots, light bridges, and dark nuclei), resulting from the complex behavior of partially ionized dense gas moving in a strong magnetic field, including various types of magnetoconvection. Sunspot umbrae and penumbrae are associated with complex patterns of magnetic fields and velocities. Using high-resolution images and 2D spectra, obtained and analyzed in collaboration with Instituto de Astrofísica de Canarias (IAC) and with the National Astronomical Observatory of Japan (NAOJ), stratifications of physical parameters, dynamics, evolution, and mutual relations of various types of sunspot fine structures as well as organized flows around sunspots and pores are analyzed. Observations obtained with extremely high spatial resolution (0.12") at the 1-m Swedish Solar Telescope, La Palma, are utilized to refine the current knowledge about the detailed structure of sunspots, small-scale magnetic elements, and solar granulation.

The organization of line-of-sight velocities in evolving magnetic fields of active regions is investigated and the correlation of dynamical changes in magnetic and velocity fields with other activity phenomena is studied. Processes in deeper layers of the convection

zone, with dominant influence on the dynamo action, manifest themselves partially in large-scale and global flows in the photosphere. We study velocity fields of these flows using surface magnetic fields and supergranules as tracers. More recently, the method of local helioseismology is utilized to measure mass flows in the upper convection zone. Moving magnetic fields are extrapolated to the corona and compared with observed coronal structures. Global velocities derived from supergranular motions as well as from surface magnetic flux transport are used to study the differential rotation of the Sun, meridional circulation in the photosphere and the long-term properties of mean velocity components. Detailed data from the regions occupied by local magnetic fields are used to study the coupling between the surface flows, the underlying magnetic fields, and the active phenomena.

1.3 Heliosphere and Space Weather

Head scientist – M. Vandas. Scientists – P. Hellinger[1], S. Šimberová, P. Trávníček[1]. PhD student - A. Lynnyk[1]. Assistants – T. Vaněk[1], F. Zloch.

[1] part time

Space weather research and forecasting involves a complex chain of various dynamic phenomena. Improved understanding of heliospheric disturbances is needed to enhance capabilities to associate, and eventually forecast, solar eruptive phenomena with geomagnetic storms. Essential to this effort are magnetohydrodynamic (MHD) numerical simulations of propagation, evolution, and interaction of transient disturbances on their way to Earth. The group performs these simulations with a special emphasis on coronal mass ejections (CMEs) and their most geo-effective subset, magnetic clouds, which are in fact the interplanetary flux filaments. Apart from MHD simulations, structure and evolution of magnetic clouds are studied theoretically and compared to in situ spacecraft measurements. Kinetic simulations of the interaction of collisionless solar wind plasma with planets and moons are performed. We have developed a global model of a planetary magnetosphere based on the kinetic theory of plasma and applied it to the study of a planet with a magnetosphere comparable to the planet Mercury. This model is used by NASA within the MESSENGER project and for studies of the lunar wake, of the interaction of the water plume near Enceladus with plasma of Saturn, and the environment of the Jovian moon Io. Kinetic simulations are also used to study general processes in the solar wind, e.g., evolution of electron temperature and its anisotropy with the radial distance from the Sun.

A part of the group is a small group of Solar Activity Monitoring and Forecasting. This group observes the Sun in white light and in the Hα line. The observations are used in scientific research conducted by the Solar Department, and contribute to the world net ISES (as station No. 31516) and to SIDC in Brussels. Besides solar observations, the group collects all the accessible data on the actual state of solar activity. The group compiles and publishes a weekly solar-activity forecast (for approximately 90 Czech and international users) and daily solar-activity forecast (for Czech Television). The solar-activity forecasts have been published weekly at Ondřejov since 1978, and this particular group has been doing the forecasting since 1990. Two small refractors are used for monitoring observations of the whole solar disc (in white light - refractor 150/750 mm, in Hα - refractor 50/320 mm + Hα filter Coronado 0.7 Å). For detailed observations of the solar photosphere and chromosphere, two refractors are used (205/2830 mm / A. Clark - 1858/ and 210/3410 mm + Hα filter DayStar 0.6 Å), with CCD-cameras and digitization. A small refractor (63/840 mm) is used for drawings of the whole solar photospheric disk. The latest data can be found on http://www.asu.cas.cz/~sunwatch/.

The group is also involved in image information processing. The art of image processing is a topic with boundaries well beyond astronomy. Astronomical image processing applies a variety of numerical methods to extract scientifically valuable information from the observed data. Applied sciences in this subject cover very broad area including pre-processing (data acquisition from the space and ground-based observation, standard data reduction, removing of noise components and random disturbances, raw and processed data archiving), image reconstruction, analysis, and pattern recognition.

2. Department of Stellar Physics

Head scientist – J. Kubát. Deputy – A. Kawka.

Secretary: E. Hajduová, Phone: (+420) 323 620 226, E-mail: hajduova@sunstel.asu.cas.cz

Fig. 14. Physics of Hot Stars Group and Two-meter Telescope Group (2009). First line: J. Fišerová, A. Kawka, M. Kraus, P. Koubský, D. Korčáková, J. Fuchs, V. Votruba, L. Řezba; Second line: F. Žďárský, E. Hajduová, M. Šlechta, J. Sloup, J. Kubát; Third line: J. Honsa, J. Soldán, M. Tlamicha; Missing: E. Arazimová, E. Kortusová, L. Kotková, J. Polster, P. Škoda, S. Štefl, B. Šurlan, S. Vennes.

2.1 Physics of Hot Stars

Head scientist – J. Kubát. Scientists – P. Harmanec[1], D. Korčáková, A. Kawka, P. Koubský, M. Kraus, E. Niemczura[2], P. Škoda, S. Štefl[3], V. Votruba. PhD students – E. Arazimová[5], M. Ceniga[4], J. Elner, B. Kučerová[4], M. Netolický, J. Polster, B. Šurlan[5].

[1] part time till May 2007, [2] till September 2007, [3] on long-term leave, [4] tilll September 2008, [5] since October 2008

The research of the group is focused on the theoretical and observational studies of binaries, early-type stars, Be and B[e] stars, white dwarfs, stellar winds, moving envelopes in general, and stellar pulsations. The observational program is primarily based on spectroscopic data from the Ondřejov 2-m telescope, on data obtained at the ESO observatories in Chile, and on data from other facilities abroad – Dominion Astrophysical Observatory (Canada), Observatoire de Haute Provence (France), Rozhen Observatory (Bulgaria), Cerro Tololo Inter-American Observatory (Chile), Kitt Peak National Observatory (U.S.A.), Apache Point Observatory (U.S.A.), Mt Stromlo and Siding Springs Observatories (Australia). The spectroscopic data are supplemented by photometric measurements obtained at Hvar Observatory (Croatia). Surveys like SDSS and GALEX are also being extensively used. Recently (in 2007) extensive international collaboration in the framework of the ESA Gaia concentrates on automated stellar classification procedure for Be and other variable stars.

The spectroscopic program includes a search for new spectroscopic binaries among Be stars. These data are vital for testing the generalized binary model of Be stars. This model is based on the theory of the binary motion and gas dynamics. Several objects, like TT Hydrae, beta Lyrae, upsilon Sagitarii, HD 208905, BU Tauri, zeta Ophiuchi, and beta Persei were studied in detail. Spectroscopic studies of hot stars were also focused on B[e] stars, that show forbidden emission lines in their spectra. Two southern stars, namely the SMC supergiant LHA 115-S23, the unclassified B[e] star CD-42°11721, and the LMC B[e] supergiant R 126 were treated in more detail. Emission line stars were studied in the open cluster NGC 6910.

A spectropolarimetric survey of 61 southern white dwarfs, searching for magnetic fields using Zeeman spectropolarimetry, has been conducted. The fraction and distribution of magnetic white dwarfs in the solar neighborhood was determined. The white dwarf spectra were analysed to obtain effective temperatures and surface gravities. The evidence for the existence of ultramassive (M>1.1Msolar) white dwarfs was re-examined. The confirmation and identification of high-mass white dwarfs using parallax measurements may prove critical in establishing the population fraction of these objects and in constraining the high end of empirical initial-mass to final-mass relations. It was also shown that CPD-20 1123 (Albus 1) is a bright He-B subdwarf, and not a white dwarf.

FUSE observations of the hot white dwarfs in the post-common-envelope binaries Feige 24, EUVE J0720-317, BPM 6502, and EUVE J2013+400 were analysed. We determined the orbital properties of all four binary systems. Other binaries of different types were also analyzed (V731 Cephei, V379 Cephei, Cygnus X-1, HD 143418,).

In the theoretical field, a computer code for calculating plane parallel and spherically symmetric non-LTE model atmospheres has been developed and is applied to the studies of hot stars. Moreover, a code for the axial symmetry solution of the radiative transfer equation in moving stellar atmospheres in two dimensions was also developed.

Multicomponent winds of hot stars were further studied, also using powerful numerical simulations with a detailed description of the momentum transfer between absorbing and passive parts of the plasma. Algorithms for solving nonstationary hydrodynamic equations of the two-component stellar wind were developed. We compare the

hot-stellar wind models calculated by assuming an older solar-abundance determination with models calculated using the recently published values derived from 3D hydrodynamical model atmospheres. We show that the use of new abundances with lower metallicity improves the agreement between wind observations and theory in several aspects.

Part of our research has been focused on the development of the astronomical Virtual Observatory (VO) in close collaboration with the International Virtual Observatory Alliance and EU-funded EURO-VO Data Center Alliance. Work on the definition of important VO interoperability standards and on the improvement of VO spectral tools (SPLAT, VOSpec) was followed by the implementation of a VO-compatible server of archives of HEROS spectra obtained with the 2m Ondřejov telescope. Finally, the worlds only spectral range cutout server was bench-tested and published in the world-wide VO registry.

2.2 Two-meter telescope group

Head scientist – M. Šlechta. Technicians and assistants – J. Fuchs, J. Honsa, L. Kotková, L. Řezba, J. Sloup, M. Tlamicha, F. Žďárský[1].

[1] part time

The principal instrument of the stellar department is the 2-meter reflecting telescope, which has been in operation since 1967. In past decades, three major upgrades (1982–87, 1996–98, 2007) were made. The telescope is used mostly for high dispersion spectroscopy.

The main camera of the coudé spectrograph was the 700 mm camera equipped with a LN2-cooled CCD chip – SITe ST005A thinned UV-enhanced back illuminated chip 2000 X 800 15μm pixels. Its outstanding performance and low readout noise of less than 7 electrons allows us to obtain high S/N spectra (resolution 10 000 – 20 000) of objects up to 12 magnitudes in less than two hours of exposure. A new CCD detector (custom manufactured ITL chip STA0520A based on LORAL wafer, thinned, 2688x512 15μm pixels, cooled by Cryotiger) was installed in the coudé 400mm camera. Another CCD – EEV thinned back illuminated chip 2048 X 2048 13.5 μm pixels is operating at the focus of the Ondřejov echelle spectrograph (OES).

A new interface for operating all the CCD cameras is currently being developed. PESO (Python Exposure Script for Ondřejov) is a multi-threaded Python script providing GUI interface for operating the CCD cameras in the Ondřejov observatory 2m telescope spectrographs. It handles the process of setting up the required spectrograph configuration, acquiring data from the CCD and writing the correct FITS header information and finally saving the FITS frame. It is written in Python calling C wrappers and custom libraries.

The most recent upgrade of the telescope control system offers highly precise and stable performance and enables remote control of the telescope. The autoguiding system using the system OPSO (OpenGL Pointing System for Ondřejov) was proven to be fully functional and enables automatic control of the telescope position according to movements of the stellar image at the slit.

2.3 High Energy Astrophysics

Head scientist – R. Hudec. Scientists – R. Gális[1], C. Polášek[1], M. Skulinová, V. Šimon. PhD students – M. Bašta[3], J. Štrobl, M. Topinka[4], I. Sujová. Technician – M. Nekola, Assistants – V. Hudcová, L. Hudec[7], F. Münz[2], M. Kocka[6], A. Kutka[5], P. Sobotka.

[1] part time, [2]till September 2007, [3]till December 2007, [4]till March 2008, [5]till June 2008, [6]since January 2008, [7]since December 2008

Fig. 15. High Energy Astrophysics Group (2009). From left to riht: M. Nekola, M. Blažek, C. Polášek, J. Štrobl, R. Hudec, V. Hudcová, V. Šimon, P. Sobotka. Missing: M. Skulinová, M. Kocka, I. Sujová.

The group concentrates on multispectral analyses, evolution and emission mechanisms of celestial X-ray and gamma-ray sources (extragalactic - gamma-ray bursts (GRBs), blazars; galactic X-ray binaries and other types of X-ray sources). It participates in satellite projects. Recently, its activity has been focused on the ESA INTEGRAL satellite, namely experiment OMC (Optical Monitoring Camera) and the INTEGRAL Scientific and Data Centre, ISDC. The INTEGRAL satellite continues its smooth operation in space, and the group is involved in related scientific analyses. Since 2007, we are participating in the ESA Gaia project by managing 2 allocated sub-work packages on cataclysmic variables and high-energy sources and participating in the work package on supplementary ground-based observations within Gaia CU7 unit and applications of ultra-low dispersion spectra delivered by Gaia RP/BP photometers in astrophysics.

We investigate the properties of optical afterglows (OAs) of GRBs and their time evolution, including the supernova-GRB relation and the resolution between the synchrotron component and the contribution of the supernova.

Analyses of the long-term X-ray activity of galactic sources are focused on the investigation of transient events like outbursts and high/low state transitions in the systems with the mass-accreting compact object (e.g. neutron star), like the remarkable and unique Rapid Burster (MXB 1730-335), Aql X-1, 4U 1608-52, and ultra-compact systems (e.g. 4U 1820-30). Among others, these analyses make use of the *ASM* data from the *RXTE* satellite. The long-term processes operating in the accretion disc of these systems are the main purpose of these studies.

The group also provides ground-based data and analyses for various satellite projects. The ground-based segment includes several robotic CCD-based detecting systems/telescopes

(D50cm, D25cm/BART, and three D30cm telescopes (BOOTES, fully robotic, in collaboration with Spain) with RTS2 control software (P. Kubánek). They provide rapid observations of optical counterparts of GRBs and monitoring of other objects of high-energy astrophysics. D50 has successfully detected OAs of GRBs down to a magnitude 20. The BOOTES collaboration resulted in scientific publications including a collaborative Nature paper in 2008. The GRB analyses are supported by investigations of GRBs by SID ionospheric monitors and optical all-sky monitors (in collaboration).

We also participate in efforts to scientifically use the valuable information recorded on archival astronomical plates (project UDAPAC). Selected known extragalactic (blazars) and galactic (cataclysmic variables and other high-energy sources) sources have been researched on the unique plates partly within a collaborative project DAAD/AV ČR. More recently, we evaluate methods for automated analyses of low dispersion spectral images recorded on plates related to ESA Gaia with emphasis on studies of spectral type variability.

Studies of astronomical X-ray optics (e.g. related to the ESA/NASA/JAXA IXO project and/or to the NASA Generation X mission) and the design and development of novel wide-field optics of the Lobster-Eye type for astrophysical applications are also being continued, supported by several grants. We organized an international workshop AXRO (Astronomical X-Ray Optics) in Prague in 2008.

3. Department of Interplanetary Matter

Head scientist – P. Spurný. Deputy – P. Pravec.

