Mathematical Physics in the Heart of Germany III

03.05.2024 @ Friedrich Schiller Universität Jena

HS5 Abbeanum (Fröbelstieg 1, 07743 Jena)

10.00 – 10.30 Welcome & Coffee

10.30 – 11.20 Marcel Schmidt (Leipzig)
Criticality Theory

11.30 – 12.20 Jens Hoppe (Braunschweig)
Relativistic membranes and the fast non-commutative sharp drop

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Workshop Lunch @ Landgrafen Jena

14.40 – 15.30 Marcel Griesemer (Stuttgart)
Infraparticle scattering in the confined massless Nelson model

Coffee Break

16.00 – 16.50 Luca Fresta (Bonn)
Dynamics of Extended Fermi Gases at High Density

17.00 – 17.50 Jobst Ziebell (Jena)
Wetterich's Equation and Renormalisation

Abstracts

Marcel Schmidt (Leipzig): *Criticality Theory*

TBA

Jens Hoppe (Braunschweig): *Relativistic membranes and the fast non-commutative sharp drop*

Infinitely many axially symmetric time-like minimal hypersurfaces in 4-dimensional space-time are constructed, as well as new matrix model solutions.

Marcel Griesemer (Stuttgart): *Infraparticle scattering in the confined massless Nelson model*

The confined, massless Nelson model is infrared singular in the sense that it has no ground state. This is expected to be accompanied with the emergence of infraparticles with a diverging number of soft photons as time evolves. We give a simple construction of such infraparticle states and we prove their asymptotic completeness assuming that asymptotic completeness holds for the Nelson model in an infrared regular (non-Fock) representation of the CCR.

Luca Fresta (Bonn): *Dynamics of Extended Fermi Gases at High Density*

In my talk, I will discuss the quantum evolution of many-body Fermi gases confined in arbitrarily large domains, focusing on a high-density/semiclassical scaling regime. I will show that, as the density approaches infinity, the many-body evolution of the reduced one-particle density matrix converges to the solution of the Hartree equation, with convergence rate depending on the density only. The result holds for short macroscopic times for non-relativistic particles, but extends to arbitrary times in the case of pseudo-relativistic dispersion. Joint work with Marcello Porta and Benjamin Schlein.

Jobst Ziebell (Jena): *Wetterich's Equation and Renormalisation*

I will present Wetterich's flow equation that formally connects the classical action and the quantum effective action via an infinite-dimensional PDE. The equation may be derived in a rigorous fashion for many regularised models. It will be shown how the validity of the equation in the non-regularised case is connected to renormalisation.