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WITHDRAWN - Laser spectroscopy of the $g^6\Phi - X^4\Delta$ electronic transition of iron monodeuteride, FeD

Transitions of the gas-phase iron hydride molecule are observed in the spectrum of the sun and of some cooler stars. It has a strong magnetic response, and the Zeeman splitting of individual rotational lines is used to determine the strength of the magnetic field produced by the stars in which its signature is seen. Its spectrum is complicated by the high spin and angular momentum of its electronic states, and there are many gaps in the experimental observations of this molecule. Further, information regarding its isotopolgues is scant. We will describe our recent experiments on the iron monodeuteride (FeD) isotopologue, focusing on the intercombination band $g^6\Phi - X^4\Delta$ near 448 nm. We create the molecule in a pulsed supersonic jet of helium seeded with both iron pentacarbonyl, $Fe(CO)_5$, and molecular deuterium. The jet pulse is electrically discharged as it expands from the high-pressure (40 psi) plenum into vacuum, creating the FeD molecule, which is detected with laser-induced fluorescence. The results inform the electronic structure of the FeH family of molecules, and permit indirect estimation of vibrational spacings in the upper state.

Primary author: HARVEY, Ryan (University of New Brunswick)

Co-authors: Dr TOKARYK, Dennis (Dept. of Physics, University of New Brunswick); Dr ADAM, Allan (University of New Brunswick)

Presenter: HARVEY, Ryan (University of New Brunswick)

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