Secretary: H. Ceplechová, Phone: (+420) 323 620 160, E-mail: hanamph@asu.cas.cz

The Department of Interplanetary Matter studies minor bodies of the Solar System, in particular meteoroids and asteroids. Attention is devoted to the study of the interactions of interplanetary bodies of different sizes with the Earth's atmosphere. Photometric studies of Near-Earth Asteroids are also performed. The Department consists of two working groups.

Figure 16: Department of Interplanetary Matter (2009). From left to right: P. Spurný, J. Starý, R. Brilová, P. Kušnirák, P. Koten, K. Hornoch, L. Smolíková, P. Pravec, J. Keclíková, H. Ceplechová, D. Čapek, Z. Ceplecha, J. Borovička, P. Pecina, P. Scheirich, J. Boček. Missing: L. Shrbený, R. Štork, R. Šula, A. Galád, M. Velen.

3.1 Meteor Physics

Head scientist – J. Borovička. Scientists – Z. Ceplecha[1,2], D. Čapek, P. Koten, P. Pecina, P. Spurný, R. Štork. PhD student – L. Shrbený. Assistants – J. Boček, R. Brilová[1], H. Ceplechová, J. Keclíková, L. Smolíková, J. Starý, R. Šula.

[1] part time; [2] emeritus of AS CR

The group observes meteors in the optical region and performs theoretical interpretations of the observations. The basic observational system is the European Fireball Network (EN) established in former Czechoslovakia in 1963 and now consisting of 10 stations in Czech Republic, where the center of the EN is located, and 14 stations in Germany, 2 in Slovakia and 1 each in Austria, the Netherlands, France and Switzerland. All Czech stations have been equipped with new Autonomous Fireball Observatories (AFO). The efficiency of observations, complexity and quality of recorded data significantly increased after this modernization of the Czech part of EN was finished in 2007. Fireballs brighter than magnitude –4 are observed, including very detailed light curves provided by photoelectric sensors of the AFOs. Additional data on fireballs are obtained from long-focus horizontal cameras placed at Ondřejov Observatory. Also, fireball spectra are simultaneously photographed at the Ondřejov Observatory. Sensitive television cameras are used to observe faint meteors and their spectra during meteor shower activity.

The observational data are used to study physical processes during the penetration of meteoroids into planetary atmospheres, including ablation, deceleration, radiation, and meteoroid fragmentation. The physical properties and chemical composition of different types of meteoroids, their origin and distribution in the solar system and their relation to comets, asteroids and meteorites are being determined. The members of the group have developed a variety of methods for these purposes. Occasionally, we also interpret data on important events which occurred outside the scope of our observations. These events included the formation of the Carancas impact crater in Peru on September 15, 2007 and the atmospheric entry of asteroid 2008 TC_3 over Sudan on October 7, 2008.

In the last four years we substantially participated in a new ambitious project of a new fireball network in Australia. At the end of 2005, the core of the new Desert Fireball Network started its operation in the Nullarbor Plain of Western Australia, a very suitable place for meteorite recoveries. Three new stations were built in December 2005 and equipped with AFOs modified for work in the harsh desert conditions. The fourth station was set up in November 2007. About 50 precise fireball orbits were obtained, including 5 probable meteorite falls. The most promising case belonged to the so called “superbolide” category and was recorded by all three stations on 7th October 2007. Unfortunately no meteorites could be recovered because it terminated far over the Southern Ocean. Nevertheless we were successful in this respect in October 2008, when we found in many ways a unique meteorite Bunburra Rockhole .

3.2 Asteroids

Head scientist – P. Pravec. Scientists – P. Scheirich, A. Galád[1]. Assistants – P. Kušnirák, K. Hornoch, M. Velen[1].

[1] part time

The main topic of the group is physical studies of asteroids. The focus is on studies of binary systems and paired asteroids and asteroids in excited (non-principal axis) rotation states. An important aspect of the studies is that a part of the asteroid population represents an impact hazard for the earth. We study properties of these, so called Near-Earth Asteroids (NEAs), as well as of NEA source regions. Precise astrometry is an additional task that allows determination of the orbits of NEOs. There is a number of observatories across the world which collaborate with us on the project, see references available on http://www.asu.cas.cz/~ppravec/

The main observational instrument is the 0.65-m telescope located at Ondřejov equipped with a CCD camera. The collaboration with observatories across the world provides us with data from a number of their instruments that allow us to get a much more thorough understanding of the studied objects.

4. Galaxies and Planetary Systems

Head scientist – J. Palouš. Deputy – C. Ron.

Secretary: Z. Dienstbierová, Phone: (+420) 267 103 038, E-mail: zuzana@ig.cas.cz

The department of Galaxies and Planetary Systems (GPS) studies the evolution of galaxies in groups and clusters, and the formation of stars and starclusters. Radio, infrared, optical, and X-ray observations are compared with analytical models and computer simulations of gravitational and MHD processes. The kinematics and physical properties in central parts of active galaxies are explored and compared with models. Relativistic effects in active galactic nuclei and galactic black hole candidates are analyzed in X-rays observed by satellites. Earth's rotation and its gravity field and the gravity field of other bodies of the solar system are studied. The dynamics of asteroids, Earth satellites and Trans Neptunian Objects (TNO) are examined, and an astrometric star catalogue is compiled.

Several scientists from the department are also dealing with the history of astronomy. The topics include the role of astronomy in culture, Mesoamerican archeoastronomy, and the study of Jesuit and other astronomical heritage. Members of the department are involved in the care of the Astronomical clock of Prague and historical sundials as well as in editions, translations and interpretation of medieval and early modern astronomical texts.

Fig. 17. Department of Galaxies and Planetary Systems (2009). Back row from left to right: J. Palouš, V. Štefka, C. Ron, T. Pecháček, J. Vondrák, J. Horák, M. Bursa, P. Jáchym, Z. Dienstbierová, J. Svoboda, R. Wünsch, R. Goosmann, V. Sidorin, Z. Šíma, R. Peřestý, M. Šidlichovský, Ch. Gruber, J. Klokočník, L. Pospíšilová, B. Picková, J. Dale, L. Perek. Front row from left to right: P. Suchan, I. Stoklasová, M. Dovčiak, P. Hadrava.

4.1 Astrophysics of Galaxies

Head scientist – J. Palouš. Scientists – J. Dale, S. Ehlerová, P. Jáchym, B. Jungwiert, L. Perek[1], A. Růžička, I. Stoklasová, R. Wünsch. PhD students – I. Ebrová, M. Křížek, V. Sidorin.

[1] part time

Young stars eject energy, mass and metals into the interstellar medium. Star formation drives supersonic turbulence and triggers subsequent star formation at other places. Structures - shells, supershells, filaments and sheets - are formed by the mass and energy feedback of young stars. A cataloque of shells and supershells in the second and third galactic quadrants of the Milky Way was produced by an automatic routine for searching in 3D data cubes. The structures discovered are identified in galactic surveys in other wave-bands. The gravitational fragmentation of expanding shells is studied using the SPH and AMR techniques, which are found to agree very well. Fragmentation is discovered to be strongly influenced by the environment in which the shell expands, with a low-pressure environment leading to supression of low-mass fragments and potentially a top-heavy stellar or cluster mass function.

Hydrodynamical processes occuring during the formation of super star clusters (SSC) are studied with analytical and numerical models and compared to optical and X-ray observations of SSCs. We make numerical models of winds driven by SSCs taking into account radiative cooling. The importance of the cooling for the wind dynamics depends on the properties of the central clusters: the wind of low stellar density clusters behaves almost adiabatically and can be described by the well known semi-analytical solution. As the stellar cluster density grows the cooling of the wind starts to be important and the wind enters the so-called radiative regime in which the wind temperature quickly drops at a certain distance from the

cluster. In the case of the densest clusters, a thermal instability occurs inside the cluster and no stationary wind solution exists. We follow the evolution of the clusters in such a super-critical regime using the hydrodynamic code ZEUS for which the cooling routine was modified to make it suitable for the modelling of extremely rapidly cooling regions. We found that the wind evolves in a bimodal regime in which the densest inner region undergoes strong radiative cooling which results in the accumulation of matter there, while the outer region still sustains a quasi-stationary wind. 2D simulations show that cold dense clumps are formed in the inner cluster region, which may support the secondary star formation. However, a fraction of the clumps formed is accelerated by the surrounding hot wind and ejected from the cluster.

The evolution of galaxies in groups and clusters is analyzed with restricted N-body codes using genetic algorithms. A model of the evolution of the galaxy group including the Milky Way, LMC and SMC was proposed. The high-speed motion of galaxies in the hot and diluted medium in galaxy clusters creates a ram pressure on the interstellar medium, which is stripped away from parent galaxies. The code GADGET using the SPH approach with a gravity tree is used to describe how the ISM gas is removed from spirals, quenching the star formation in galactic discs while triggering it in the tidal arms and at the leading edge of gaseous discs. The above projects are performed in collaboration with the University of Cardiff, UK; Instituto Nacional de Astrofísica Optica y Electronica in Mexico; Observatoire de Paris, France; and Institut fuer Astronomie der Universitaet Wien, Austria.

We have mapped narrow-line regions (NLRs) of 11 nearby Seyfert 2 galaxies with the optical integral-field spectrograph OASIS mounted at the Canada-France-Hawaii Telescope. We have modelled emission-line profiles of 5 forbidden-line doublets and 2 Balmer lines, correcting for the underlying stellar absorption by reconstructing stellar spectra with synthetic evolutionary stellar population models. For each of the 11 targets, we present 2D maps of surface brightness in the observed emission lines, diagnostic line intensity ratios, gas kinematics (mean line-of-sight velocity and velocity dispersion), electron density, and interstellar reddening, and we plot spatially resolved spectral-diagnostic diagrams. The stellar data are represented by maps of mean line-of-sight (LOS) velocities and of the relative mass fractions of the young stellar populations. The gas velocity fields in 80% of the sample exhibit twisted S-shaped isovelocity contours, which are signatures of non-circular orbits and indicate non-axisymmetric gravitational potentials, gas motions out of the galactic plane, or possible outflows and inflows. Based on the kinematic measurements, we identified a possible nuclear ring or radial gas flow in NGC 262 (Mrk 348), not reported before. Eight of the eleven observed objects exhibit strongly asymmetric or multi-component emission-line profiles, in most cases confined to an elongated region passing through the galactic centre, perpendicular to the major axis of emission. This project was carried out in collaboration with CRAL-Lyon Observatory, France, and Calar Alto Observatory, Spain.

We have presented results from a pilot HST/ACS (Hubble Space Telescope/Advanced Camera for Surveys) deep imaging study in broadband V filter of five low-redshift QSO host galaxies classified in the literature as ellipticals. The aim of our study is to determine whether these early-type hosts formed at high redshift and have since evolved passively, or whether they have undergone relatively recent mergers that may be related to the triggering of nuclear activity. We perform two-dimensional modelling of the light distributions to analyze the host galaxies' morphology. We find that, while each host galaxy is reasonably well fitted by a de Vaucouleurs profile, the majority of them (4/5) reveal significant fine structure such as shells and tidal tails. These structures contribute between ~5% and 10% to the total V-band luminosity of each host galaxy within a region of r~ 3reff and are indicative of merger events that occurred between a few hundred Myr and a Gyr ago. These timescales are comparable to

starburst ages in the QSO hosts previously inferred from Keck spectroscopy. Our results thus support a consistent scenario in which most of the QSO host galaxies suffered mergers with accompanying starbursts that also likely triggered the QSO activity in some way, but we are also left with considerable uncertainty regarding physical mechanisms that might have delayed this triggering for several hundred Myr after the merger. We studied in more detail, using HST/ACS images, Keck spectroscopy and restricted N-body simulations, one of the targets, MC2 1635+119, a QSO hosted by a galaxy previously classified as an undisturbed elliptical galaxy. Our new images reveal dramatic shell structure indicative of a merger event in the relatively recent past. The brightest shells in the central regions of the host are distributed alternately in radius, with at least two distinct shells on one side of the nucleus and three on the other, out to a distance of ~13 kpc. The light within the five shells comprises ~6% of the total galaxy light. Lower surface brightness ripples or tails and other debris extend out to a distance of ~65 kpc. Our N-body model for a merger reproduces the inner shell structure and gives an estimate for the age of the merger of between ~30 Myr and ~1.7 Gyr, depending on a range of reasonable assumptions. While the inner shell structure is suggestive of a minor merger, the total light contribution from the shells and extended structures is more indicative of a major merger. The spectrum of the host galaxy is dominated by a population of intermediate age (~1.4 Gyr), indicating a strong starburst episode that may have occurred at the time of the merger event. We speculate that the current QSO activity may have been triggered in the recent past by either a minor merger, or by debris from an older (~Gyr) major merger that is currently "raining" back into the central regions of the merger remnant. This project was carried out in collaboration with University of California-Riverside, Space Telescope Science Institute, California Institute of Technology, Carnegie Observatories and University of Hawaii.

Management of Outer Space

Scientist L. Perek

A comparative table of space networks and active satellites in the geostationary orbit has been set up. Radio stations[1] of the networks have been restricted to category N, i.e. to networks which passed successfully through a coordinating process. These networks enjoy international recognition and protection. The total number of N networks is about 800, with additional 80 in the Broadcasting Satellite Service. Active satellites have been taken from various sources, in particular from the Encyclopedia of Satellites and Probes[2] of the Library of the Czech Academy of Sciences and from the publication Classification of Geosynchronous Objects[3]. There are between 370 and 380 active satellites. A comparison at nominal orbital positions has shown that in about 20 % of cases there is no active satellite at the relevant orbital position. A transmission from these radio stations is thus not possible. In some other cases, where one or more radio stations from different countries are located at the same orbital position and satellites from only one country, any transmission is possible only if a contract between the participants exists. Since this need not be the case in all positions concerned, the total number of radio stations which are unable to transmit may be higher than 20 %. Consequently, the overcrowding of the geostationary orbit may be less severe than the number of radio stations indicates.

Results have been presented at the International Astronautical Congress in Glasgow in October 2008 and at a Conference at the European Space Policy Institute in Vienna in November 2008.

[1] ITU Space Network List, Sections A1, A 10, A 11. See at www.itu.int/ITU-R/space/snl.
[2] Encyclopedia of Satellites and Probes of the Library of the Czech Academy od Science, autor A. Vitek. See at http://www.lib.cas.cz/space.40/.
[3] Edition 11 by R,. Choc and R. Jehn, European Space Operations Centre, Darmstadt.

4.2 Relativistic Astrophysics

Head scientist – V. Karas. Scientists – M. Bursa, M. Dovčiak, R. Goosmann, P. Hadrava, J. Horák, T. Pecháček, L. Šubr[1]. PhD students – J. Svoboda, O. Kopáček.

[1] External collaborator

Members of the Working Group of Relativistic Astrophysics deal with theoretical aspects of strong gravitational fields in cosmic bodies, including the data modelling and interpretation. Additional research funding has been attracted from national granting agencies and through the European Space Agency Plan for European Cooperating States. The group is part of the Centre for Theoretical Astrophysics and is involved in teaching and supervising students at undergraduate and graduate levels. Research and teaching are carried out in fruitful collaboration with collaborators at Charles University in Prague, Silesian University in Opava, and at various institutions abroad.

