Physics 790 Seminar

Simulations of Plasma Column Expansion in Neon Gas Cell Experiments

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Abstract:

In this presentation, I discuss a small sub-project within my larger project of neon photoionized plasma experiments. The purpose of the experiments as a whole is to study the atomic kinetics in neon photoionized plasmas via K-shell line absorption spectroscopy. The experiment employs the intense x-ray flux emitted at the collapse of a Z-pinch to heat and backlight a photoionized plasma contained within a cm-scale gas cell placed at various distances from the Z-pinch and filled with neon gas pressures in the range from 3.5 to 30 torr. An x-ray crystal spectrometer is used to collect absorption spectra showing line absorption by several ionization stages of neon, including Be-, Li-, He-, and H-like ions. Analysis of these spectra yields ion areal densities and charge state distributions. An old result showed that the sum of these areal densities fell below the total neon areal density given by the neon filling pressure. This prompted an investigation into whether expansion of the directly irradiated column of neon gas into the cooler surrounding gas could be a culprit in this result. Helios-CR was used in cylindrical geometry along with electron temperature time histories in order to simulate this possible scenario of expansion to see what effect, if any, it might have on our analysis results.

Goudsmit Conference Room, LP 208
Thursday, April 6th, 2017 4:00 – 4:45 PM