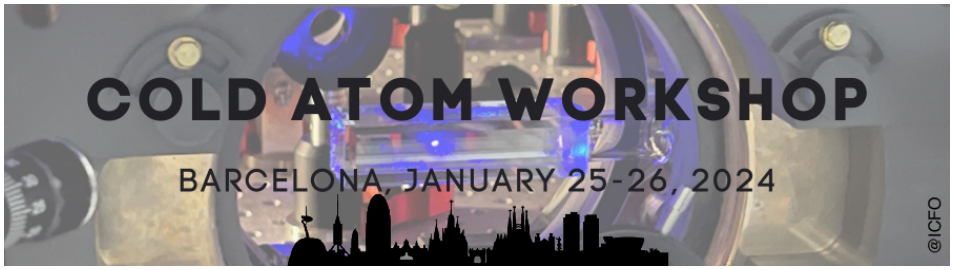

Contribution ID: **11** Type: **not specified**

Out-of-equilibrium quantum phase separation in free-space atomic ensembles

Thursday 25 January 2024 12:50 (20 minutes)

The driven Dicke model, wherein an ensemble of atoms is driven by an external field and undergoes collective spontaneous emission due to coupling to a leaky cavity mode, is a paradigmatic model that exhibits a driven dissipative phase transition as a function of driving power. Recently, a highly analogous phase transition was experimentally observed, not in a cavity setting, but rather in a free-space atomic ensemble. Motivated by this, we present our ongoing efforts to better characterize the free-space problem, and understand possible differences compared to the cavity version. We specifically discuss a cavity QED model with weak local dissipation as a minimal model for the free space. We find that the presence of local dissipation dramatically changes the properties of the phase transition. In particular, we present preliminary arguments that suggest that the free-space case might exhibit a smooth crossover rather than a true phase transition in the thermodynamic (large atom number) limit.

Presenter: GONCALVES (ICFO - THE INSTITUTE OF PHOTONIC SCIENCES), Daniel

Session Classification: Day 1