The recent development of extreme ultraviolet (EUV) sources has increased the need for diagnostic tools, and has opened up a previously limited portion of the spectrum. With ultrafast laser systems and spectroscopy moving into shorter timescales and wavelengths, the need for nanosecond scale imaging of EUV is increasing. EUV’s high absorption has limited the number of imaging options due to the many atomic resonances in this spectrum. Currently EUV is imaged with photodiodes and X-ray CCDs. However photodiodes are limited in that they can only resolve intensity with respect to time and X-ray CCDs are limited to temporal resolution in the microsecond range.

This work shows a novel approach to imaging EUV light over a nanosecond time scale, by using a EUV scintillator to convert EUV to visible light imaged by a conventional streak camera. A laser produced plasma, using a mass-limited tin based target, provided EUV light which was imaged by a grazing incidence flat field spectrometer onto a Ce:YAG scintillator. The EUV spectrum (5nm-20nm) provided by the spectrometer is filter by a zirconium filter and then converted by the scintillator to visible light (550nm) which can then be imaged with conventional optics. Visible light was imaged by an electron image tube based streak camera. The streak camera converts the visible light image to an electron image using a photo cathode, and sweeps the image across a recording medium. The streak camera also provides amplification and gating of the image by the means of a micro channel plate, within the image tube, to compensate for low EUV intensities. The system provides 42ns streaked images of light with a temporal resolution of 440 ps at a repetition rate of 1 Hz. Upon calibration the EUV streak camera developed in this work will be used in future EUV development.