Research topics and scientific results of the group members include the following:

X-ray spectroscopy of active galaxies: The X-ray reflection features of irradiated accretion discs around black holes enable us to probe the effects of strong gravity and determinate the black-hole properties. We investigate the reflection signs, i.e. the iron K-line and the Comptonized hump, which arise by reprocessing of radiation on the surface of an accretion disc, and how they are affected by the spin of a rotating black hole. We develop models for the polarization signature of the radiation coming from the vicinity of accreting black holes. In the optical/UV range, polarimetry observations and modelling have already proven to be a very useful tool to investigate active galaxies by tracing geometrical and dynamical properties of structures surrounding their nuclei. Recently we have concentrated our attention on the study of variations in the primary and reprocessed radiation from an orbiting spot around a black hole.

High-frequency quasi-periodic oscillations: Accreting black holes in binary systems often exhibit quasi-periodic oscillations of the observed X-rays. Sometime the frequency of these oscillations is very high (kilohertz) and they occur at two distinct peaks. QPO properties differ between sources. However, it appears that they keep a fixed frequency ratio of small rational numbers. The origin of this phenomenon is currently unknown. We have focused on the resonance scenario of accretion disc oscillations.

Stochastical variability in accretion discs: The short-term variability of active galactic nuclei is often being linked with a presence of hot spots residing on the surface of an accretion disc. We apply the theory of random point processes to model the observed signal from an ensemble of randomly generated spots and to reproduce typical features that are found by Fourier-analysing X-ray lightcurves from galactic centers.

Magnetic fields around black holes: Do extremely rotating black holes power relativistic jets? A compelling answer may be beyond our reach for some time. To be sure, magnetic fields play an important role in astrophysics. Near rotating compact objects, neutron stars and black holes, the field lines are wildly deformed by rapidly moving plasma and strong gravitational fields. Recently we have studied the frame-dragging effects as the origin of magnetic reconnection which could take place in close vicinity of a rotating black hole. We have also

examined the properties of the lobes of stable motion which can be formed by off-equatorial orbits of electrically charged particles in strong gravitational fields near magnetized compact objects.

Interaction of stars with their environment: Dense star clusters surround nuclei of galaxies, including the centre of our own Milky Way. Studying the rapid motion of stars within the central arcsecond and their interactions with the surrounding environment provides essential tools to determine the mass of the central supermassive black hole in the Galaxy. We have studied the model of orbital resonances to address the issue of origin of stars close to the Galactic Centre supermassive black hole. We have also collaborated on the model of bright spots and spiral waves to explain the Galactic Centre flares that have been reported in various wavelengths from X-rays to near infrared and sub-millimeter domains.

4.3 Planetary Systems

Head scientist – C. Ron. Scientists – A. Bezděk, M. Burša[1], Ch. Gruber, J. Klokočník, L. Sehnal[1], M. Šidlichovský, Z. Šíma, J. Vondrák[1]. PhD students – J. Sebera[1], V. Štefka. Assistants – M. Páleník[1], B. Picková[1], L. Pospíšilová[1].

[1] part time; [2] emeritus of AS CR

The Zeiss Photographic Zenith Tube (PZT) used at the Ondřejov Observatory to monitor changes of the Earth's orientation in space since 1973 has been renovated radically in 2005–2006. The photographic plate has been replaced by a CCD chip and all the system can be now controlled remotely through the internet. The PZT is used mostly for monitoring of non-polar and non-tidal deflection of the local vertical and also for determining the positions and proper motions of stars.

We worked on the problem of creating a new, more precise astrometric star catalogue with improved proper motions and quasi-periodic terms reflecting orbital motions of stars in multiple systems by combining space mission results (Hipparcos and Tycho Catalogues) with ground-based optical observations of latitude/universal time variations.

The group, in close cooperation with a group of geodesists from the Czech Technical University, established a Combination Research Centers (CRC) of the International Earth Rotation and Reference Systems Service (IERS). The CRC has been working under the umbrella of the Center for Earth Dynamics Research (established in 2000 as a project of the Ministry of Education, Youth and Sports). We calculate combinations of Earth Orientation Parameters from VLBI and GPS observations, namely of universal time with length-of-day changes and celestial pole offsets with their temporal rates. We use these combinations to test precession-nutation models. In recent years, the activity has been concentrated on geophysical excitation of nutation. Namely the atmospheric and oceanic excitation of free core nutation was studied.

Effects of chaotic dynamics and resonances on the structure of asteroid and Kuiper belts in our planetary system are also studied. We are interested in stability and resonances in multiple exoplanetary systems. The applicability of averaging principle to the secular evolution of systems with two non-resonant exoplanets is studied by comparison of semi-analytical results with numerical integration.

The satellite altimetry data, namely single and dual satellite crossover altimetry for the Earth's gravity field determination and accuracy assessement has been studied and applied. A new method for the Earth's gravity field models accuracy assessement, based on the single

satellite cross-over residuals and latitude-lumped coefficients has been developed and applied for various gravity models.

The satellite altimetry data are also used for monitoring the temporal variation in the geopotential W0 and time variability of the Earth's inertia ellipsoid.

The satellite gradiometry mission GOCE (Gravity and Ocean Circular Experiment) has been launched in March 2009 and is equipped with a gradiometer to directly measure the second derivatives of the geopotential. Our group participated in planning of its orbit (fine orbit tuning) and data processing for gravity field determination and testing. We have grant ESA PECS C 98056 (2007-2011) for this purpose.

We study relationship between density of ground tracks and accuracy of gravity field parameters (namely of monthly solutions for variations of gravity) and we applied the results for the missions GRACE and GOCE and we are extending this study for planetary orbiters.
We were invited to cooperate in a frame of a special study group of IAG on the evaluation of the new gravitational model EGM 08 (which has been issued by US NIMA). Our testing concerns comparison with detailed terrestrial data and verification of known impact craters on the Earth; the accuracy and resolution of EGM 08 is a few miligals on majority of locations on the Earth and about 9 km at the equator. So we are able to confirm the well known (geologically proved) impact structures on the Earth with diameter higher than about 30 km. At this opportunity we identified several new candidates for the impact craters.

We also study the motion of artificial satellites under the influence of non-gravitational forces, like the drag of the atmosphere or the radiative forces with respect to our own models of the thermosphere and of the terrestrial albedo distribution.

X Supervising PhD and Masters Theses

On the basis of an agreement with the Faculty of Mathematics and Physics of Charles University, Prague, the Astronomical Institute participates in the undergraduate study programs of Astronomy and Astrophysics and on Plasma Physics. The Institute, along with the Faculty, is also responsible for PhD-study program on Theoretical Physics, Astronomy and Astrophysics. Students of some other universities (including Masaryk University, Brno) are also supervised by researchers from the Astronomical Institute.

Supervising PhD Theses

P. Heinzel: supervisor of PhD Theses of J. Štěpán (Cotutelle Université de Paris) and S. Gunár (Charles University).
B. Jungwiert: supervisor of PhD theses of I. Stoklasová, I. Ebrová, I. Křížek (all Charles University) and T. Krátká (Masaryk University).
V. Karas: supervisor of PhD Theses of T. Pecháček (Charles University).
P. Pravec: supervisor of PhD Thesis of P. Scheirich (Charles University).
M. Sobotka: supervisor of PhD Theses of M. Švanda (Charles University).

Supervising Masters Theses

B. Jungwiert: supervisor of Master Theses of M. Křížek and I. Ebrová (Charles University).
V. Karas: supervisor of Master Theses of O. Kopáček (Charles University).
P. Kotrč: supervisor of Master Theses of A. Avdibegovič (Charles University)

XI Participation in Editorial Boards

V. Bumba: Honorary member of the Editorial Board of Solar Physics.
M. Burša: Member of Editorial Board of Earth, Moon, and Planets.
P. Heinzel: Member of the Editorial Board of Solar Physics
M. Karlický: Member of the Editorial Board of Solar Physics
J. Kleczek: Honorary member of the Editorial Board of Solar Physics.
P. Kotrč: Member of the Editorial Board of the Central European Astrophysical Bulletin.
P. Koubský: Member of the Editorial Board of the Central European Astrophysical Bulletin.
L. Perek: Member of Editorial Board of Space Policy
J. Vondrák: Member of Editorial Board of Serbian Astronomical Journal.

XII Involvement in International Scientific Organizations

European Southern Observatory (ESO)

Examples of approved observation programs for 2008 in which scientists of our institute took part.

Project name	**Telescope**	**Scientist**
Measuring the proper motions of high proper motion white dwarfs	NTT/EFOSC2	A. Kafka, CoI: S. Vennes:
Massive magnetic stars: challenging the slow-rotation paradigm	VLT-Keuyken/UVES	S. Štefl

European Space Agency (ESA)

The list of the PECS projects at the Astronomical Institute, till the end of 2008:

Project name	**PI**	**Period**
Czech participation on GAIA project	P. Koubský	2007–2011
Czech participation on INTEGRAL	R. Hudec	2005–2009
SOHO Observations and Data Analysis	P. Heinzel	2005–2009
GOCE – specific tasks on fine gravity field structure of the Earth	J. Klokočník	2007–2010
X-ray Observation XMM: Active galactic nuclei and black holes	V. Karas	2007–2009
BepiColombo: Kinetic processes in the solar wind, Mercury's magnetosheath and magnetosphere	P. Trávníček	2008-2012

Institute's scientists are also members of teams involved in ESA projects. Petr Heinzel is a member of the scientific team, as an associated scientist, of SUMER (*Solar Ultraviolet*

Measurements of Emitted Radiation) experiment of SOHO (*Solar & Heliospheric Observatory*) satellite. Petr Hellinger is a member of *Cross-scale Science Study Team* within the *Cosmic Vision ESA program*. Rudolf Gális is a member of the ISDC (*Integral Science Data Center*) team working with the INTEGRAL satellite. René Hudec is a member of the OMC (*Optical Monitoring Camera*) experiment as well as a member of ISDC consortium of the INTEGRAL satellite. Pavel Koubský and René Hudec are leaders of workpackages within section CU7 of future ESA Gaia satellite. Pavel Trávníček is a co-investigator in the PEACE and WHISPER experiments of Cluster II satellite, Co-I in the PEACE experiment, the satellite Double Star, Principal Investigator in DualSegmented Langmuir Probe (DSLP) experiment of the Proba 2 satellite, member of scientific teams of MPPE and SERENA-PICAM experiments on the BepiColombo probe. He is also leading Co-I in the Radio Plasma Waves (RPW) consortium of the Solar Orbiter mission. Jana Kašparová is the Co-I in the STIX consortium on Slolar Orbiter (X-ray imager).

The following scientists employed at the Astronomical Institute are members of the **International Astronomical Union** (IAU, standing at the end of 2008):

P. Ambrož, M. Bárta, J. Borovička, V. Bumba, M. Burša, Z. Ceplecha, M. Dovčiak, S. Ehlerová, F. Fárník, A. Galád, P. Hadrava, P. Harmanec, P. Heinzel, R. Hudec, B. Jungwiert, V. Karas, M. Karlický, J. Kašparová, J. Kleczek, J. Klokočník, M. Klvaňa, D. Korčáková, P. Koten, P. Kotrč, P. Koubský, M. Kraus, J. Kubát, D. Nickeler, J. Palouš, P. Pecina, L. Perek, P. Pravec, C. Ron, P. Schwartz, L. Sehnal, M. Sobotka, P. Spurný, M. Šidlichovský, Z. Šíma, V. Šimon, P. Škoda, S. Štefl, M. Vandas, J. Vondrák, and R. Wünsch.

The official representative of the Czech Republic to the IAU is the **Czech National Committee for Astronomy** (CNCA). The following scientists from the Astronomical Institute were members of the CNCA in 2007 and 2008:

S. Ehlerová, J. Borovička, P. Harmanec, P. Heinzel, B. Jungwiert, J. Palouš (chairman), C. Ron (secretary), J. Vondrák.

The following IAU members are currently active in the committees of the **IAU bodies** (standing at the end of 2008):

J. Vondrák: President of Division I (Fundamental Astronomy)
P. Spurný: President of Commission 22 (Meteors, Meteorites and Interplanetary Dust)
C. Ron: Member of Finance Sub-Committee
J. Vondrák: member of the organizing committees of Commission 4 (Ephemerides) and Commission 19 (Rotation of the Earth)
P. Heinzel: member of the organizing committee of Commission 12 (Solar Radiation and Structure)
P. Pravec: member of the organizing committee of Commission 20 (Positions and Motions of Minor Planets, Comets and Satellites)
J. Borovička: member of the organizing committee and secretary of Commission 22 (Meteors, Meteorites and Interplanetary Dust)
M. Vandas: member of the organizing committee of Commission 49 (Interplanetary Plasma and Heliosphere).

Involvement of scientists from the Astronomical Institute in other important international organizations: Committee on Space Research (COSPAR), European Astronomical Society (EAS), American Astronomical Society (AAS), Royal Astronomical Society (RAS), European Geophysical Union (EGU), American Geophysical Union (AGU), International Association of Geodesy (IAG) and the International Union of Geodesy and Geophysics (IUGG), Joint Organization for Solar Observations (JOSO), Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) etc. The involvement in these and other organizations is given in the following list of activities of individuals.

P. Ambrož: Chairman of the National Commission of SCOSTEP.
J. Borovička: Member of EAS.
V. Bumba: Member of EAS.
F. Fárník: Vice-Chairman of the Czech National Board for Space Activities, Member of the Czech Space Office.
P. Hadrava: Member of EAS.
P. Heinzel: Member of EAS.
R. Hudec: Member of AAAS and SPIE.
K. Jiřička: Member of the Committee on Radio Astronomy Frequencies (CRAF) of the European Science Foundation (ESF). Member of the International Union of Radio Science (URSI), commission J (Radio Astronomy).
B. Jungwiert: Member of AAS and EAS.
V. Karas: Member of RAS.
M. Karlický: Member of the Executive committee of WISER (World Institute for Space Environment Research, University of Adelaide). Co-leader of WISER Research Working Group.
J. Klokočník: Member of COSPAR, IAG/IUGG, EGU, AGU.
P. Kotrč: Member of the Board of the JOSO and JOSO National Representative.
F. Münz: Member of EAS.
J. Palouš: Member of EAS and Royal Society of Edinburgh.
L. Perek: Associate Member of the Royal Astronomical Society since 1970. Member of the Deutsche Akademie der Naturforscher Leopoldina since 1975. Member of the International Institute of Space Law since 1977, member of its Board of Directors 1996-2006. Member of the International Academy of Astronautics since 1977, Advisor to its President 2002-2006. Honorary Member of the Academie Nationale de l'Air et de l'Espace, Toulouse, since 1994. Member of EAS.
P. Pravec: Member of the Division of Planetary Sciences of the AAS. Member of the Spaceguard Foundation.
L. Sehnal: Since 1998 full member of the International Academy of Astronautics. Member of COSPAR Scientific Commissions and COSPAR Finance Committee. Member of IAF and AGU. Member of the Special Study Group of the IAG No. 2.130.
M. Sobotka: Vice-president of JOSO since 2002. National representative in the European Association for Solar Telescopes (EAST) since 2006.
Z. Šíma: Since 1995 member of the International Geoid Service, Special Working Group of the GSFC/DMA. Since 1995 member of Special Commission SC3 – Fundamental Astrogeodetic Constants of the IAG/IUGG; Inter-Commission Committee on Planetary Geodesy of IAG/IUGG. Member of Scientific Instrument Society.
S. Šimberová: Representative of the Czech and Slovak Republic of TC13 Pattern Recognition in Astronomy and Astrophysics of the International Association for Pattern Recognition (IAPR).

