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**Direct spatial imaging of blockade effects in a cold Rydberg gas**[1]

ANDREW SCHWARZKOPF, RACHEL SAPIRO, GEORG RAITHEL, University of Michigan — Recently, there has been interest in blockade effects in cold Rydberg gases. Previously, the dipole blockade has been shown to cause a saturation of the Rydberg atom number in atom samples, as well as a narrowing of the excitation number statistics. In the experiment described in this poster, it is planned to measure structures in the Rydberg pair correlation function predicted in [1]. To achieve sufficient spatial magnification, we use the principle of field ion microscopy. In our apparatus, a tungsten tip is placed close to a cold atom cloud in which several Rydberg excitations are prepared using a narrow- linewidth laser. To read out the sample, the tip voltage is suddenly switched to a high value. The Rydberg atoms are field- ionized, and the resultant ions are projected onto a nearby position-sensitive detector. Image analysis reveals structures in the spatial pair correlation function. [1] F. Robicheaux and J. Hernandez, "Many-body wave function in a dipole blockade configuration," Phys. Rev. **A 72**, 63403, 1-4 (2005).

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