Superradiance Lattice

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Superradiance lattices (SLs) provide a new platform for quantum simulation in atoms [1,2]. The SL is composed by phase correlated collectively excited states of atoms, i.e., timed Dicke states (TDSs). The phase correlation between atoms in a TDS is characterized by a wavevector of the total momentum transferred from lasers to atoms in preparing this state. Therefore, TDSs with different wavevectors, which are referred as momenta, can be coupled by multiple lasers in electromagnetically induced transparency (EIT) to realize arbitrary dimensional SLs in momentum space. Since the phase correlation of the atoms is robust to the center of mass motion, in stark contrast to optical lattices of cold atoms, SLs can be implemented in room temperature atoms. In this talk, I will introduce the recent experimental progress in superradiance lattices, including the observation of chiral edge currents [3], flat-band localization [4], Zak phase measurement [5] and dynamic localization.

References

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