Abstract Submitted
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Probing, quantifying, and freezing coherence in room temperature atoms[1] ARIF WARSI LASKAR, NIHARIKA SINGH, PRATIK ADHIKARY, ARUNABH MUKHERJEE, SAIKAT GHOSH, Indian Institute of Technology Kanpur — Stable superposition of quantum states is the building block of quantum technologies and protocols, and the ability to generate and control such states provide distinct advantages when compared to their corresponding classical counterpart. Accordingly, there has been a major research thrust in distilling and quantifying such coherence in recent years. A widely used technology to generate such stable superposition in atom-like system is electromagnetically induced transparency (EIT). Till now, superposed states in EIT have been probed spectroscopically, through its signature of narrow transparency window in probe absorption profile. Here, we propose and experimentally explore a single shot, time domain measurement technique to quantify the generated coherence in EIT system of a dilute atomic ensemble at room temperature. The quantifier captures the effective ground state coherence and identifies two distinct regimes of EIT and Autler–Townes splitting (ATS). Using this quantifier as an indicator, we further demonstrate a mechanism to phase coherently control and freeze coherence by introducing an active decay compensation channel in the system. In the growing pursuit of quantum technologies at room temper, our results provide a unique way to phenomenologically quantify and coherently control quantum coherence in atom-like systems.

Reference:A. W. Laskar, N. Singh, P. Adhikary, A. Mukherjee, and S. Ghosh, Optica 5, 1462 (2018).

[1]Department of Science and Technology, Ministry of Science and Technology (DST) (SERB/PHY/2015404

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