

DIRECT TERAHERTZ ROTATIONAL MEASUREMENTS OF FeH AND FeD ($X^4\Delta_i$)

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Iron-bearing molecules have eluded radio astronomers for decades, in part due to the dearth of laboratory spectroscopic data. To this day, there has been only one definitive detection of an iron-bearing molecule, FeCN. One molecule of much interest is FeH. The rotational spectrum of this radical thus far has only been measured with Laser Magnetic Resonance (LMR), which utilizes the Zeeman effect. Therefore, LMR requires extrapolation to zero field frequencies, which can introduce uncertainties. Here we present the first measurements of the rotational spectrum of FeH and its deuterated analog FeD in their ground electronic state using direct absorption methods in the THz region. The molecule was created in an AC discharge in a mixture of H₂, argon, and Fe(CO)₅, with pressures of 30 milli-torr and 3 milli-torr, respectively. Thus far, five transitions of FeH in the $\Omega = 1/2, 3/2$, and $7/2$ ladders (0.7 - 1 THz) and eight transitions of FeD in the $\Omega = 3/2, 5/2$, and $7/2$ ladders (0.5 - 1 THz) were recorded. Additional measurements are underway.