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Mean-field Dynamics for the Nelson model with Fermions

The Nelson model (with ultraviolet cutoff) describes a quantum system of non-relativistic identical particles coupled to a quantized scalar field. In this talk, I would like to discuss its time evolution in a mean-field limit of many fermions which is coupled to a semiclassical limit. At time zero, we assume that the bosons of the radiation field are in a coherent state and that the state of the fermions is given by a Slater determinant, whose reduced one-particle density matrix is an orthogonal projection with semiclassical structure. At later times and in the limit of many fermions it can be proven that the fermion state remains close to a Slater determinant and that the time evolution is approximately described by the fermionic Schrödinger-Klein-Gordon equations. I will introduce the mentioned models and explain our main theorem. The talk is based on work in progress with Sören Petrat.