

Mathematisches Oberseminar *PDG und Spektraltheorie* (WiSe 2013/14).

Date: 05.12.2013.

Time and place: 14:15 in B 134.

Speaker: Oliver Matte (Aarhus University & LMU).

Titel: *Stochastic differential equations associated with the standard model of nonrelativistic quantum electrodynamics.*

Abstract:

The standard model of nonrelativistic quantum electrodynamics describes quantum mechanical matter particles (electrons) interacting with a quantized radiation field (photon field). The corresponding Hamiltonian can be considered as a Schrödinger operator for the matter particles perturbed by certain non-commuting operators acting in a bosonic Fock space. We derive and discuss stochastic differential equations associated with the heat semi-group of this model. In particular, we re-derive Feynman-Kac type formulas for spinless matter particles and obtain new Feynman-Kac formulas involving series of time-ordered integrals of certain annihilation-preservation-creation processes when the electron spin is taken into account. Moreover, we discuss stochastic differential equations and Feynman-Kac representations for an operator-valued integral kernel of the semi-group. Applications to the study of regularity properties of the semi-group and its integral kernel will be mentioned.

The talk is based on joint work with Batu Güneysu and Jacob Schach Møller.

Thomas Østergaard Sørensen