MATTHIAS LIENERT, University of Tuebingen

A new kind of interacting quantum dynamics via integral equations for a relativistic two-particle wave function

In this talk, I present a new kind of interacting Lorentz invariant quantum dynamics which can be formulated using integral equations for a relativistic two-particle wave function $\psi(x_1, x_2)$ depending on two spacetime points $x_1, x_2 \in \mathbb{R}^4$. This idea is related to the Bethe-Salpeter equation of quantum field theory (but not identical to it). Such integral equations make it possible to express direct interactions with time delay at the quantum level. In the retarded case, the integral equations attain a Volterra-type structure and we were able to prove the existence and uniqueness of solutions for simple models.
This is joint work with Roderich Tumulka.