# THERMAL RESONATOR EXPERIMENTS USING A MAGNETIZED ELECTRON TEMPERATURE FILAMENT

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Results are presented from basic heat transport experiments of a magnetized electron temperature filament that behaves as a thermal resonator. Experiments are performed in the Large Plasma Device (LAPD) at UCLA. A biased $CeB_6$ cathode injects low energy electrons (below ionization energy) along a strong magnetic field into a pre-existing large and cold plasma forming an electron temperature filament embedded in a colder plasma, and far from the machine walls. It has previously been reported that the filament exhibits spontaneous excitation of thermal waves [1], and that the temperature gradient drives drift-Alfvén waves that lead to enhanced cross-field transport [2]. In the single filament experiment we have added a series of low amplitude pulse trains to the cathode DC bias that are tuned to the thermal resonance of the filament in order to externally excite the thermal diffusion waves. Multiple axial and transverse probe measurements allow for the determination of the phase velocity and radial decay length of the thermal mode. These results and diffusion wave theory are used to compute the axial and transverse thermal conductivities of the magnetized plasma and compare with those given by classical transport theory. Agreement of the axial conductivity provides a measurement of electron temperature, while deviation of the transverse conductivity from classical theory provides information on the anomalous cross-field transport.

**[1]** D.C. Pace, M. Shi, J.E. Maggs, G.J. Morales, and T.A. Carter, Phys. Rev. Lett. **101**, 035003 (2008)
**[2]** A.T. Burke, J.E. Maggs, G.J. Morales, Phys. Plasmas **7**, 1397 (2000)

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