SEMINÁŘ OTF ÚJF, ŘEŽ

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Big Bang treated as quantum catastrophe

Abstrakt

All attempts of a consistent buildup of the quantum theory describing the evolution of the Universe near its Big Bang (BB) singularity encounter numerous no-go obstacles. Some of them (e.g., Big Bounce theory) will be listed and shown inconclusive,

We shall proceed constructively and using drastic simplifications of course. First of all, the realistic, continuous 4D space-time will be replaced, in a cynically non-covariant manner, by the discrete set of representative time-dependent spatial grid points. Their classical distances $x(t), y(t), \ldots$ will have to vanish in the BB limit $t \to 0^+$ of course. The latter measured/prescribed quantities have to be quantized. Thus, we shall pick up a friendly Hilbert space $\mathcal{H}^{(F)}$ and replace the classical observables by operators $X(t), Y(t), \ldots$ in this space, with real (i.e., potentially measurable) eigenvalues $x_n(t), y_m(t), \ldots$, respectively.

The existence of the correct BB quantum singularity *alias* catastrophe *alias* phase transition will be guaranteed by having the operators non-Hermitian. This implies that the standard requirements of quantum theory will have to be re-installed by a generalized, time-dependent Freeman Dyson's trick: (a) we declare the initial space unphysical, (b) the second, standard physical Hilbert space $\mathcal{H}^{(S)}$ will be *constructed* via an update of the inner-product metric $\Theta(t)$.

The rest of the story will be clarified using several solvable benchmark examples. In particular, during a schematic return to BB singularity we shall show that and how the backward-running reconstruction of the time-evolution of the observables during the (finite) Inflation Period is related to the emergence and growth of the anisotropy of the inner geometry of the physical Hilbert space.

Seminář se koná v pátek 2. 10. 2015 v 10:30 hod.
v seminární místnosti OTF ÚJF Řež

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