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Two Photon Excitation of Rydberg States in a MOT JASON DAY, ERIK BREKKE, THAD WALKER, University of Wisconsin-Madison — We observe the generation of Rydberg atoms in a MOT via trap loss. In the course of this work two different excitation schemes were used: A two step resonant excitation and an off-resonant two photon excitation - detuned by 1.2 GHz from the $5P_{3/2}$ state - both through the use of 780 nm 5S-$5P_{3/2}$ light and 480 nm $5P_{3/2}$-ns,d_J light. Final states of n=30, 50, and 70 were reached and for each state the trap loss as a function of the 480 nm laser power was measured. The lineshape of the transition was measured by slowly scanning the frequency of the excitation laser. This method reveals the significant difference in the lineshapes for off-resonant two-photon excitation as opposed to the two step process. The two-photon Rabi frequency is sufficient to power broaden the line profiles, which at low power have widths less than 5 MHz. This work was supported by the NSF and NASA.

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