

# Particle creation and annihilation in terms of interior-boundary conditions: 1D models

**Martin Sieber (University of Bristol)**

joint work with Stefan Keppeler (University of Tübingen)

Abstract: Recently, Teufel und Tumulka proposed a novel formulation of quantum field theories where particle creation and annihilation is modelled in terms of conditions coupling Fock space sectors with different numbers of particles. In simple models these interior-boundary conditions (IBCs) avoid ultraviolet divergencies that are associated with conventional formulations using creation and annihilation operators. They lead to formulations that are automatically ultraviolet finite and equivalent to the conventional renormalised theory.

Teufel and Tumulka studied models in three spatial dimensions in which non-relativistic scalar particles can be created and annihilated at external sources. We consider simple models in one dimension for which many calculations can be done explicitly. For these models, we derive explicit solutions for spectra, (generalised) eigenfunctions, Green function and a trace formula. Moreover, we introduce a quantum graph version of IBC-Hamiltonians that describes particle creation and annihilation on quantum graphs.