Contribution ID: **1165** Type: **Oral**

TIME EVOLUTION OF HARD X-RAY CHARACTERISTIC EMISSION FROM TUNGSTEN PULSED-POWER PLASMAS

Thursday 27 June 2019 15:00 (30 minutes)

Recently, hard x-ray characteristic lines from high Z materials produced from pulsed power plasmas have been studied: as signatures of hot electrons using Mo K-alpha emission from Mo nested wire arrays on SNL-Z [1], Cu and Zn K-alpha emission from brass planar wire arrays on UNR's Zebra generator [2], and as a new hard x-ray spectroscopic diagnostic for the direct measurement of the ionization distribution in warm dense plasmas using W L emission generated by the NRL's Gamble II pulsed power machine [3]. Characteristic x-ray W L-shell lines occupy the energy range from 8 to 12 keV and in pulsed power plasmas their studies were focused mainly on the spatially resolved hard x-ray spectroscopy. However, investigation of time evolution of hard x-rays is very important for understanding the mechanisms of hard x-ray and electron beam generations [4]. Here we present the analysis of experiments with W Compact and Nested Cylindrical Wire Arrays (CCWA and NCWA, respectively) produced on the Zebra generator. A comprehensive set of diagnostics including x-ray detectors, a bolometer, a Faraday cup, a time-gated spatially resolved x-ray pinhole camera, and a time-gated spatially integrated x-ray spectrometer were implemented. The time history of relative intensities of characteristic x-ray W L lines from W NCWA in a broad time interval before and after stagnation is presented and compared with W CCWA. Correlation with measurements of electron beams and possible mechanisms of W L lines formation are considered. Future work on x-ray line polarization of these lines is discussed. This research was supported by NNSA under DOE grant DE-NA0003877 and in part by DE-NA0002075.

1. S.B. Hansen et al, Phys. Plasmas 21, 031202 (2014).
2. N.D. Ouart et al, HEDP 8, 247 (2012).
3. J.F. Seely et al, HEDP 9, 354 (2013).
4. I.K. Shrestha et al, HEDP 6, 113 (2010).

Author: Prof. SAFRONOVA, Alla (University of Nevada, Reno)

Co-authors: Prof. KANTSYREV, Victor (University of Nevada, Reno); Dr STAFFORD, Austin (University of Nevada, Reno); Dr SHRESTHA, Ishor (University of Nevada, Reno); Ms SHLYAPTSEVA, Veronica (University of Nevada, Reno); Mr CHILDERS, Ryan (University of Nevada, Reno); Mr BUTCHER, Christopher (University of Nevada, Reno); Dr OUART, Nicholas (Naval Research Laboratory); Dr GIULIANI, John (Naval Research Laboratory)

Presenter: Prof. SAFRONOVA, Alla (University of Nevada, Reno)

Session Classification: 4.3 Radiation Physics & X-ray Lasers and 4.5 Laser Produced Plasmas

Track Classification: 4.3 Radiation Physics & X-ray Lasers