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**Charge Exchange Recombination Detection of Low-Z
Impurities in the Extreme UV using Digital Lock-In Techniques***

N.H. Brooks, *GA*, O. Meyer, *CEA* — A digital technique has been used to extract that portion of the XUV spectrum which varies synchronously in time with the modulation of the 30-Left neutral beam (NB) viewed by DIII-D's SPRED spectrometer [1]. A scalar product of two temporal vectors is performed for each pixel in the SPRED linear array detector — the first vector is the time history of light intensity at that pixel, the second is a NB-derived correlation function. In the spectra resulting from this pixel-by-pixel manipulation of the temporal data, all light from medium-Z and high-Z metals are strongly suppressed, exposing with great clarity the Rydberg-series lines from the H-like charge states of the low-Z impurities He, B, C and O. Time-averaged relative abundances of the low-Z impurities may be readily deduced. Removal of the beam-correlated component of the detected XUV light will be used as a pre-processing step to improve reliability of emission line time histories calculated from SPRED data.

[1] R.J. Fonck, et al., *Applied Optics* **21**, 2115 (1982).

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