P Škoda: Manager of section Databases and Data-mining of ENEAS (European Network of Excellence in AsteroSeismology).
M. Vandas: Since 2000 IAU representative to COSPAR Scientific Committee D. Since 2002 member of the National Committee of SCOSTEP.
J. Vondrák:. Since 2005 Czech National Representative to ICSU (International Council for Science).

XIII Research Fellows

Pavel Ambrož (*1941, pambroz@asu.cas.cz, Solar Physics, emeritus)

Research fields: Large-scale and global properties of solar magnetic and velocity fields, structure of kinetic energy distribution, solar differential rotation and meridional circulation. Dynamic properties of the solar convection zone and of the solar atmosphere. Structure of the solar corona, models of the coronal magnetic field and their temporal variations. Stationary and dynamic models of the solar corona and coronal radiation related to the observed brightness distribution. 1958-1963 study of physics, graduated from the Natural Sciences Faculty of J. E. Purkyně University, Brno. Since 1964 in the Astronomical Institute. 1972 PhD in astrophysics.1981 graduated in astronomy and astrophysics from the Faculty of Mathematics and Physics of Charles University, Prague. 1977-1990 Deputy Head and Head of the Solar Department. Since 1985 external lecturer on Solar Physics at the Faculty of Mathematics and Physics of Charles University, Prague.

Eva Arazimová (*1984, arazimova@sunstel.asu.cas.cz, Stellar Physics, PhD student)

Research fields: Local sample of white dwarfs, their atmospheric properties and distribution within our Galaxy. In 2008 graduated in Astronomy and Astrophysics from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2008 PhD student at Charles University, PhD thesis “White dwarfs in the Solar Neighbourhood”. Supervisor: A. Kawka

Miroslav Bárta (*1973, barta@asu.cas.cz, Solar Physics)

Research fields: Physics of Solar Flares and Prominences (solar-flare reconnection, current-sheet dynamics, turbulent cascade in magnetic reconnection, MHS eqilibria in prominences), Computational Astrophysics (2D/3D MHD simulations, multi-scale/AMR numerical modelling of space-plasma processes), Solar Radiophysics (plasma waves, wave dynamics, plasma micro-instabilities, radio emission theory, interpretation of radio bursts), High-Performance Computing (computer clusters, MPI, CUDA, parallel algorithms and their application to MHD numerical modelling). 1996 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. 2003 PhD in Astrophysics at Charles University.

Milan Bašta (*1980, milanchik@seznam.cz, Stellar Physics, PhD student)

Research fields: Blazars, active galactic nuclei – data gathering (plate stacks, photographical data), data analysis (Fourier, wavelet) and statistics and blazar models

(possible binary black hole nature of blazars). Member of the secondary INTEGRAL Science Data Centre. 2003 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2003 PhD student at Charles University. Supervisor: R. Hudec

Aleš Bezděk (*1970, bezdek@asu.cas.cz, Galaxies and Planetary Systems)

Research Fields: Celestial mechanics, orbital dynamics of low earth artificial satellites, atmospheric drag, orbital resonances, models of thermospheric density, use of satellite microaccelerometric data. 1997 graduated from the Faculty of Mathematics and Physics of Charles University in Prague. 2004 PhD in Astronomy, Charles University in Prague.

Jiří Borovička (*1964, borovic@asu.cas.cz, Interplanetary Matter)

Research fields: Physics of meteor flight in the atmosphere, meteor spectroscopy, chemical composition, structure and origin of meteoroids, radiation of meteor trains, reduction methods for determination of meteor trajectories and light curves. 1987 graduated in Astronomy from Charles University, Prague. Since 1988 at the Astronomical Institute, 1993 PhD in Astronomy. 2000–2004 Head of the Interplanetary Matter Department, since 2004 Deputy Director of the Astronomical Institute, since 2007 chairman of the Council of the Astronomical Institute. 1998–2001 chairman of the Czech Astronomical Society. 1997 Junior Award from the Learned Society of the Czech Republic, 2002 Otto Wichterle Premium from the Academy of Sciences.

Václav Bumba (*1925, bumba@asu.cas.cz, Solar Physics, emeritus)

Research Fields: Solar magnetic and velocity fields global, as well as local, dynamics of their changes in relation to various solar global and local activity phenomena and their geoactivity. Author or co-author of more than 380 scientific papers, co-author of the Atlas of Solar Magnetic Fields, Carnegie Institute of Washington, Publ. No 626, Washington 1967. Prizes of the Czechoslovak Academy of Sciences (1953, 1967), Czechoslovak State Prize (1961). Medals of various scientific institutions home and abroad. 1949 graduated from Charles University, Prague, 1950 RNDr. degree from Charles University. 1955–1958 PhD study at Crimean Astrophysical Observatory, 1960 PhD from State Univ. Moscow, 1964 Mt. Wilson and Palomar Observatories (UNESCO and Carnegie Institute Scholarships), Pasadena, 1967 DrSc. degree from State Univ. Moscow, 1975 Corresponding member ČSAV. Since 1948 at the Astronomical Institute (State Observatory), 1970–1987 Deputy Chief and head of the Solar Department, 1968–1975 Deputy Director, 1975–1990 Director of the Institute. Chairman and Vice-chairman of the Scientific board of the Czechoslovak Acad. od Sci. for astronomy, geophysics, geodesy and meteorology (1976 - 1990), Scientific secretary (1972 - 1980) and Vice-president (1980 - 1983) of the Czechoslovak Commission Interkosmos, delegate of the Czechoslovak Republic to the UN Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Subcommittee (1972 - 1979), Chairman of the Cechoslovak National Committee for Astronomy (1976 - 1990). Member of the International Academy of Astronautics (since 1981) and Foreign Member of the Russian Acad. of Sci (since 1988). Vice-president and President of Commission 10 of the IAU (1974 - 1982) and many years its representant in FAGS, MONSEE and IUWDS. Since the foundation in 1967, Member and since 1998 Honorary Member of the Editorial Board of Solar Physics.

Michal Bursa (*1977, bursa@astro.cas.cz, Galaxies and Planetary Systems)

Research fields: Relativistic astrophysics of compact sources, especially effects of strong-gravity lensing near compact objects, short-term variability of accreting black holes. 2006 PhD from Charles University in Prague.

Milan Burša (*1929, bursa@ig.cas.cz, Galaxies and Planetary Systems, emeritus)

Research fields: Figures of the Earth, Moon and Planets, Earth‘s rotation, tidal evolution of the Sun-Earth-Moon system, dynamics of tidal development of satellite systems of selected planets (Mars, Saturn, Uranus, Neptune). Author of 438 scientific papers and 15 books including “Gravity Field and Dynamics of the Earth” (co-author K. Pěč), 1993, Springer-Verlag. 996 references in foreign scientific publications. 1948–1951 study of Geodesy, Czech Technical University in Prague. 1951–1955 study of Astronomy and Geodesy, Moscow Geodetic Institute. 1959 PhD in Geodesy. 1973 DSc. in Astronomy. Since 1974 at the Astronomical Institute, until 1990 as Head of the Department of Dynamics of the Solar System, since 1987 Professor at the Czech Technical University Prague, 1983–1987 vice-president of the IAG, 1983–1987 president of the Special Study Group 5.99 “Tidal Friction and the Earth‘s Rotation” of the IAG. 1987–1991 president of the Special Study Group 5.100 “Parameters of Common Relevance of Astronomy, Geodesy and Geodynamics“ of the IAG. 1991–1995 president of commission SC-3 IAG Fudamental astrogeodetic constants. Since 2003 member of the IAG/IAU inter-union WG on reference systems and rotational elements of the planets and the satellites.

Michal Ceniga (*1979, emceniga@sunstel.asu.cas.cz, Stellar Physics, PhD student)

Research fields: Spectral analysis, study of stellar winds in hot stars. In 1998–2004 studied physics at the Faculty of Science, Masaryk University in Brno. Since 2004 PhD student at Masaryk University. Supervisor: J. Kubát

Zdeněk Ceplecha (*1929, zdenekce@asu.cas.cz, Interplanetary Matter, emeritus)

Research fields: Minor bodies of the solar system, meteors, meteoroid interaction of interplanetary bodies with the Earth‘s atmosphere. 1952 graduated from Charles University, Prague, 1956 PhD in Astronomy, 1967 DSc in Astrophysics, since 1951 working at the Astronomical Institute. 1977–1993 Head of the Interplanetary Matter Department, 1968–1971 Research Associate to the Smithsonian Institution USA, founder of the European Fireball Network. In 1994 became one of the 35 Founding Members of the newly established Learned Society of the Czech Republic. Published 177 papers on meteors, fireballs, comets and on atmospheric interaction and classification of meteoroids, succeeded in taking double-station rotating-shutter photographs of a meteorite fall in 1959 (Příbram multiple fall), the first scientific photographs of such an event ever made. Awards: 1984 ‘G.P. Merrill Award’ from the National Academy of Sciences of the USA, 1970 ‘Laureate of the State Award’, asteroid No. 2198 named ‘CEPLECHA’, 1989 ‘The Gold Medal for Physical Sciences’ from the Czechoslovak Academy of Sciences, 2004 ‘F.Nušl Award’, 2006 Praemium Bohemiae Award.

David Čapek (*1977, capek@sunkl.asu.cas.cz, Interplanetary Matter)

Research fields: Non-gravitational effects on small solar system bodies (Yarkovsky and YORP effect), thermal stress and rotation of meteoroids. 2000 graduated from Faculty of Mathematics and Physics of Charles University, Prague. 2007 graduated from Faculty of Science of Charles University, Prague (specialization Geology). 2007 PhD in Astronomy. Since 2008 at the Astronomical Institute.

James Dale (*1977, jim@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Star formation, stellar feedback, numerical modelling of HII regions and stellar winds, gravitational instabilities and fragmenting shells, triggered star formation, stellar collisions and mergers. 1999: BA in Natural Sciences, Cambridge University, 2000: MSc in Experimental and Theoretical Physics, Cambridge University, 2004: PhD in Astrophysics, Cambridge University. 2004--2007: Postdoctoral Researcher, University of Leicester. 2007--2008 Wenner Gren postdoctoral researcher and lecturer in stellar evolution, Lund University. 2008--present: Marie Curie Research Fellow at the Astronomical Institute in Prague.

Research fields: Astrophysical processes around black holes, X-ray spectroscopy of active galactic nuclei and microquasars, development of general relativistic models for spectral fitting. Since 2003 at the Astronomical Institute. 2004 PhD in Astrophysics at Charles University in Prague. Member of International Astronomical Union.

Elena Dzifčáková (*1956, elena@asu.cas.cz, Solar Physics)

Research fields: plasma physics, spectroscopic diagnostics, physics of the solar corona, ionization and excitation equilibrium in the solar corona for the non-thermal electron distributions, diagnostics of the non-thermal distributions in corona and transition region, solar flares, analysis of the magnetic topology of solar flares, computation of magnetic field in solar corona from photospheric measurements. 1975-1980 study of physics, graduated from the Faculty of Mathematics and Physics, Comenius University, Bratislava. 1990 PhD in Astrophysics, 2003 Associate Professor in physics at Faculty of Mathematics, Physics and Informatics, Bratislava. 1980-1983 Physical Institute of the Slovak Academy of Science, 1983-1990 Astronomical Institute of the Slovak Academy of Science, 1990-1993 Assistant Professor, Faculty of engineering, Slovak Technical University Košice, 1993 - 2007 Faculty of Mathematics and Physics, Comenius University, since 2007 in the Astronomical Institute Ondřejov and external lecturer at the Faculty of Mathematics Physics and Informatics Comenius University. Member of the International Astronomical Union.

Ivana Ebrová (*1982, ivana@ig.cas.cz, Galaxies and Planetary Systems, PhD sudent)

Soňa Ehlerová (*1972, sona@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Interstellar medium, HI shells and supershells (automatic detection algorithm, statistical studies of shells in the Milky Way, numerical simulations), star formation. 1995 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. 1995 and 1999 scientific stays in Kiel (Germany), 1997 observations with the Effelsberg radiotelescope (Germany). 2000 PhD in Astrophysics. Since 2001 an external lecturer at the Faculty of Mathematics and Physics, Charles University, Prague (Exercises in the Galactic Astronomy). Member of the International Astronomical Union.

Jan Elner (*1982, janelner@centrum.cz, Stellar Physics, PhD sudent)

Research fields: Multiple stars spectra decomposition and data analysis, applications of Fourier disentangling. 2006 graduated in Astronomy and Astrophysics from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2006 PhD student at Charles University. Supervisor: P. Koubský.

František Fárník (*1946, ffarnik@asu.cas.cz, Solar Physics)

Research fields: X-ray emission of solar flares – instrumental aspects of X-ray detection, analysis of observational data from broad-band detectors and telescopes. In 1970 graduated from the J.E. Purkyně University in Brno (Physics), since graduation a staff member of the Astronomical Institute of the Academy of Sciences of the Czech Republic. 1978 PhD in Astrophysics. Principal investigator of several X-ray instruments onboard Prognoz, Phobos and Coronas spacecrafts. Since 1990 cooperating with scientists from the Space Research Laboratory in Utrecht, Netherlands, the Space Environment Center in Boulder, Colorado, USA, the Institute of Space and Astronautical Sciences in Tokyo, Japan and many others. Principal investigator of the hard X-ray spectrometer launched on March 12, 2000, as a part of the US MTI project. In recent years organizing and supporting participation of the Astronomical Institute in the Science Program of ESA, especially in the Solar Orbiter project.

Adrián Galád (*1970, adriangalad@yahoo.com, Interplanetary Matter)

Research fields: Physical properties of asteroids in the inner part of the Solar System, photometry of asteroids. Graduated in Astronomy from the Faculty of Mathematics, Physics, and Informatics, Comenius University, Bratislava, Slovakia, in 1993. Scientific researcher at Astronomical Observatory in Modra, Slovakia, since 1994, PhD in Astronomy in 2001, at the Astronomical Institute since 2004 (part time), member of the IAU since 2006.

René Goosmann (*1974, goosmann@astro.cas.cz, Galaxies and Planetary Systems)

Research fields: Accretion, emission and radiative transfer processes in the vicinity of accreting black holes; development and application of theoretical models for active galactic nuclei and black hole binaries in the X-ray range. Polarization modelling in the optical/UV; PhD in 2005 at the Observatoire de Paris, France; since January 2006 at the Astronomical Institute in Prague.

Christian Gruber (*1968, gruber@asu.cas.cz, Galaxies and Planetary Systems)

Research fields: Spherical harmonic expansion via fast Fourier transformation. Gravity field determination from satellite observations. Dynamical satellite geodesy & orbit determination. Satellite resonances and latitude lumped coefficients analysis. 1996 graduation from the University of applied Sciences, Faculty of Surveying and Cartography, Munich. 2003 Dipl.-Ing. from the Faculty of Physical Geodesy of the Technical University, Berlin. In Mai 2007 defense of his doctoral thesis at the Technical University, Berlin. Since Mai 2009 postdoctoral position at the German Research Centre for Geosciences (GFZ) in Munich.

