MP 8: Field Theory

Zeit: Mittwoch 18:10–19:10 Raum: Z6 - SR 1.012

MP 8.1 Mi 18:10 Z6 - SR 1.012

Multi-soliton theory of matter in 1+1+2 dimensions — •Ingo Steinbach and Julia Kundin — Ruhr-Universiy Bochum, ICAMS

Soliton solutions of non-linear wave equations have been intensively studied as candidates to formulate elementary particles in a monistic, field-theoretical framework. The presentation reviews shortly the main theoretical background of soliton solutions. An explicit solution of a chain of elementary particles in 1+1 dimensions is constructed [I. Steinbach, arXiv:1703.05583v2, 2017]. Along the concept of 'interface fields' [I. Steinbach, F. Pezzolla, Physica D, 385-393, 1999], these solutions will be generalized to a 'multi-soliton network' in 1+1+2 dimensions. Based on similarities between the energy functionals in the soliton theory and the theory of superconductivity an extension to charged particles in electro-magnetic fields will be discussed.

MP 8.2 Mi 18:30 Z6 - SR 1.012

Conditions for Regular Black Holes — Piero Nicolini[1,2] and •Michael Florian Wondrak[1,2] — [1]Frankfurt Institute for Advanced Studies (FIAS), Frankfurt am Main, Germany — [2]Institut für Theoretische Physik, Johann Wolfgang Goethe-Universität Frankfurt am Main, Frankfurt am Main, Germany

Black hole spacetimes typically exhibit a curvature singularity in the central region. The corresponding divergence in the energy density indicates that general relativity provides no appropriate description in such regions.

Several black hole models inspired by quantum gravity introduce a minimal length. They turn out to avoid singularities and to be regular instead. In this talk we study conditions to be imposed on the energy-momentum tensor in order to ensure regular black hole spacetimes.

MP 8.3 Mi 18:50 Z6 - SR 1.012

From spacetime symmetries to "good tetrads" in teleparallel gravity — •Manuel Hohmann — Universität Tartu, Tartu, Estland

General teleparallel theories of gravity, which have originally been formulated in terms of a tetrad only, can be formulated covariantly with respect to local Lorentz transformations by introducing a flat spin connection as an additional gauge degree of freedom. The corresponding field equations are similar for a wide range of theories and can be solved either by a suitable spin connection, or in the Weitzenböck gauge of vanishing spin connection by a suitable ("good") tetrad. We discuss the geometric meaning of this condition, and show how spacetime symmetries can aid in solving the connection field equations. A number of example solutions will be provided.