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Spectroscopic study of an iodine plasma in a low pressure RF-ICP ion source FLORIAN MARMUSE, THEO COURTOIS, JEAN-PAUL BOOTH, CYRIL DRAG, Laboratoire de Physique des Plasmas (CNRS, Ecole polytechnique, Sorbonne Universite, Universite Paris-Sud, Observatoire de Paris), ANE AANESLAND, ThrustMe, PASCAL CHABERT, Laboratoire de Physique des Plasmas (CNRS, Ecole polytechnique, Sorbonne Universite, Universite Paris-Sud, Observatoire de Paris) — Iodine is being considered as an alternative to Xenon for plasma propulsion, mainly because of its lower cost and possibility for solid storage. However, iodine plasmas are less well understood than Xenon plasmas, making a need for reliable diagnostic measurements to validate the models of iodine plasmas. We present initial measurements on two iodine plasma systems: an RF-CCP plasma in a closed cell (around 50 Pa), and an RF-ICP plasma (PEGASES plasma source) with flowing I2 gas in the pressure range 0.2-20 Pa. Several diagnostics are presented: emission spectroscopy, laser absorption spectroscopy, cavity ring-down spectroscopy, and a RF compensated Langmuir probe. Absorption from excited states of atomic iodine (at 804, 906 and 911nm) were measured using a cw Ti:Sa laser. Ground state I atoms were measured by the magnetic-dipole allowed spin-orbit transition at 1315nm using a diode laser, either by multi-pass absorption or by cavity ring-down spectroscopy (for greater sensitivity). The absolute atom density was deduced using the transition strengths found in the literature, and the gas temperature was deduced from the Doppler width. The electron density and temperature was deduced from the RF-compensated Langmuir probe. An early comparison with a global model is presented.

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