Stanislav Gunár (*1981, gunar@asu.cas.cz, Solar Physics)

Research fields: Solar prominences: multi-dimensional non-LTE radiative transfer, modeling of synthetical spectra. 2004 graduated from the Faculty of Mathematics, Physics and Informatics of Comenius University, Bratislava. In December 2007 defended a doctoral thesis at the Faculty of Mathematics and Physics of the Charles University, Prague. Since January 2008 postdoctoral position at Astronomical Institute.

Rudolf Gális (*1973, galis@ta3.sk, Stellar Physics)

Petr Hadrava (*1951, had@sunstel.asu.cas.cz, Galaxies and Planetary Systems)

Research fields: Theory of stellar atmospheres, classical and relativistic radiative transfer, radiation hydrodynamics; binary stars, circumstellar mass, solution of radial-velocity and light-curves (FOTEL code), disentangling of spectra of multiple stars (KOREL code), spectroscopic and photometric observations of stars; relativistic astrophysics, dynamics and appearance of accretion discs; history of medieval and renaissance astronomy. 1974 graduated in Theoretical Physics from the Faculty of Mathematics and Physics of Charles University, Prague. 1980 PhD in Astrophysics, 2001 DrSc in Astrophysics, 2004 Associate Professor at Charles University. 1975–2004 at the Stellar Department of the Astronomical Institute, then Galaxies and Planetary Systems. External lecturer and member of the Supervisory Board for PhD studies at the Faculty of Mathematics and Physics of Charles University Prague. 1997–2001 part-time professor at Trondheim University (NTNU). Member of International Astronomical Union.

Petr Heinzel (*1950, pheinzel@asu.cas.cz, Solar Physics)

Research fields: Solar atmosphere: Flares, prominences, coronal loops, chromospheric structure. Non-LTE radiative transfer: numerical methods for multi-level problems, partial frequency redistribution, accelerated lambda iteration techniques, 2D-transfer. Model atmospheres: structure and dynamics of the chromosphere and flares, the physics of isolated plasma structures (loops, prominences, chromospheric network). Radiation-hydrodynamics: time-dependent non-LTE problems, energy balance, heating mechanisms. Spectral diagnostics: analysis of optical and UV spectra, semi-empirical models. 1974 graduated from the Faculty of Mathematics and Physics of Charles University in Prague, 1982 PhD in Astrophysics, 1993 DSc in Astrophysics, 2005 Associate Professor at Charles University, Director of the Astronomical Institute since 2004, External lecturer on Stellar Atmospheres at Charles University, Wroclaw University and Komensky University, member of the Supervisory Boards for PhD students. Supervisor of PhD students at Charles University. Visiting professor at the Université de Paris (Orsay), Observatoire de Meudon, Wroclaw University and MPA Garching. Associate scientist of the SOHO/SUMER team.

Petr Hellinger (*1970, petr.hellinger@ig.cas.cz, Solar Physics)

Research fields: Nonlinear phenomena in space plasmas, collisionless shocks, kinetic instabilities; numerical simulations and theoretical modelling. 1993 graduated in Theoretical physics from Charles University, Prague. 1996 PhD in Space plasma physics at Université de Paris (Orsay), Observatoire de Paris-Meudon, France. Scientific researcher at the Institute of Atmospheric Physics, AS CR, since 1995. Since 2008 member of the Solar Physics Department (part time).

Jiří Horák (*1978, horak@astro.cas.cz, Galaxies and Planetary Systems)

Research fields: Relativistic astrophysics of compact sources, oscillations of relativistic fluid tori, variability and polarization of X-rays from compact objects. 2005 PhD from Charles University in Prague. Since 2006 a postdoc at the Astronomical Institute.

René Hudec (*1951, rhudec@asu.cas.cz, Stellar Physics)

Research fields: High energy astrophysics with emphasis on multi-spectral analyses and eruptive processes in cosmic plasma. Gamma ray bursts (GRB), galactic and extragalactic X-ray and gamma-ray sources (AGNs, QSOs, blazars). Searches for counterparts at optical wavelength. Analyses of evolution and emission mechanisms. Designer of space and ground-based experiments in these areas. Development and design of X-ray optics and X-ray telescopes for space as well as laboratory applications. 1970 graduated from the Technical Faculty of General Engineering, 1975 graduated from Charles University, Faculty of Mathematics and Physics, 1978 RNDr. degree from Charles University, Prague, 1981 PhD Czechoslovak Academy of Sciences Prague, 2007 habilitation (Assoc. Prof.) at Czech Technical University in Prague. Since 1975 at the Astronomical Institute. Since 1989 Head of Working Group on Interdisciplinary Astrophysics, later Head of the Group of High Energy Astrophysics. Principal Investigator of satellite and ground-based projects (e.g., X-ray telescope TEREK-FOBOS). Since 1992 Principal Investigator of the European Central Initiative Cooperation Project Investigation of GRB. Since 1996 co-I and consortium member of the experiment OMC onboard the INTEGRAL ESA, and Co-I and consortium member of the INTEGRAL Science and Data Center ISDC. Since 1996 PI of the Czech participation in the INTEGRAL satellite program, ESA. Since 2005 member of the CU7 Coordination Unit, ESA Gaia. Since 2009 member of the Telescope Working Group of the project ESA IXO. Author and co-author of 511 scientific papers and communications (157 in refereed journals).

Pavel Jáchym (*1978, jachym@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Dynamics and evolution of galaxies in galaxy clusters and groups, numerical simulations (N-body tree/SPH algorithms) of environmental effects in galaxy clusters (ram pressure stripping, galaxy harassment, tidal interactions), millimeter observations of environmentally affected galaxies. 2001: MSc in Astronomy and Astrophysics at Charles University in Prague, 2006: PhD in Astrophysics at Charles University and University Paris 6. 2003-2004: Marie Curie fellowship for graduate students at Paris Observatory, 2009: short term attachment at IRAM Grenoble, 2009-2010: Fulbright-Masaryk Scholarship at Yale University.

Karel Jiřička (*1944, jiricka@asu.cas.cz, Solar Physics)

Research fields: Solar radio flares, instrumentation for radio astronomy (low-noise receivers, data acquisition systems, etc), analysis, processing, and archiving of radioastronomical data. 1967 graduated from the Faculty of Electrical Engineering of the Czech Technical University in Prague. 1973 PhD in Radio Science. Since 1975 at the Astronomical Institute. Member of the CRAF (Committee on Radio Astronomy Frequencies) of the ESF (European Science Foundation), member of the URSI (International Union of Radio Science) Commission J (Radio Astronomy).

Bruno Jungwiert (*1970, bruno@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: dynamics, activity and evolution of galaxies, N-body simulations, integral-field spectroscopy. 1993 Master degree in Physics (Charles University, Prague); 1995 DEA (Diplome d´Etudes Approfondies) in Astrophysics and Space Techniques (Meudon Observatory); 1998 PhD in Astrophysics at Université Paris VII and Charles University. Since 1998 researcher at the Astronomical Institute ASCR. Prize of the Academy of Sciences of the Czech Republic for young researchers (1999). Long-term stays abroad: Meudon Observatory (9 months), Paris Observatory (18 months), Centre de Recherche Astronomique de Lyon (2 years, post-doc, Marie Curie Research Training Network "Euro3D-Promoting 3D Spectroscopy in Europe"), University of California (Los Angeles – 3 months, Riverside – 16 months). PI and co-I of observational projects with large and medium size telescopes (VLT, Keck, HST, WHT, Calar Alto 3.5m, Lick Observatory 3m). External lecturer and supervisor of undergraduate and graduate students at the Charles University in Prague, Masaryk University in Brno and University of California-Riverside.

Jan Jurčák (*1978, jurcak@asu.cas.cz, Solar Physics)

Research fields: Magnetic fine structure and velocity fields in sunspots, analyses of high spatial resolution spectroscopy and spectropolarimetry. 2002 graduated from the Charles University, Prague, Master's Degree in astrophysics. Since 2002 at the Astronomical Institute, Solar Department. 2006 PhD in astrophysics, Charles University, Prague. 2004 four-month stay at Instituto de Astrofisica de Canarias (IAC) as an EARA fellow. 2006 - 2008 post-doc position at National Astronomical Observatory of Japan (NAOJ), Mitaka as a JSPS fellow.

Vladimír Karas (*1960, vladimir.karas@cuni.cz, Galaxies and Planetary Systems)

Research fields: Relativistic astrophysics; radiation processes in strong gravity and their applications to active galactic nuclei and Galactic black holes. 1998 Associate Professor, 2001 DrSc in Astrophysics. Since 2004 a research scientist at the Astronomical Institute, Head of the Group of Relativistic Astrophysics, Deputy for Foreign Relations of the Institute. Supervisor of undergraduate and graduate students. Member of professional organizations: International Astronomical Union, Royal Astronomical Society. Author of research and educational articles. Translator of popular science books.

Marian Karlický (*1949, karlicky@asu.cas.cz, Solar Physics)

Research fields: Solar flare physics: evolution of superthermal particles in flare loops, evaporation, reconnection of magnetic field, hard X-ray emission, polarization of optical chromospheric lines. Solar radioastronomy: radio bursts in metric, decimetric and microwave frequency ranges. Plasma astrophysics: Langmuir waves in current-carrying plasma, tearing and coalescence processes in flare current sheet, solutions of Zakharov equations, electron, proton and neutral beams, return current. Numerical modeling: particle (parallel version), hybrid and MHD codes. 1973 graduated from J. E. Purkyně University in Brno, 1976 RNDr degree from Charles University, Prague, 1981 PhD in Solar Plasma Physics, 1992 DSc in Astrophysics, 2008 Associate Professor. Several stays abroad – Meudon Observatory, Trieste Observatory, Potsdam Observatory, Glasgow University, Birmingham University, Colorado University, Nanjing University, Beijing Astronomical Observatory, INPE Sao Jose dos Campos, Brazil, Nobeyama Observatory, Japan, JAXA/ISAS Japan, New Jersey Istitute of Technology, USA. 1990–1996 Head of the Solar Department, 1996–2004 Deputy Director of

the Astronomical Institute, since 2004 Head of Working Group Physics of solar flares and prominences. Since 2002-2009 Member of the Scientific Council of the Academy of Sciences of the Czech Republic. Member of Editorial Board of Solar Physics journal since 2005.

Jana Kašparová (*1976, kasparov@asu.cas.cz, Solar Physics)

Research fields: Solar flares: non-LTE radiative transfer, analysis of optical and hard X-ray spectra. 1999 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. 2004 PhD in Theoretical Physics, Astronomy and Astrophysics at Charles University, Prague.

Adela Kawka (*1977, kawka@sunstel.asu.cas.cz, Stellar Physics)

Research fields: Evolution, atmospheric properties of white dwarfs, and their distribution within our Galaxy, close binary systems: their evolution, orbital parameters and atmospheric properties of the components stars. Spectroscopic and photometric observations in the optical and ultraviolet of white dwarfs and close binaries. Obtained a PhD in 2004 at Murdoch University, Perth, Australia. Since 2004 at the Astronomical Institute.

Jaroslav Klokočník (*1948, jklokocn@asu.cas.cz, Galaxies and Planetary Systems)

Research fields: Satellite dynamics, orbit determination from observations, gravity field of the Earth, orbital resonances, navigation for applied satellites, satellite (crossover) altimetry, tests of accuracy of gravity field models, gradiometry, archeoastronomy. In 1971 graduated in Space Geodesy from the Czech Technical University, Prague. 1979 PhD in Astronomy. 1996 DSc in Astronomy. 2000 Associate Professor of Geodesy, senior lecturer of geodesy, CTU Prague. Researcher at the Astronomical Institute. Several stays in Germany, USA, and other countries. Member of several special study groups of IUGG, principal investigator of ESA PECS grant on GOCE gradiometry. About 130 research papers, at least 155 references in foreign periodicals.

Miroslav Klvaňa (*1943, mklvana@asu.cas.cz, Solar Physics)

Research fields: Magnetic and velocity fields in solar active regions and quiet photosphere (observations, interpretation, and modelling), instrumentation, data processing. 1966 graduated in Physics from Technical University of Leningrad. Since 1968 at the Astronomical Institute, Solar Department. 1978 PhD in Astrophysics. 1969–1972 development of the Ondřejov first scanning photoelectric magnetograph, 1972 first photoelectric measurements of solar magne-tic and velocity fields in Czechoslovakia, 1972-1983 systematical magnetographic measurements and their physical interpretation, 1985–1990 development of the Ondřejov second generation scanning photoelectric magnetograph SOLMAG, 1990-2001 coordinator and head of group of magnetographic measurements by SOLMAG. 1997-1998 reconstruction of control system of the solar telescope at Hvar Observatory (Jugoslavia), team member for construction of big solar telescopes at Canary Islands (1,5m GREGOR, 4m Europen Solar Telescope EST). 2003-2006 reconstruction of spectroheliograph in Coimbra, Portugal, 2004-2009 development of Solar Spectra Analyser SOLSPAN at Ondřejov Observatory. Cooperation with Groups of magnetographic measurements (Potsdam-SRN, Irkutsk-Russia, Crimean Astrophysical Observatory, Ukraine). Author and co-author more than 200 publications and holder of 3 patents.

Ondřej Kopáček (*1981, kopacek@seznam.cz, Galaxies and Planetary Systems, PhD sudent)

Daniela Korčáková (*1975, kor@sunstel.asu.cas.cz, Stellar Physics)

Research fields: Modeling of stellar atmospheres, radiative transfer, stellar winds, observation and analysis of spectra of B[e] stars. 1993-1998 study physics with a specialisation to the astronomy at the faculty of science of the Masaryk University in Brno, diploma thesis "Spectroscopy of the cool star beta UMi", supervisor V. Štefl, 1998-2003 postgraduate study at the faculty of science of the Masaryk University, PhD thesis "NLTE models of the moving stellar atmospheres", supervisor J. Kubát, 1998 part-time research assistant at the Astronomical Institute of the AV CR in Ondřejov, 2002 full-time research assistant at the AV ČR in Ondřejov. Since 2006 member of the IAU. 2009 full-time scientific position at the AV ČR in Ondřejov. 2009 Otto Wichterle Premium from the Academy of Sciences.

Pavel Koten (*1972, koten@asu.cas.cz, Interplanetary Matter)

Research fields: Photometry, light curves and physical structure of faint video meteors, models of meteoroids, double station observations of meteors, trajectory computation, image processing of video meteors, automation of the observation and data proccesing, meteor streams identification. 1996 MSC, graduated from the Faculty of Mathematics and Physics of Charles University in Prague. Since 1996 at the Astronomical Institute. 2001 PhD in Astronomy from Charles University. Popularization of astronomy. Member of the International Astronomical Union.

