UCLA

Plasma Physics Seminar

Location: BaPSF Auditorium (Rehab Building Room 15-70)
Thursday, May 30, 2019
12:30PM

Determining Metastable Ion Lifetime and History Using Wave-Particle Interaction and Laser-Induced Fluorescence

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Laser-induced fluorescence (LIF) performed on metastable ions is frequently used to probe the dynamics of ground-state ion motions in many laboratory plasmas. However, these measurements place restrictions on the metastable ion lifetime. Metastable states are produced from direct ionization of neutral atoms as well as ions in other electronic states, of which the former will only faithfully represent processes that act on the ion dynamics in a time shorter than the metastable lifetime. I present here the first experimental study of this type of systematic effect using wave-particle interaction in an argon multidipole plasma. The metastable lifetime and relative fraction of metastables produced from preexisting ions, necessary for correcting the LIF measurement errors, can be determined by fitting the experimental results with the theory I propose. In addition, I show that the technique used in the experiment provides a new method to determine the absolute electric field in a plasma, which can be used to calibrate other electric field measurement tools.