

Abstract Submitted  
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**Single Photon Modulation by the Collective Emission of an Atomic Chain** ZEYANG LIAO, M. SUHAIL ZUBAIRY, Institute for Quantum Science and Engineering (IQSE) and Department of Physics and Astronomy, Texas A&M University, College Station, TX 77843-4242 — We study the collective spontaneous emission of a linear atomic chain excited by a single photon. The interaction between the atoms and the common vacuum field can significantly change the eigenenergy and the spontaneous emission rate of the system. The system can be in the superposition of the super-radiant and sub-radiant modes which results in the non-exponential decay dynamics. The emitted photon can be either super-radiant photon or sub-radiant photon, and we can also tune their frequency and linewidth by simply changing the polarization of the incident photon or the atomic separation.

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