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Superfluorescence from Laser-Cooled Atoms[1] E. PARADIS, B. BARRETT, A. KUMARAKRISHNAN, York University, R. ZHANG, G. RAITHEL, University of Michigan — We have observed temporally resolved superfluorescence (SF) from samples of laser-cooled Rubidium atoms. The atomic system was excited to the 5D level from the ground state by a two-photon process, involving excitation laser pulses tuned to the vicinity of the 5S-5P and 5P-5D transitions. We observe time-delayed signals on the 6P-5S transition at 420nm. The delay time of these pulses $\sim N^{-1}$, where N is the atom number. These time delays are much smaller than expected for the case of cascade fluorescence. Since N is significantly smaller than the threshold number for SF on this transition, our observations suggest that the 420nm emission is triggered by rapid de-excitation of the 5D level through SF at 5.2μm. If the shape of the trapped sample is changed from a sphere to a cigar, we observe that the signal changes from being isotropic to being strongly enhanced along the long axis of the sample. We also discuss the properties of the SF emission by varying the temporal sequence of the excitation pulses.

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Eric Paradis
York University

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