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Design of a Magnetic Reconnection Experiment in the Collisionless Regime[1] JAN EGEDAL, A. LE, P. MONTAG, O. OHIA, A. VRUBLEVSKIS, MIT, W. DAUGHTON, LANL — A new model for effective heating of electrons during reconnection is now gaining support from spacecraft observations, theoretical considerations and kinetic simulations [1]. The key ingredient in the model is the physics of trapped electrons whose dynamics causes the electron pressure tensor to be strongly anisotropic [2]. The heating mechanism becomes highly efficient for geometries with low upstream electron pressure, conditions relevant to the magnetotail. We propose a new experiment that will be optimized for the study of kinetic reconnection including the dynamics of trapped electrons and associated pressure anisotropy. This requires an experiment that accesses plasmas with much lower collisionality and lower plasma beta than are available in present reconnection experiments. The new experiment will be designed such that a large variety of magnetic configurations can be established and tailored for continuation of our ongoing study of spontaneous 3D reconnection [3]. The flexible design will also allow for configurations suitable for the study of merging magnetic islands, which may be a source of super thermal electrons in naturally occurring plasmas.

[1] J Egedal et al., Nature Physics, 8, 321 (2012).

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