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Rydberg three-body recombination experiments in a Penning trap[1] ERIC PARADIS, CORNELIUS HEMPEL, MALLORY TRAXLER, GEORG RAITHEL, University of Michigan — In this poster, we present work towards observing three-body recombination in a Penning trap (B $\sim$ 3 T). Recombination is an important mechanism in anti-hydrogen formation. The rate of recombination of Rydberg atoms is strongly dependent on the electron temperature ($\sim n_e^2 T^{-9/2}$), and has been numerically calculated for various magnetic fields and electron energies [1]. In our experiment, Rubidium atoms are ionized at the center of the trap, using a narrow-band ($<\sim$ 5MHz linewidth) cw excitation laser. Due to the long lifetime of the Penning trap ($\tau \sim$ 100s), electron accumulation leads to a high electron density, and cyclotron cooling to a low electron temperature (close to the 4 K background temperature). A field ionization ramp is applied to analyze the state distribution of Rydberg atoms formed in the ion-electron plasma. [**1**] "Three-body recombination for protons moving in a strong magnetic field," F. Robicheaux and James D. Hanson, Phys. Rev. A **69**, 010701 (2004).

[1]DOE

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