Pavel Kotrč (* 1948, pkotrc@asu.cas.cz, Solar Physics)

Research fields: Solar atmosphere, flares, surges, prominences, coronal loops, spectral observation and analysis, diagnostics of solar activity phenomena, solar corona, eclipses of the Sun, instrumentation. PI, Co-PI or Co-I on several solar physics projects. In 1972 graduated from Faculty of Sciences, J. E. Purkyně University (now Masaryk University) in Brno (Mathematics and Physics). Since then working as a staff member at the Solar Department of the Astronomical Institute of the Academy of Sciences of the Czech Republic at Ondřejov. 1980 PhD in Astrophysics (Solar Physics). Responsible person for the solar optical telescope and spectrograph HSFA2. In recent years studied prominences and effects of accelerated particles in solar flare spectra. Longer missions abroad: ISZF Irkutsk, Russia, Hvar Observatory, Croatia, Crimean Astrophysical Observatory, Ukraine, National Solar Observatory Sacramento Peak, USA, Observatoire de Paris, Meudon, France. Member of solar eclipse expeditions to east Siberia (1981 and 1997), Romania & Hungary (1999), Angola (2001 and 2002) and Turkey (2006). Since 1992 external lecturer on spectroscopy at Charles University at Prague. In 2000 external lecturer on solar physics at Masaryk University in Brno, supervisor of 9 Master diploma theses. Member of the International Astronomical Union and a Representative of the Czech Republic in JOSO. Member of Editorial Board of the Central European Astrophysical Bulletin. Author and co-author of about 130 papers.

Pavel Koubský (*1943, koubsky@sunstel.asu.cas.cz, Stellar Physics, emeritus)

Research fields: Early-type stars, close binaries, Be stars, astronomical techniques. In 1965 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. Since

1966 at Stellar Department of the Astronomical Institute. 1977 PhD in Astrophysics. 1981-1989 Head of the Working Group 2m Telescope, 1990-2000 and 2004-2008 Head of the Stellar Department. Since 1990-2006 member of the Council of Sciences of the Astronomical Institute. In 1972 promoting systematic photoelectric observations at the joint Czech-Yugoslav Observatory, Hvar (now Croatia). Responsible for three upgrades of the 2m telescope (1982-87, 1996-98, and 2007). Observational stays at Observatoire de Haute Provence, France, KPNO USA, Dominion Astrophysical Observatory Victoria and David Dunlap Observatory, Canada. In recent years continued spectroscopic, photometric and interferometric study of Be stars and rapid variability in early type stars.

Michaela Kraus (*1972, kraus@sunstel.asu.cas.cz, Stellar Physics)

Research fields: Winds of hot stars; Be and B[e] stars; ionization structure calculations in non-spherically symmetric and rotationally distorted winds; modeling forbidden emission lines from non-spherically symmetric winds, and the spectral energy distribution of flat, flared and outflowing dusty discs. 1997 graduated in Physics from the faculty of physics and astronomy of the Rheinische-Friedrich Wilhelms University in Bonn, Germany, 2000 PhD in Astrophysics at the Rheinische-Friedrich Wilhelms University in Bonn, Germany. Until 2001 post-doc at the Max-Planck Institute of Radioastronomy in Bonn, Germany, from 2001 to 2005 post-doc at the Astronomical Institute, Utrecht University, the Netherlands, since 2005 post-doc at the Astronomical Institute.

Miroslav Křížek (*1981, krizek@ig.cas.cz, Galaxies and Planetary Systems, PhD student)

Research fields: structure, dynamics and evolution of galaxies, N-body simulations. 2007 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2007 PhD student at Charles University. Supervisor: B. Jungwiert.

Jiří Kubát (*1962, kubat@sunstel.asu.cas.cz, Stellar Physics)

Research fields: Radiative transfer, theory of stellar atmospheres, calculation of model stellar atmospheres, line profiles, NLTE physics, dynamics of stellar winds. 1985 graduated in theoretical physics from the Faculty of Mathematics and Physics of Charles University, Praha. 1985 – 1989 at the Astronomical Institute of the Czechoslovak Academy of Sciences. 1989 – 1992 worked as a programmer and teacher in a secondary school. Since 1992 at the Astronomical Institute. 1994 PhD in Astrophysics. Author of the computer code for calculating non-LTE model stellar atmospheres in planar and spherical geometry. Since 1997 member of the IAU, Commision 36 (Theory of stellar atmospheres). Teaches a semestral course “Physics of stellar atmospheres” at the Masaryk University Brno. 1996–2000 deputy director of the Astronomical Institute. 2004 – 2008 deputy head of the stellar department, 2000 – 2004 and since 2008 head of the stellar department. Since 2008 head of the working group Physics of hot stars. Since 2007 member of the Council of the Astronomical Institute.

Blanka Kučerová (*1980, aknalb@physics.muni.cz, Stellar Physics, PhD student)

Research fields: hot stars, observation and analysis of spectra of B[e] stars. 1998–2004 study physics with a specialization in astronomy at the faculty of science of the Masaryk University in Brno, diploma thesis "Spectroscopy of binary star 96 Herculis”, supervisor

P. Koubský. Since 2004 postgraduate study at the Faculty of Science of the Masaryk University, PhD thesis "Study of hot B[e] stars", supervisor D. Korčáková.

Alena Kulinová (*1973, kulinova@sunkl.asu.cas.cz, Solar Physics)

Research fields: Solar flares, spectroscopic diagnostics - soft X-ray spectra, diagnostics of the non-thermal distributions in the corona and the transition region, data processing (satellite and groundbased), participating on the developemnent of Solar Optical Robotic Telescope. In 1997 graduated from the Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia. 2005 PhD in Astrophysics at Comenius University, Bratislava. 1997 – 1999 observer at Slovak Central Observatory, since 2002 teacher and assistant reseacher at FMPhI Comenius University, Bratislava and since 2008 researcher at the Astronomical Institute of the AV CR in Ondřejov.

Jan Libich (*1978, libich@sunstel.asu.cas.cz, Stellar Physics, PhD student)

Research field: Rapid changes of hot stars and their binary origin. 1997–2002 study physics at the Faculty of Mathematics and Physics of Charles University and in 2002 graduated in Astronomy and Astrophysics, Prague. Diploma thesis " The determination of physical properties of triple star epsilon Persei", supervisor P. Harmanec. Since 2002 PhD student at the Faculty of Mathematics and Physics of Charles University. PhD thesis: "The study of rapid variations of hot stars and their binarity", supervisor: P. Harmanec. Since 2002 part-time at the Stellar Department of the Astronomical.

Andrii Lynnyk (*1983, andrii.lynnyk@mff.cuni.cz, Solar Physics, PhD student)

Research fields: Coronal Mass Ejections, Magnetic Clouds. 2006 graduated from the Physical and Technical Institute of National Technical University of Ukraine "KPI", Kiev, Ukraine. 2003–2006 engineer in Space Research Institute, Kiev, Ukraine. From 2006 to 2007 PhD Student at Charles University and a member of the Solar Physics Department. Supervisor: M. Vandas.

Hana Mészárosová (*1959, hana@asu.cas.cz, Solar Physics)

Research fields: Solar flares, radio radiation, data analysis, statistical methods. Main interest in the impulsively generated magnetoacoustic waves in the solar coronal loops (radio and X-rays data). 1987 graduated from the Faculty of Electrical Engineering, Czech Technical University in Prague (technical cybernetics), since 1990 at the Astronomical Institute in Ondřejov. 2004 PhD in Astrophysics at Charles University, Prague. 2006 year-long stay in INPE, São José dos Campos, Brazil.

Filip Münz (*1974, munz@asu.cas.cz, Stellar Physics)

Research fields: High-energy astrophysics, experimental methods for gamma-ray astronomy and data analysis. Starting with ground-based methods (Cherenkov atmospheric technique) for GeV-TeV energies during a work on PhD thesis at College de France, followed at the Astronomical Institute since 2003 working on data from satellite experiments for study of sources of hard-X/gamma rays (focus on variable sources like blazars or cataclysmic variables). As a member of a Czech INTEGRAL team he spend 11 month at INTEGRAL Science Data Centre at Versoix, Switzerland. Also studied time changes of X-ray spectra of

active galaxies obtained from XMM-Newton satellite. Since 2007 working in Bologna, Italy on an archive of gamma-ray burst data from HETE-2 experiment. Member of European Astronomical Society.

Martin Netolický (*1981, netol@physics.muni.cz, Stellar Physics, PhD student)

Research fields: Interferometry in visual and near-IR bands, hot stars, stellar envelopes, spectroscopy. In 2004 graduated from the Faculty of Science of Masaryk University, Brno. Since 2004 postgraduate study at the Faculty of Science of the Masaryk University, supervisor P. Koubský

Dieter Nickeler (*1968, nickeler@asu.cas.cz, Solar Physics)

Research fields: Stationary ideal and non-ideal MHD flows of large scale stellar winds (astrospheres/heliosphere) and solar flows, solutions of nonlinear MHD equations, theory of magnetic reconnection. 1998 graduated from faculty of physics and astronomy of the Ruhr-University, Bochum, 2005 PhD in Astrophysics at the University of Utrecht.

Pavel Novák (*1965, pavel.novak@vugtk.cz, Galaxies and Planetary Systems)

The figure and gravitational field of the Earth, satellite positioning, adjustment calculus and statistics. Author of 65 peer-reviewed publications, 90 references in foreign scientific publications. 1984–1989 study of Geodesy, Czech Technical University in Prague. 1996–1999 study of Geodesy, University of New Brunswick in Fredericton, Canada. PhD in Geodesy (1999), assistant professor in Geodesy (2003) and full-professor (2007) in Geodesy, Czech Technical University in Prague. Affiliations: Research Institute of Geodesy, Topography and Cartography (1989-1995), Technical University in Berlin (1991-1992), University of New Brunswick (1996-1999), University of Calgary (1999-2001), University of Stuttgart (2002-2004), Research Institute of Geodesy, Topography and Cartography (since 2002), University of West Bohemia in Pilsen (since 2003), Astronomical Institute of the Academy of Sciences of the Czech Republic (since 2007). Elected-Fellow of the International Association of Geodesy (IAG, 2007), vice-president of the Inter-Commission Committee on Theory of the IAG (since 2007), member of several IAG study groups, member of the International Editorial Board of the Journal of Geodesy (since 2003).

Jan Palouš (*1949, palous@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Evolution of galaxies, two-component systems, interstellar matter and stars, star formation, stellar winds and mass recycling, feedback, chemical evolution, shells, supershells and filaments, gravitational instability, triggered star formation, the initial mass function, galaxies in groups and clusters, tides, merger events, harassment, gas stripping, formation of super-star clusters, intracluster medium. 1972: graduated from the Faculty of Mathematics and Physics of Charles University, Prague. 1977: PhD in Astronomy and Astrophysics, 1993: DSc in Astronomy and Astrophysics, 1994: Assistant Professor, 2001: Professor of Astronomy at Charles University, Prague. 1993–1996: member of the Council of the Academy of Sciences of the Czech Republic. 1996–2004: Director of the Astronomical Institute of the Academy of Sciences of the Czech Republic. Since 2005: President of the Council for International Affairs and member of the Council of the Academy of Sciences of the Czech Republic. Since 2009: member of the Learned Society of the Czech Republic. Member of International Astronomical Union (IAU), 1997–2003: member of the organizing

committee of IAU Commission 33. Since 2004 chairman of the Czech National Committee for Astronomy, chairperson of the National Organizing Committee of the General Assembly of IAU 2006 in Prague. Member of the European Astronomical Society (EAS), 1992–1996 its secretary, since 2008 its vice-president. Supervisor of undergraduate and graduate students in astronomy and astrophysics. Author and co-author of research articles in professional journals, public presentations in newspapers, magazines, radio and TV.

Petr Pecina (*1950, ppecina@asu.cas.cz, Interplanetary matter)

Research fields: Radar observations of meteors and their analysis, solving problems of physical theory of meteors and its application to observations, study of mutual interrelations between radar and TV meteors, determination of heliocentric orbital elements of radar meteoroids, study of selected meteor showers (Geminids, Perseids, Leonids). 1973 graduated in Astronomy from Charles University, Prague. Since 1973 working at the Astronomical Institute. 1981 PhD in Astronomy.

Tomáš Pecháček (*1981, pechacek_t@seznam.cz, Galaxies and Planetary Systems)

Research fields: Relativistic astrophysics of compact sources, various effects of strong gravitational field acting on radiation field near compact objects, stochastical models of X-ray variability. Obtained a PhD in 2008 at Charles University, supervisor V. Karas. Since 2008 a postdoc at the Astronomical Institute.

Luboš Perek (*1919, perek@ig.cas.cz, Galaxies and Planetary Systems, emeritus)

Research Fields: Distribution of mass in the galaxy, high-velocity stars, planetary nebulae, definition of outer space, geostationary orbit, space debris, management of outer space. 1946 graduated from Masaryk University, Brno, 1956 PhD in Astronomy at Charles University, Prague, 1961 DSc in Astronomy. 1965 Corresponding Member of the Czechoslovak Academy of Sciences. 1952–1956 Associate Professor, Masaryk University. 1964 Visiting Professor, Northwestern University. 1967–1970 General Secretary of the IAU. 1968–1975 Director of the Astronomical Institute of Czechoslovak Academy of Sciences. 1975–1980 Chief, Outer Space Affairs Division, United Nations, New York. Medals: University of Liège 1969, ADION 1972, T. Hagecius de Hajek 1980, Nagy Ernö 1981, Zagreb Univ. 1982, City of Paris 1982, Collège de France 1986, Prix Janssen de la Societé Astronomique de France 1992, Medal of the Czech Learned Society 2009. Asteroid 2900 named Lubos Perek, Dr. H. C. Masaryk University 1999. 44 papers on stellar dynamics and planetary nebulae, Catalogue of Galactic Planetary Nebulae (jointly with L. Kohoutek) Academia Praha 1967. 100 papers and articles on the geostationary orbit, definition of outer space, space debris, protection of space environment, and space traffic. President of IAU Commission 33 in 1973-1976, Vice-President of the International Council of Scientific Unions 1968-1970, Associate Member of the Royal Astronomical Society since 1970, Member of the Deutshe Akademie der Naturforscher Leopoldina since 1975, Member of the International Institute of Space Law since 1977, member of its Board of Directors 1996-2006, Member of the International Academy of Astronautics since 1977, President of the International Astronautical Federation 1980-1982, member of its International Program Committee 1990-1992, Advisor to its President 2002-2006, Honorary Member of the Academie Nationale de l'Air et de l'Espace, Toulouse, since 1994, Delegate of the Czech Republic to the UN Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Subcomittee 1992-2003.

Cyril Polášek (*1943, polasek@asu.cas.cz, Stellar Physics)

Research fields: High-energy astrophysics, data reductions, optics, testing and development of innovative X-ray and optical CCD telescopes of apertures: 50 cm (1mirror with field corrector). In plans: 63cm (2mirror aplanatic), 64cm and 45 cm Richter/Slevogt's (high speed and wide field). History of astronomy and astrophysics, light pollution. 1967 graduated in Numerical Mathematics from the Faculty of Natural Sciences of Palacký University in Olomouc. 1997 PhD in Astronomy. Since 1970 at the Astronomical Institute. (up to 1989 Computing Center, until 1996 in Near-Earth Physics Department, since 1996 HEA Group in the Interplanetary Matter Department, since 2004 High Energy Astrophysics Group).

Jan Polster (*1982, polster@physics.muni.cz, Stellar Physics, PhD student)

Research fields: Common features of B[e] and Be stars spectra, time variations in spectra. 2006 graduated in Astrophysics from the Faculty of Science of Masaryk University in Brno, since 2006 PhD student at Masaryk University, Supervisor: D. Korčáková

Petr Pravec (*1967, ppravec@asu.cas.cz, Interplanetary Matter)

Research fields: Physical properties of asteroids, photometry and astrometry of asteroids and comets, discoveries, recoveries and follow-up of both new and old poorly observed asteroids; application of CCD technology in astronomy. 1990 graduated from Masaryk University, Brno. Since 1990 in the Interplanetary Matter Department of the Astronomical Institute. 1996 PhD from Charles University, Prague. Author and co-author of papers devoted to studies of near-Earth asteroids, asteroid photometry and astrometry, use of CCD in astronomy. Discoverer of a few hundred asteroids. Currently concentrating on studies of binary asteroids. Awarded the Premium of Otto Wichterle from Academy of Sciences for his work on asteroids in 2004.

