



Fyzikální ústav Akademie
věd České republiky
Institute of Physics of the
Czech Academy of Sciences

CELOÚSTAVNÍ SEMINÁŘ FZU COLLOQUIUM

9. 2. 2023 | 13:00

Přednáškový sál SOLID21 | Lecture Hall SOLID21
Pod Vodárenskou věží 1, Praha 8

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Nuclear fusion with lasers and related science

“From the recent breakthrough at the National Ignition Facility (NIF) to a new European Pathway for Laser-Fusion in EU”

The Inertial Confinement Fusion method represents one of the most reliable approaches to obtain nuclear fusion on the earth. The idea is to confine plasma with lasers following the same principle that gravity does in the stars.

On the 5th of December 2022 at the Lawrence Livermore Laboratories the first demonstration of the laser-fusion was obtained within the National Ignition Campaign in which a total Energy Gain (Fusion energy over Laser energy) of 1.5 has been reached.

The laser fusion community was waiting for such a relevant result since the beginning of the NIF campaign in 2009 to start a proper Inertial Fusion Energy (IFE) program that must be based on more advanced laser-fusion schemes. The main goal is to reach energy gains greater than 100 at a minimum repetition rate of 10 Hz to reach the minimum conditions for positive energy production.

Europe must take the opportunity to be a relevant player in the field by starting a proper IFE program. Recently the EU laser-fusion community launched an initiative (The Hiper plus) to facilitate the constitution of an EU project to investigate new schemes for fusion energy which main starting point is the experience of the Hiper project. Hiper was included in the ESFRI map, however, later on it was closed mainly due to the lack of results in the NIF.

Laser fusion includes several fields of investigation among which: laser plasma and particle acceleration, High Energy Density and Warm Dense Matter (WDM), Astrophysics and Planetology, material science and nuclear physics. With respect to this, recent results on Ion stopping power in WDM relevant for laser fusions will be presented.