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Exponential Frequency Spectrum in a Magnetized Plasma– UCLA MEIXUAN SHI, DAVID PACE, JAMES MAGGS, GEORGE MORALES, UCLA — The frequency spectrum of density and temperature fluctuations associated with a controlled, electron temperature filament in a magnetized plasma is investigated. A hot, narrow electron-temperature structure is generated from injection of a small, low-voltage beam into the LAPD-U device. Fluctuations develop after an initial quiescent period dominated by classical electron heat transport. Coherent structures associated with drift-Alfven modes grow due to the electron temperature gradient, but eventually a broadband frequency spectrum emerges, which exhibits an exponential frequency dependence for frequencies less than a third of the ion cyclotron frequency. Similar spectra have been previously observed in totally different experimental situations, including in tokamak plasmas.. Using a variety of signal analysis techniques, it is found that the exponential frequency dependence arises from a series of individual, soliton-like pulses. The relationship of the width, occurrence-frequency and amplitude of individual pulses to the exponential spectral index is determined. The dependence of the formation and characteristics of the solitary pulses on heating power, and magnetic field is explored.

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