Abstract Submitted
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A Spatial Heterodyne Spectrometer for Plasma Spectroscopy[1]
J.E. LAWLER, Z. LABBY, F. L. ROESLER, Univ. of Wisconsin, Madison, WI, J. HARLANDER, St. Cloud State Univ., St. Cloud, MN — Spatial Heterodyne Spectrometer (SHS) designs will revolutionize interferometric spectroscopy in the VUV. Advantages of interferometric spectrometers include: (1) a very high spectral resolving power with a large etendue, (2) excellent absolute wavenumber accuracy, (3) extremely broad spectral coverage, and (4) high data collection rates. Interferograms from a conventional Fourier transform spectrometer (Michelson interferometer) are recorded as a function of time using a single channel detector while moving a mirror. Interferograms from an SHS are spread in space across a detector array. The lack of moving parts means that an SHS is compatible with low duty cycle, transient sources common in the VUV. Our SHS has a CaF_2 beamsplitter and a matched pair of very coarse (23.2 groove/mm) echelle gratings blazed for 63.5 $^\circ$. Key mechanical components have temperature compensated designs and many parts, including the entire optical bread board, are made of Invar for long term phase stability. The 96 mm wide gratings are compatible with a theoretical limit-of-resolution of 0.058 cm^{-1} (inverse maximum path difference of 2 x 9.6 cm x sin 63.5 $^\circ$) using a symmetric interferogram. The quality of interferograms recorded with a low resolution test camera indicated that the optics and mountings is satisfactory. First results with the full resolution 4 Mega-pixel VUV compatible CCD camera will be reported.

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