Contribution ID: **18** Type: **not specified**

MCQM Seminar: Marco Merkli (Memorial University of Newfoundland)

Wednesday, 13 December 2023 14:15 (1 hour)

Title: Open quantum system dynamics and metastability

Abstract: We consider the paradigmatic model of an open quantum system, an N-level system in contact with a thermal Bose field (reservoir) and study the evolution of the system-reservoir complex. We show that under suitable conditions the ubiquitous Born and Markov approximations – that is, the markovian master equation – can be proven to hold on all time scales. In case there is correlation between the system and the reservoir in the initial state, our results show that the markovian master equation is still valid, that the correlations decay in time and that after the decay, the Born approximation becomes valid. We will explain the results first and then present the main ideas of the mathematical methods used to show them. We will focus in particular on the dynamical resonance theory, which describes the effective dynamics of the N-level system in terms of metastable states (slowly decaying in time) arising from perturbation of unstable bound states of the non-interacting system-reservoir complex.