

Axel Lode

Fragmented Superradiance of a Bose-Einstein Condensate in an Optical Cavity and Introduction to MCTDH-X for atoms in cavities<sup>1</sup>

<sup>1</sup>the multiconfigurational time-dependent Hartree method for indistinguishable particles

The Dicke model and the superradiance of two-level systems in a radiation field have many applications. Recently, a Dicke quantum phase transition has been realized with a Bose-Einstein condensate in a cavity. We numerically solve the many-body Schrödinger equation using MCTDH-X and study correlations in the ground state of interacting bosons in a cavity as a function of the strength of a driving laser. Beyond a critical strength, the bosons occupy multiple modes macroscopically while remaining superradiant. This fragmented superradiance can be detected by analyzing the variance of single-shot measurements.