Speaker: **Lucas Weitzel Dutra Souto, University of Freiburg**

Title: **Generalized pseudomode theory for lossy cavities**

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Place: **Lesesaal Bibliothek/Library Westbau, 1st floor, Hermann-Herder-Str. 3a**

Title: **Generalized pseudomode theory for lossy cavitiesAbstract:**

In the present work, we address the problem of theoretically describing the dynamics of a quantum system within a general, realistic cavity, that is, with arbitrary geometry, composition and losses. We present a first-principles formalism that replaces the frequency-continuum electromagnetic field with a finite set of auxiliary discrete modes --- the pseudomodes --- which, nevertheless, encompasses the exact same dynamics for the matter system. In addition, our method is non-perturbative, that is, it does not rely on any assumptions regarding the strength of the light-matter interaction or the cavity's coupling to the external environment. Our approach generalizes the standard methods found in the literature, as it takes into account the position degree of freedom of the quantum system itself, and it is applicable even in the case of highly-lossy cavities. Finally, as a prospect, the former characteristic makes our approach ideal to theoretically tackle setups featuring spatially-extended quantum systems within a cavity.