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Time-resolved temperature measurements on SSPX with Te>350 eV H.S. MCLEAN, D.N. HILL, J.M. MOLLER, C. ROMERO-TALAMAS, R.D. WOOD, Lawrence Livermore National Laboratory — The recent achievement of electron temperature Te > 350 eV is motivating new methods to time-resolve Te in the SSPX spheromak, primarily to diagnose energy transport in the near-term and to study plasma heating dynamics and beta limits in future neutral beam injection experiments. The most direct method is to increase the rep-rate of the Thomson scattering laser system with the required rep-rate closely coupled to the physics being studied. Rapidly evolving MHD instabilities require very fast time response on the order of several microseconds necessitating a closely-spaced burst of laser pulses. Neutral beam heat deposition studies require measurements spaced out over several milliseconds. Several schemes are described including sequential firing of multiple independent lasers, multiple Q-switching of a single laser, and boosting the output of a high-frequency/low energy laser with several amplifier stages. This work was performed under the auspices of the U.S. Department of Energy by the University of California Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

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