Tomáš Prosecký (*1980, prosecky@asu.cas.cz, Solar Physics, PhD sudent)

Research fields: Spectroscopy of solar flares. 2005 graduated in Astrophysics from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2005 PhD student at Charles University. Supervisor: P. Heinzel.

Cyril Ron (*1957, ron@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Astrometry, PZT observations and their analysis, Earth orientation parameters (EOP) from optical astrometry and combination of the EOP series derived from different techniques, geophysical excitations of the Earth rotation. 1981 graduated in Geodesy and Cartography from the Faculty of Civil Engineering of the Czech Technical University, Prague. Since 1983 at the Astronomical Institute. 1986 three-month mission to the Zentralinstitut für Physik der Erde in Potsdam, Germany. 1992 PhD in Astronomy. 1997-1998 mission to the Lohrmann Observatory, Technical University Dresden, Germany. Member of the Center for the Earth's Dynamics Research (CEDR) and of the IERS Combination Research Center. Since 2000-2006 member of organizing committee of IAU Commission 19 (Rotation of the Earth). Member of team awarded the prize of Academy of Sciences of the Czech Republic in 2000. Chairman of local organizing committee of 26th

General Assembly of IAU held in Prague 2006. Regular lectures on Space Geodesy at the West Bohemian University in Pilsen since 2005.

Adam Růžička (*1978, adam@ig.cas.cz, Galaxies and Planetary Systems, PhD student)

Research fields: Galactic dynamics, N-body simulations, evolutionary algorithms, clusters of galaxies. 2001 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2001 PhD student at Charles University. Supervisor: J. Palouš. Received the PhD degree in November 2006.

Josef Sebera (*1983, josef.sebera@fsv.cvut.cz, Galaxies and Planetary Systems, PhD sudent)

Ladislav Sehnal (*1931, lsehnal@asu.cas.cz, Dynamics of Satellite Motion, emeritus)

Research fields: Celestial mechanics, orbital and rotational dynamics of artificial satellites, non-gravitational perturbing forces (atmosphere, radiative effects). Theory of satellite motion in the atmosphere, models of the atmosphere and of the terrestrial albedo distribution. Theory of space accelerometric measurements. 1954 graduated in Astronomy from Charles University, Prague. 1959 PhD in Astronomy. 1984 DSc in Astronomy. Since 1954 at the Astronomical Institute, 1990–1996 Director of the Astronomical Institute. 1965–1971 with the Smithsonian Astrophysical Observatory, Cambridge, Mass., USA, 1988, 1989 with the DGFI Munich, Germany. About 118 research papers published.

Lukáš Shrbený (*1981, shrbeny@asu.cas.cz, Interplanetary Matter, PhD student)

Research fields: Physics of bright photographic meteors, measuring of all-sky images. Also participates in the international project of fireball network in Australia. 2005 graduated from Faculty of Mathematics and Physics of Charles University, Prague. Since 2005 PhD student at Charles University. Supervisor: P. Spurny. Since 2008 employee of Imperial College London.

Peter Scheirich (*1979, petr.scheirich@centrum.cz, Interplanetary Matter)

Research fields: Modeling of binary and tumbling asteroids from photometric data. In 2003 graduated from Faculty of Mathematics and Physics of Charles University, Prague. In 2008 obtained PhD in Theoretical Physics, Astronomy and Astrophysics at the Charles University (supervisor: Petr Pravec). Since 2008 at PostDoc position at the Interplanetary Matter Department of the Astronomical Institute of Academy of Sciences of the Czech Republic.

Pavol Schwartz (*1974, schwartz@asu.cas.cz, Solar Physics)

Research fields: Non-LTE study of the solar filaments and prominences, EUV spectroscopy of small-scale chromospheric structures, reduction of the data from SoHO/CDS and SoHO/SUMER spectrographs and from instruments of Hinode satelite. In 1998 graduated from the Faculty of Mathematics, Physics and Informatics of the Comenius University in Bratislava, Slovakia. In 2004 obtained PhD in Astrophysics at the Comenius University. Since 2004 working as a staff member of the Solar Department of the Astronomical Institute of Academy of Sciences of the Czech Republic. In 2005 at IAS Orsay, France participated in planning of the observations of the filaments and prominences using SoHO/CDS and SoHO/SUMER spectrographs during the 15th MEDOC observing campaign.

Vojtěch Sidorin (*1982, vojtech.sidorin@gmail.com, Galaxies and Planetary Systems, PhD sudent)

Research fields: Interstellar matter, star formation, shells, supershells and filaments, gravitational instability, triggered star formation, the initial mass function. 2008: graduated from the Faculty of Mathematics and Physics of Charles University, Prague, diploma thesis: "IR, optical and X-ray counterparts of HI shells in the Milky Way", supervisor: Jan Palouš. Since 2008: PhD student at Charles University, Prague, PhD thesis: "Shell-like structures in the ISM: observation vesus simulations", supervisor: Jan Palouš, advisor: Jim Dale.

Michal Sobotka (*1954, msobotka@asu.cas.cz, Solar Physics)

Research fields: Sunspots, fine structure and velocity fields in solar photosphere, high spatial resolution photometry and spectroscopy, image processing, time-series analysis, instrumentation.1978 graduated from the Charles University, Prague, Master's Degree in astrophysics. 1981–1985 external PhD student at the Leningrad State University and Crimean Astrophysical Observatory. 1985 PhD in astrophysics, Leningrad State University. 2007 DSc in astrophysics, Academy of Sciences of the Czech Republic. 1990–1992 Postdoctoral Fellowship at Instituto de Astrofisica de Canarias (IAC). 1993 three-month European Community Grant at IAC. 1999 Visiting Professor at the Karl-Franzens University, Graz. 1999–2000 one-year sabbatical stay at IAC. 2003 and 2005 Researcher at Observatoire Midi Pyrénées, Tarbes. Since 1979 at the Astronomical Institute, Solar Department, since 1995 Head of the Working Group "Structure and Dynamics of Solar Atmosphere", since 2004 Deputy Head of the Solar Department. 2002-2008 vice-president of JOSO. Since 2006 national representative in the European Association for Solar Telescopes (EAST). Participation in the projects of the 1.5-m solar telescope GREGOR and of the 4-m class European Solar Telescope EST. Cooperation with institutions in Spain, France, Germany, Italy and Austria. Author and co-author of more than 130 astronomical publications.

Jan Soldán (*1957, jsoldan@asu.cas.cz, Stellar Physics)

Research fields: Design and development of instruments and software for ground-based experiments, namely two robotic telescopes: BART (Ondřejov, Czech Republic) and BOOTES (Al Arenosilo, Spain) for follow-up observations of optical counterparts of gamma ray bursts. Software development for driving CCD cameras and telescopes, image data acquisition and processing. Software development of Optical Monitoring Camera (OMC) and Jem-X experiments for INTEGRAL mission (C, C++, CERN's Root). 1982 graduated from the Technical University in Brno, since 1983 at Astronomical Institute. 1994 2-month mission to the University of California, Riverside. 1998 PhD from the Czech Technical University, Prague. Co-I of numerous space and ground-based grant projects such as the robotic telescope BART and experiment BOOTES. Since 1996 consortium member of the OMC experiment, INTEGRAL satellite project, ESA. Long-term stay in Switzerland 1998-2006, member of software development team of INTEGRAL satellite. Since 2007 in Stellar Physics Department – group of Physics of Hot Stars.

Pavel Spurný (*1958, spurny@asu.cas.cz, Interplanetary Matter)

Research fields: Physics of meteor flight in the atmosphere, computations of meteor orbits and trajectories, prediction of meteorites impact positions, radiation of meteors at very high altitudes, reduction methods for determination of meteor trajectories, high resolution light

curves of fireballs from AFO radiometers, double station television observations of meteors. Principal investigator of the project "Automation of the cameras for fireball observations in the Czech part of the European Fireball Network". Participation in the design and development of the Autonomous Fireball Observatory for photographic detection of fireballs (AFO). Main coordinator of the European Fireball Network (EN) and head of the Czech part of the EN since 1993. Complete modernization of all fireball stations in the Czech Republic (2004-2009). Fundamental participation in the international project of the Desert Fireball Network in SW Australia. 1982 graduated from Charles University, Prague. Since 1982 at the Astronomical Institute. 1992 PhD in Astronomy, 2000–2004 Head of the Group of Meteor Physics, 1993–2000 and since 2004 Head of the Interplanetary Matter Department. 2003 Senior Scientist Award of the Learned Society of the Czech Republic, 2007 Laureate of the Kopal Lecture of the Czech Astronomical Society, 2006-2009 President of the IAU Commission 22 Meteors, Meteorites and Interplanetary Dust.

Ivana Stoklasová (*1978, ivana@sirrah.troja.mff.cuni.cz, Galaxies and Planetary Systems)

Research fields: Narrow-line regions of active galaxies, kinematics and excitation of gas. PhD at Charles University in Prague, Faculty of Mathematics and Physics in 2009. At present, a post-doc at Astronomical Institute ASCR, Prague.

Ivana Sujová (*1984, caivana@gmail.com, Stellar Physics, PhD sudent)

Jiří Svoboda (*1982, svoboda@astro.cas.cz., Galaxies and Planetary Systems, PhD student)

Research fields: Effects of strong gravitational field acting on radiation near compact objects, X-ray spectroscopy. PhD student at Charles University. Supervisor: V. Karas.

Miloš Šidlichovský (*1947, sidli@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Dynamical astronomy, chaos, resonances, structure of the asteroid and Kuiper belts, stability of orbits, multiple exoplanetary systems. 1970 graduated with honors in Theoretical Physics from Charles University, Prague. Since 1970 at the Astronomical Institute, presently in Group of Planetary Systems. 1994–1996 Deputy Director for Foreign Contacts, 2000–2004 Head of the Department of Dynamical Astronomy.

Zdislav Šíma (*1947, sima@ig.cas.cz, Galaxies and Planetary Systems)

Research fields: Scientific interest first focused on binary stars, later more on problems of gravitational fields of planets in the solar system, namely the combination of satellite altimetric measurements and primary constants of the Earth and other planets. A member of `Inter-Commision Committee on Planetary Geodesy (ICCPG)' of IAG-IUGG. Devoted also to the history of astronomy and astronomical instruments. Responsible for astronomical aspects of the old astronomical clock of Prague. Reconstructed old sundials in Břevnov monastery, Prague, and the ones at Parliament building of the Czech Republic, Prague – Malá Strana. Contributed to several TV films about history of astronomy. A member of Scientific Instrument Society. Since 1999 a member of the Società Astronomica Italiana. 1970 graduated in Astronomy from the Faculty of Mathematics and Physics of Charles University, Prague. 1973–74 11-month study mission at the Astrophysical Observatory at Asiago of the University of Padua. Since 1975 at the Astronomical Institute. 1978 PhD in Astronomy. 1994 two-month DAAD scholarship in IPG Technische Universitaet Darmstadt, Germany.

Stanislava Šimberová (ssimbero@asu.cas.cz, Solar Physics)

Research fields: Digital image processing in astronomy and astrophysics; pattern recognition - image fusion, contextual classification, feature selection, classifier performance, filtration. Image enhancement and restoration - multispectral image analysis and reconstruction, texture synthesis, geometric transformation, probabilistic relaxation, multichannel blind deconvolution. 1978 MSc graduate in honours Czech Technical University, Prague, Electronics. 1982 MSc Inst. of Engineering Studies, Prague, Pedagogics. 1990 PhD Czech Technical University, Prague, Cybernetics. Since 1989 researcher at the Astronomical Institute, Solar Department. Since 1998 chairman of the Czech Pattern Recognition Society (CPRS), since 2001 member of the scientific council of the Czech Society for Cybernetics and Informatics. 1996 ISPRS Vienna - Dolezal Award, 2007 Grant Agency CR President Award.

Vojtěch Šimon (*1968, simon@asu.cas.cz, Stellar Physics)

Research fields: High energy astrophysics. Astrophysical sources of high-energy radiation and their optical counterparts. Galactic X-ray sources: study of mass accreting compact objects – cataclysmic variables, supersoft X-ray sources, novae, X-ray binaries (mainly soft X-ray transients), analysis of their long-term activity and eruptive processes in X-ray and optical regions; accretion processes; relations of the character of the orbital modulation to the current state of the long-term activity; investigation of the dependence of the observed characteristics of X-ray sources on their physical state and parameters. Extragalactic sources: investigation of afterglows of gamma-ray bursts (GRBs), study of their comprehensive properties, supernova - GRB connection, implications for the environment in the host galaxies of GRBs. CCD photometry, data analysis and evaluation. Participation in the international campaigns on high-energy astrophysical sources and their optical counterparts. 1992 graduated from the Faculty of Natural Sciences of Palacky University, Olomouc. Since 1992 at the Astronomical Institute AS CR. 1998 PhD in Astronomy at Charles University. Member of the Czech Astronomical Society and the International Astronomical Union. Popularization of astronomy. 2001 Hlavka Award for Young Scientists of the Hlavka Foundation. 2003 Prize of the Academy of Sciences of the Czech Republic for Young Researchers. Author or co-author of more than 120 papers in international scientific journals and in proceedings of international conferences.

Petr Škoda (* 1964, skoda@sunstel.asu.cas.cz, Stellar Physics)

Research fields: CCD spectroscopy, data acquisition and reduction, telescope instrumentation, computational astrophysics, astronomical databases and archives and the Virtual Observatory . In 1987 graduated in Astrophysics from the Faculty of Mathematics and Physics of Charles University, Prague. 1987–1989 postgraduate student at the Astronomical Institute of the Czechoslovak Academy of Sciences in Ondřejov. Since 1989 a regular staff member of the Stellar Department at the Astronomical Institute. 1996 PhD in Astrophysics (supervisor P. Hadrava). Occasional system administrator of Linux PCs; responsible for maintenance of main astronomical SW packages like IRAF, MIDAS, IDL. Involved in the complex refurbishment of the telescope and spectrograph control systems of Ondřejov observatory 2m telescope. Co-author of CCD detector control and data acquisition program and of the telescope auto-guiding system. Expert in reduction of CCD single-order and mainly echelle spectra. Author of some archives of spectra exposed by Ondřejov 2m telescope detectors. Deeply involved in the project of Virtual Observatory. Collaborates with

International Virtual Observatory Alliance on new standards and applications. Co-author of two important VO standards and of VO-compatible spectra server. Since 2002 manager of section Databases and Data-mining of ENEAS

Miroslav Šlechta (*1971, slechta@sunstel.asu.cas.cz, Stellar Physics)

Research fields: Observational and computational astronomy, CCD data acquisition and reduction. History of natural sciences and astronomy. 1994 graduated from Charles Univ., Prague. 2001 PhD in Astrophysics at Charles Univ., Prague 1997-1998 employed at the Observatory and Planetarium of M.R.Stefanik, Prague. Since 1998 at the Astronomical Institute of the Academy of Sciences of the Czech Republic, v.v.i., stellar department. Since 2008 head of the technical group in stellar dept.

