Abstract Submitted for the DPP20 Meeting of The American Physical Society

Species mix, magnetic field strength, and distribution function dependence of instabilities near the ion cyclotron range of frequencies¹ GENEVIEVE DEGRANDCHAMP, WILLIAM HEIDBRINK, UCI, KATHREEN THOME, MICHAEL VAN ZEELAND, CAMI COLLINS, XIAODI DU, GA, STEVE VINCENA, SHAWN TANG, NEAL CROCKER, UCLA, MARK KOEPKE, SAMUEL NOGAMI, WVU — Frontier Science experiments on the DIII-D tokamak explored energetic ion-driven instabilities in the magnetosphere by studying related phenomena in tokamak plasmas: high-frequency Alfvén eigenmodes and ion cyclotron emission (ICE). The instabilities' dependence on plasma ion species mix, magnetic field strength, and energetic ion species and their phase space distribution was explored. Ten different beam-ion distributions were studied by varying: species (H^+/D^+) , direction (co- vs. counter-current), energy (81/55 kV), and radial location (on- vs. off-axis) of the energetic ions at birth. The background plasma was D^+ with H^+ and ${}_{3}He^{++}$ in different mixtures throughout the experiment. Prominent ICE harmonics from co-injecting beams changed with increasing H⁺, whereas ICE from counter-injecting beams is not similarly affected. The instabilities were measured with toroidal magnetic loops digitized at 200 MSamples/s. Additional loops were recently installed and enable more detailed measurements which are used to characterize modes observed in pure D^+ shots recreated from the Frontier experiment.

 1 Work supported by US DOE under DE-FC02-04ER54698, DE-SC0018270, and DE-SC0011810.

Genevieve DeGrandchamp UCI

Date submitted: 28 Jun 2020

Electronic form version 1.4