Abstract Submitted
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Laser characterization of electric field oscillations in the Hall thruster breathing mode[1] CHRISTOPHER YOUNG, ANDREA LUCCA FABRIS, Stanford Plasma Physics Laboratory, NATALIA MACDONALD-TENENBAUM, WILLIAM HARGUS JR., Air Force Research Laboratory, Edwards AFB, MARK CAPPELLI, Stanford Plasma Physics Laboratory — Hall thrusters are a mature technology for space propulsion applications that exhibit a wide array of dynamic behavior, including plasma waves, instabilities and turbulence. One common low frequency (10–50 kHz) discharge current oscillation is the breathing mode, a cycle of neutral propellant injection, strong ionization, and ion acceleration by a steep potential gradient. A time-resolved laser-induced fluorescence diagnostic non-intrusively captures this propagating ionization front in the channel of a commercial BHT-600 Hall thruster manufactured by Busek Co. Measurements of ion velocity and relative ion density (using the $5d[4]_{7/2} - 6p[3]_{5/2}$ Xe II transition at 834.95 nm, vacuum) reveal a dynamic electric field structure traversing the channel throughout the breathing mode cycle.

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