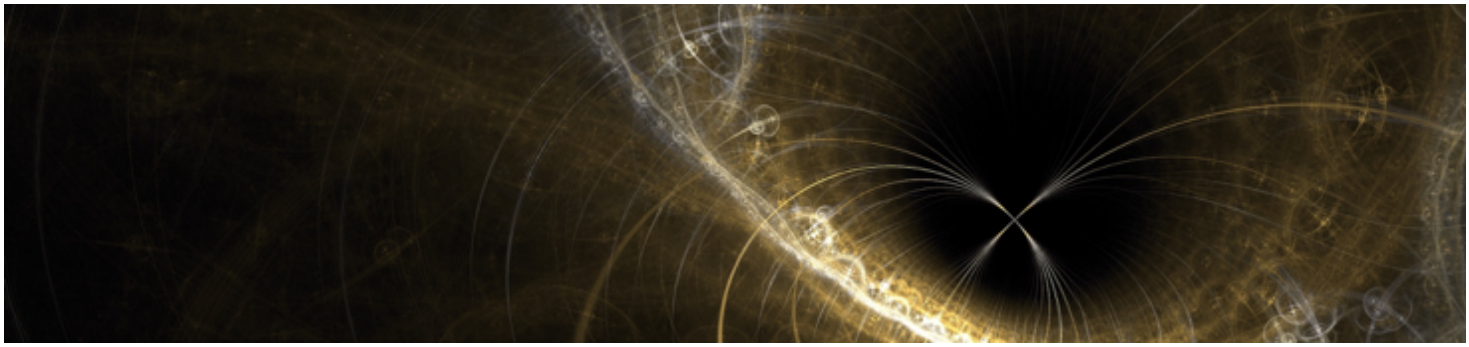
Theory



February 4, 2022

» About ~ Program ~ Talks

About

This event is organized alternately each seminar by the groups of Dirk - André Deckert (LMU), Wojciech Dybalski (U Poznań), Felix Finster (U Regensburg), and Peter Pickl (U Tübingen).

The event will take place on Zoom: Please, join us on Zoom here.

Program

Time	Event	Description
13:20-13:30	Opening	Welcome and gathering before the talks
13:30-14:30	Talk	Daniela Cadamuro: Fermionic integrable models and graded Borchers triples
14:30-15:00	Discussion break	BYO coffee and cookies
15:00-16:00	Talk	Miguel Ballesteros: Levinson Theorem for Matrix-Valued Shrödinger Operators on the Discrete Line
16:00-16:30	Discussion break	BYO coffee and cookies
16:30-17:30	Talk	A. Shadi Tahvildar-Zadeh: Classical and Quantum Laws of Motion for Singularities of Spacetime
17:30-18:00	Discussion break	BYO coffee and cookies
18:00 and possible open end	Closing	Final discussion, get-together, clsoing

Talks

Fermionic integrable models and graded Borchers triples

Speaker: Daniela Cadamuro (U Leipzig)

Abstract: We present a construction of 2D quantum field theories with asymptotic fermionic particles in the operator-algebraic framework by using the notion of a "graded" Borchers triple. The non-triviality of the graded local algebras is still implied by the usual modular nuclearity condition, since this is unchanged under the grading. Only the even part of such algebra is observable, even if it lacks Haag-duality. We apply Haag-Ruelle scattering theory in the version that uses wedge-local operators, and show that the asymptotic particles are indeed fermionic. Finally, we provide an explicit example of such construction in the context of quantum integrable models in 1+1 dimensions, and discuss the characterization of the local observables in these models, and therefore also the connection to the form factor programme.

Levinson Theorem for Matrix-Valued Shrödinger Operators on the Discrete Line.

Speaker: Miguel Ballesteros (UNAM Mexico City)

Abstract: We study spectral and stationary scattering theories for matrix-valued Shrödinger operators on the discrete real line. We derive formulas for the scattering matrix in the band edges in both: the exceptional and the generic cases. In the exceptional case, the so-called half bound states appear (they are generalized eigenvectors that are not square summable, but they are bounded). We prove a formula that relates scattering data to bound and half-bound states in the Levinson Theorem.

Classical and Quantum Laws of Motion for Singularities of Spacetime

Speaker: A. Shadi Tahvildar-Zadeh (U Rutgers)

Abstract: I will report on recent progress towards a fully relativistic quantum-mechanical theory of motion for a fixed, finite number of electrons, photons, and their anti-particles. I will briefly explain the necessary conditions under which worldlines of charged particles can be identified with time-like singularities of spacetime, and show examples of classical as well as quantum theories of motion for them. I will present a unifying framework for defining a quantum-mechanical wave function that guides the motion of a particle, regardless of whether it is a boson or a fermion, and use that to obtain a Lorenz-covariant system of multi-time wave equations for an interacting two-body system in one space dimension, comprised of one electron and one photon. I will demonstrate that the corresponding initial-boundary-value problem is well-posed, and that the resulting electron and photon trajectories behave in a way that is consistent with Compton scattering. I will conclude with some future directions to pursue.