

SUB-MILLIMETER/TERAHERTZ SPECTROSCOPY OF FeH AND FeD ($X^4\Delta_i$)

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Direct measurements of the lowest pure rotational transitions of the $\Omega = 7/2$, $5/2$, and $3/2$ ladders of FeD and of the $\Omega = 1/2$ ladder of FeH in the $^4\Delta_i$ ground electronic states have been conducted using millimeter/sub-millimeter direct absorption techniques in the frequency range 530-810 GHz. Both species were created in an AC discharge from the reaction of $\text{Fe}(\text{CO})_5$ with H_2 or D_2 . In several of these transitions lambda-doubling and proton/deuterium hyperfine structure have been resolved. These data improve on the zero field frequencies predicted from previous LMR data by several MHz.^a Accurate frequencies are crucial for sub-millimeter searches for FeH toward the interstellar medium. Searches for additional transitions are in progress.

^a J.M. Brown, H. Korngren, S.P. Beaton, & K.M. Evenson, *J. Chem. Phys.* 124, 234309 (2006)