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3P74 - Development of an LIF-dip system to measure electric field magnitude

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Modeling gas chemistry interactions with high energy electrons can help answer many basic and applied physics questions, but the electric field generated is a key parameter for modeling that is not always well known. Measurements of electric field under relevant conditions could help to inform and validate plasma chemistry models. In support of NRL gas chemistry studies, the University of Michigan is developing a laser-induced fluorescence dip (LIF-dip) spectroscopy system. LIF-dip is a technique using two lasers to directly measure electric field magnitude. One laser populates the fluorescing state while the other depopulates it to Rydberg states. The electric field can be measured by analyzing the "dip"in the fluorescence signal as the second laser wavelength is scanned. The technique can detect low electric field magnitude because Rydberg states are highly sensitive to the Stark effect. In this contribution, we describe the buildup of this capability and present initial LIF measurements of argon metastables.

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