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Study of Ion heating and acceleration in magnetic reconnection and laboratory flux loop experiments at MRX ERDEM OZ, MASAAKI YAMADA, SETH DORFMAN, HANTAO JI, JONGSOO YOO, Princeton Plasma Physics Laboratory — Although it has been studied for many decades there is no comprehensive theoretical model that describes particle heating and acceleration commonly observed in space and astrophysical plasmas. Magnetic reconnection is considered to be the main process that causes ion heating and acceleration; however, the fundamentals of reconnection heating mechanism is not yet well understood. In the Magnetic Reconnection Experiment, we recently built a new type of ion Doppler spectroscopy probe in order to measure local ion temperature and flow velocity. The light from the plasma is collected by an optical fiber bundle and transported to a high resolution spectrometer where spectral images of 4 slits are recorded using an intensified gated camera capable of recording 2 images in a single plasma shot. The new light collection system gives an order of magnitude improvement in signal intensity compared to previous studies on MRX [1]. Initial results from this probe in two specific experimental campaigns, the "pull" reconnection experiments, and the laboratory flux loop experiment [2], will be reported.

[1] S. C. Hsu, et al, Phys. Plasmas 8, 1916 (2001)
[2] Abstract APS 2008 DPP GP6.19

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