Vojtěch Štefka (*1980, stefka@ig.cas.cz, Galaxies and Planetary Systems, PhD sudent)

Research fields: Combination of Earth orientation parameters measured by modern space techniques and combined astrometric catalog (EOC-3) based on optical observations of latitude / universal time / altitude variations. 2005 - graduated in Geodesy from the Faculty of Civil Engineering of the Czech Technical University, Prague. Since 2006 PhD student under supervision of Prof. Jan Kostelecký.

Stanislav Štefl (*1955, sstefl@sunstel.asu.cas.cz, Stellar Physics)

Research field: Active B stars. Graduated in Astronomy from Charles University, Prague. 1986 PhD in Astronomy. 1991–1993 Research Associate at the European Southern Observatory, Garching bei München. Observing stays at ESO, La Silla, David Dunlap, Mt. Stromlo, Mt. John observatories. 2000–2003 chairman of the Organizing Committee of the IAU Working Group "Active B Stars". Member of consorcia of the MONS and Eddington space projects. Since November 2004 on long-term leave at the ESO Paranal Observatory.

Jiří Štěpán (*1980, stepan@asu.cas.cz, Solar Physics)

Research fields: Non-LTE polarized radiative transfer, atomic processes, chromospheric magnetic fields, solar flares, software development. He graduated summa cum laude in 2004 from the Faculty of Mathematics and Physics of the Charles University in Prague. 2008 Ph.D. in astrophysics from Observatoire de Paris-Meudon (France) and Charles University in Prague (advisors Petr Heinzel and Sylvie Sahal-Bréchot). Since 2008 postdoc position at Instituto de Astrofísica de Canarias (IAC), La Laguna, within the project Solar Magnetism and High-Precision Spectropolarimetry.

Rostislav Štork (*1969, stork@asu.cas.cz, Interplanetary Matter)

Research fields: Research fields: TV observation of faint meteors. 1993 graduated in Physics from Charles University, Prague. Since 1994 at the Astronomical Institute, Interplanetary Matter Department. 1998 PhD in Astrophysics at Charles University. 2000–2007 webmaster www.asu.cas.cz

Jan Štrobl (*1977, strobl@asu.cas.cz, Stellar Physics, PhD student)

Research fields: Cataclysmic variable stars – multispectral analysis, high-energy X-ray & gamma-ray sources data analysis, CCD sky monitors and related data analyses and interpretations. Member of the ESA INTEGRAL CVs working group, of the secondary INTEGRAL Science Data Centre team and of the BART robotic telescope team. 2002 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. Since 2002 PhD student at Charles University, supervisor: R. Hudec

Ladislav Šubr (*1972, subr@nbox.troja.mff.cuni.cz, Galaxies and Planetary Systems)

Research fields: Dynamics of dense stellar systems and Galactic nucelus. Graduated in 1995 at the Faculty of Mathematics and Physics, Charles university in Prague; got PhD in 2001 at the same institute. In 2006 post-doc at the Argelander Institut fuer Astronomie, University of Bonn; in 2007 Alexander von Humboldt fellow at the AIfA, Bonn.

Brankica Šurlan (*1974, brankica74@matf.bg.ac.rs, Stellar Physics, PhD sudent)

Michal Švanda (*1980, michal@astronomie.cz, Solar Physics)

Research fields: Velocity and magnetic fields in solar photosphere, helioseismology. In 2004 graduated from the Faculty of Mathematics and Physics of Charles University, Prague, 2007 finished PhD in astrophysics at the same institute under a supervision of M. Sobotka. Collaboration with Solar Oscillation Investigation group, Stanford University, Palo Alto (one month stays in 2006-2008), USA, Observatoire Midi Pyrénées, France, and Astrophysikalisches Institut Potsdam, Germany. Since 2009 on a postdoctoral stay at Max Planck Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany, in the independent junior helio- and asteroseismology research group.

Martin Topinka (*1976, toast@asu.cas.cz, Stellar Physics, PhD student)

Research fields: Cosmological gamma-ray bursts, magnetars, supernovae, AGNs – data analysis, models, statistics, numerical RMHD codes, non-linear physics. Member of the secondary INTEGRAL Science Data Centre and of the BART robotic telescope teams. 2002 graduated from the Faculty of Mathematics and Physics of Charles University, Prague. 2003-2007 PhD student at Charles University. Supervisors: R. Hudec, M. Karlický.

Pavel Trávníček (*1965, trav@ig.cas.cz, Solar Physics)

Research fields: Kinetic simulations (hybrid/Vlasov codes) of collisionless plasmas, kinetic processes in the interaction between plasma flows and planets and moons, temperature anisotropy driven instabilities in the solar wind and Earth's magnetosheath, shocks in collisionless plasmas. 1990 graduated from Czech Technical University, Prague. Since 1994 at the Institute of Atmospheric Physics, since 2006 also at Astronomical Institute of the Academy of Sciences of the Czech Republic. 1997 PhD in Mathematical Physics. 1998–2004 Deputy-head of Department of Space Physics at IAP, ASCR. 2005-2009 member of the Comission for information technologies ASCR. P.T. is a co-author of over 50 reffereed papers, Co-Investigator on two experiments of ESA CLUSTER II (WHISPER and PEACE), Co-Investigator on the ISL experiment of the ESA/CNES spacecraft Demeter, Principal Investigator of the DSLP experiment at ESA's Proba 2 spacecraft, collaborator of two

experiments on BepiColombo (MPPE and SERENA-PICAM), P.T. is also an Associate Scientist of the Atmosphere and Magnetosphere Group of NASA MESSENGER mission since 2007, lead Co-I of the Radio Plasma Waves (RPW) team of Solar Orbiter (Milan Maksimovic, LESIA, PI), and served/serves as Principal Investigator of five ESA PRODEX/PECS projects (related to CLUSTER II, Demeter, Proba 2 and BepiColombo missions) and two awards of NASA.

Marek Vandas (*1956, vandas@ig.cas.cz, Solar Physics)

Research fields: Magnetohydrodynamic simulations of interplanetary disturbances, acceleration of electrons by shock waves, magnetic clouds in the solar wind. 1980 graduated in Astronomy from Charles University, Prague. Since 1982 at the Astronomical Institute of the Czechoslovak Academy of Sciences. 1988 PhD in Astronomy, 1997 DSc in Astronomy. 1992-2000 Head of the Near-Earth Space Physics Department. Since 2000 member of the Solar Physics Department.

Michal Varady (*1965, varady@asu.cas.cz, Solar Physics)

Research fields: Solar flares, EUV and X-ray emission originating from flares, coronal loops. Numerical modelling: hydrodynamics of flare and coronal loops, transfer and dissipation of energy of high energy particle beams in solar atmosphere, hybrid codes – modelling of solar flares combined with radiative transfer. EUV and X-ray observations of solar flares: EUV and soft X-ray plasma diagnostics, high energy particle beams parameters from flare hard X-ray spectra. 1996 graduated in Astronomy and Astrophysics, 2002 PhD in Theoretical Physics, Astronomy and Astrophysics both from the Faculty of Mathematics and Physics of Charles University, Prague. Stays abroad: 1998 Goddard Space Flight Center in Greenbelt, USA, 2000 Max Planck Institute in Garching, Germany.

Jan Vondrák (*1940, vondrak@ig.cas.cz, Galaxies and Planetary Systems, emeritus)

Research fields: Numerical treatment of the Earth's rotation parameters, theoretical studies of the orbital motion of the Moon and rotational dynamics of the Earth (tidal and rotational deformations, planetary effects in precession-nutation, atmospheric and oceanic excitations of Earth orientation), linking Hipparcos reference frame to extragalactic system, combination of Earth orientation parameters measured by astrometric and modern space techniques, astrometric catalogs (combination of Hipparcos results with ground-based observations), ephemeris astronomy. 1962 graduated in Geodesy and Geodetic Astronomy from the Faculty of Civil Engineering of the Czech Technical University, Prague. 1973 PhD in Geodetic Astronomy. Since 1977 at the Astronomical Institute. 1983 three-month mission to the Bureau International de l'Heure in Paris. 1985 DSc in Astronomy. 1989 three-month mission to the U.S. Naval Observatory, Washington D.C. (Dept. Of Time Service and Earth Orientation). 1991–1994 Head of the Dept. Of Dynamics of Solar System; 1991–1992 six-month mission to the CNRS URA1125, Observatoire de Paris. 1998–2004 Chairman of the Czech National Committee for Astronomy of the IAU. 2000–2005 Deputy Director of the Astronomical Institute for Foreign Contacts. 2001–2004 Chairman of the Directing Board of the IERS. Since 2005 Czech National Representative to ICSU (International Council for Science). Since 2006 President of IAU Division I (Fundamental Astronomy).

Viktor Votruba (*1977, votruba@.physics.muni.cz, Stellar Physics)

Research fields: Radiation hydrodynamics, theory of radiatively driven stellar winds from hot stars, multicomponent stellar wind, numerical simulations, various type of instabilities in stellar wind, nonlinear dynamics. 2000 graduated from the Faculty of Natural Science of Masaryk University, Brno. Author of the computer code for computing Lyapunov's exponent and reconstruction of the phase portrait in chaotic systems and code for simulation of multicomponent stellar wind. 2006 PhD in Theoretical Physics and Astrophysics at Masaryk University.

Richard Wünsch (*1977, richard@wunsch.cz, Galaxies and Planetary Systems)

Research fields: radiation-hydrodynamic simulations, self-gravity, grid-based codes; interstellar matter, starformation, expanding shells and supershells; planet formation, protoplanetary discs, layered discs; super starcluster winds, thermal instability. 2000 graduated from theFaculty of Mathematics and Physics of Charles University,Prague. 2003 PhD in Theoretical Physics, Astronomy andAstrophysics at Charles University. 2004 - 2005 postdoc stay at Nicolaus Copernicus Astronomical Center, Warsaw, Poland.2007 - 2008 postdoc stay at Cardiff University, Cardiff, UK. Member of International Astronomical Union.

XIV Visitors of the institute

Name	*Country*	*Duration*
10 students	Serbia	52 days
Abramowicz M.	Sweden	18
Anzer U.	Germany	28
Baggaley J.	New Zealand	5
Balthasar H.	Germany	2
Balucinska M.	UK	2
Barra V.	France	4
Bennert N.	USA	5
Berlicki A.	Poland	69
Bianchi S.	Italy	7
Bisbas T.	UK	7
Bonev T.	Bulgaria	3
Borges F.	Belgium	9
Cvetinovič A.	Serbia	20
Cvetkovič M.	Serbia	20
Czerny B.	Poland	26
Čapanov J.	Bulgaria	14
Čelič E.	Serbia	20
Dale J.	UK	11
Darbon A.G.	France	11
Das T.K.	India	24
Dejanič S.	Serbia	20
Dolla L.	France	6
Dorotovič I.	Slovakia	6
Dortevič K.	Serbia	20
Dudík J.	Slovakia	63
Dzifčáková E.	Slovakia	4
Eckart A.	Germany	3
Elvis M.	USA	6
Falocco S.	Italy	8
Feldmeier A.	Germany	10
Fernandes M.B.	Belgium	9
Fernandes M. B.	France	9
Floberghagen R.	The Netherlands	3
Fogelström S.	Sweden	11
Fukushima T.	Japan	8
Geranios A.	Greece	5
Gerlach E.	Germany	16
Goncalves A.	France	8
Guainazzi M.	Spain	11
Heber U.	Germany	5
Hubber D.	UK	7
Husárek M.	Slovakia	9
Chapanov J.	Bulgaria	14
Church M.	UK	2
Iliev L.	Bulgaria	41
Isik E.	Turkey	66
Jejčič S.	Slovenia	36
Juda M.	USA	6
Kaskapova L.	Russia	4
Kitsionas S.	Germany	2
Kluzniak W.	Poland	13
Kokhirova G.	Tajikistan	15
Kolomaki S.	Poland	271

Köppen J.	Germany, France	36
Kőppen J.	France	17
Korany B.	Egypt	15
Kouba J.	Canada	9
Kovačevič A.	Serbia	30
Kreykenbohm I.	Germany	4
Krivtsov A.	Russia	14
Kulinová A.	Slovakia	12
Kuprjakov J.	Russia	225
Kusnierz W.	Poland	21
Labrosse N.	UK	4
Langhans R.	Germany	4
Levin L.	Sweden	11
Llorca J.	Spain	7
Lukač D.	Serbia	20
Luoni M.L.	Argentina	25
Marjanovič R.	Serbia	20
Markov V.	Serbia	20
Martocchia A.	Italy	5
Matt G.	Italy	18
Meyer L.	Germany	3
Michalska G.	Poland	8
Milič I.	Serbia	40
Miljkovič T.	Serbia	20
Molenda-Žakowicz	Poland	3
Mouchet M.	France	16
Muleri F.	Italy	8
Muňoz-Tuňon C.	Spain	5
Murphy K.	USA	25
Nakamura Y.	Japan	7
Nedeljkov O.	Serbia	20
Nemeth P.	USA	25
Niemcura E.	Poland	289
Nouh M.	Egypt	14
Onič D.	Serbia	20
Pavlovski K.	Croatia	14
Perez E.	Spain	9
Petrov N.	Bulgaria	3
Ponti G.	Italy	10
Potthoff H.	Germany	3
Priebisch T.	Germany	3
Pustylnik I.	Estonia	7
Radziszewski K.	Poland	5
Randelovič D.	Serbia	20
Rehola R.	Finland	3
Reid P.	USA	6
Rob P.	USA	6
Rompolt B.	Poland	5
Rovira M.	Argentina	21
Rozanska A.	Poland	7
Rozanska A.	Poland	8
Rudway P.	Poland	5
Rutten R.J.	The Netherlands	6
Saad M.	Egypt	16
Sakai J.	Japan	15
Selim I.	Egypt	21
Schmieder B.	France	6
Schmieder B.	France	5
Schmieder B.	France	13
Schnurr O.	UK	4
Schödel R.	Germany	3
Schwartz D.	USA	6
Silich S.	Mexico	9
Silich S.	Mexico	7
Sillaanpaa A.	Finland	3
Slapak R.	Sweden	11
Stande J.	Germany	2
Straub O.	Poland	7
Svoreň J.	Slovakia	9
Sych R.	Russia	22
Sýkora J.	Slovakia	2
Szalai T.	Hungary	2
Šegan S.	Serbia	4
Šuljak D.	Austria	5
Šurlan B.	Serbia	31
Šurlan B.	Serbia	3
Šurlan B.	Serbia	21
Šurlan B.	Serbia	20
Šurlan B.	Serbia	18
Tagle T.G.	Mexico	6
Tagle T.G.	Mexico	11
Tomič S.	Serbia	20
Trigo J.M.	Spain	7
Tsiropoula G.	Greece	8
Tziotziou C.	Greece	8
Vennes S.	USA	30
Vennes S.	USA	48
Vial J.C.	France	5
Vidojevič S.	Serbia	20
Whitworth A.	UK	6
Yaramov K.	Bulgaria	3
Zamaniasab M.	Germany	3
Zamaninasab M.	Germany	20
Zdolšek S.	Serbia	20
Zhang W.	USA	6
Zycki P.	Poland	4