

Abstract Submitted  
for the DPP19 Meeting of  
The American Physical Society

**Tomography System for Density Profile Reconstruction in HIT-SI3 and Ion Doppler Spectroscopy**<sup>1</sup> K.W. LEE, A.C. HOSSACK, C.J. HANSEN, University of Washington, D.A. SUTHERLAND, CTFusion, Inc. — A tomography system has been installed to assess the symmetry of spheromak plasma density in the HIT-SI3 spheromak experiment. The tomography diagnostic consists of four toroidal chord fans and three sets of three poloidal fans that provide 3D plasma emission information. Each fan expands from a wide-angle lens with 130 degree field of view coupled to bundles of fiber optics. The light collected by the fiber optics is split into two paths, filtered at 668 nm and 728 nm, and imaged by a high-speed camera. Since the ratio of the 668/728 nm emission has a strong plasma density dependence within the range of typical HIT-SI3 plasma parameters, the 3D emissivity profiles constructed by inverting line-averaged emissivity along chords can be related to the plasma density profiles. The reconstruction of emissivity profiles constitutes a highly underdetermined and ill-posed inversion problem and the maximum entropy method was chosen to find the most physically informed solution. Additionally, a multi-chord ion Doppler spectroscopy system for measuring impurity ion velocity and temperature is presented.

<sup>1</sup>The information, data, or work presented herein was funded in part by the Advanced Research Projects Agency-Energy (ARPA-E), U.S. Department of Energy, under Award Number DE-AR0000887 and by CTFusion, Inc., the primary recipient of ARPA-E award number DE-AR0001098.

K.W. Lee  
University of Washington

Date submitted: 27 Aug 2019

Electronic form version 1.4