Abstract Submitted
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Periodic Evolution of a Xe I Population in an Oscillatory Discharge: Comparison between Time-Synchronized Laser-Induced-Fluorescence Measurements and A Dynamic Collisional-Radiative Model[1] ANDREA LUCCA FABRIS, CHRIS V. YOUNG, MARK A. CAPPELLI, Stanford Univ, PLASMA PHYSICS LABORATORY TEAM — We study the evolution of the Xe I $6s'[1/2]_1 - 6p'[3/2]_2$ (834.68 nm air) transition lineshape in a plasma discharge oscillating at 60 Hz using time-synchronized laser induced fluorescence (LIF) measurements and a collisional-radiative model. Two different time-synchronized LIF techniques based on phase sensitive detection of the fluorescence signal are applied, yielding consistent results. The maximum observed peak fluorescence intensity occurs at low values of the discharge current, although the peak intensity drops to zero at zero discharge current. The peak intensity also decreases at the discharge current maximum. A dynamic collisional-radiative model of the weakly ionized xenon discharge is also implemented, based on a set of rate equations. The proper electron impact cross-sections and radiative decay rates are identified from the literature and used to compute accurate rate coefficients with the Boltzmann solver Bolsig+, including the time-varying electric field. The time evolution of the probed excited state density predicted by the model shows good agreement with the experimental measurements.

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