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Nonvolatile atomic memory in the spontaneous scattering of light from cold atoms DANIEL FELINTO, RAONI S. N. MOREIRA, PAULO J. CAV-ALCANTI, Universidade Federal de Pernambuco, PABLO L. SALDANHA, Universidade Federal de Minas Gerais, JOSE W. R. TABOSA, Universidade Federal de Pernambuco — We report an experimental investigation of the spontaneous scattering of light at a certain angle from an ensemble of cold two-level atoms, obtained from a magneto-optical trap of Rubidium 87 atoms. We report the observation of correlations between photons scattered by consecutive laser pulses detuned from the atomic resonance. Such correlations lead to an enhancement of probability to detect other photons in the same direction once a first one is observed, and after storage in the atomic system. They last considerably longer than the excited state lifetime and are robust to changes in the reading process, pointing to the crucial role of recoil-induced resonances in such simple systems. We propose a theoretical model for the mechanism of this memory that allows a more concrete interpretation for its nature.

Daniel Felinto
Universidade Federal de Pernambuco

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