PDV based technique for probing AK gap plasma in Z Machine target loads ANDREW PORWITZKY, DANIEL DOLAN, Sandia National Laboratories — It is empirically known that the behavior of current loss in the convolute, feed, and load region on Sandia's Z Machine (Z) depends on the current pulse shape as a function of time during the experiment. Charged particles can be liberated from current carrying surfaces upstream of the load as a result of the time varying electric fields generated. Pulsed electric current from the four magnetically insulated transmission lines come together in the convolute to feed the target load. In this region, the magnetic insulation breaks down, which can lead to charged particle collisions and sputtering on conductive surfaces. The resulting low density plasma affects the load dynamics. Confirming the presence and behavior of low density anode-cathode (AK) gap plasma in the target load region of Z is thus a matter of great importance. In this work, we outline a new photon Doppler velocimetry (PDV) based technique to detect arrival time of upstream plasma in the AK gap of a cylindrically convergent target load. Analysis of the PDV deduced time varying refractive index of the plasma allows for an estimation of its electron number density.

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