FeH IN COOL STARS AND BROWN DWARFS

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Metal hydrides are prominent in the near infrared spectra of cool stars, particularly M-type dwarfs, and in substellar objects such as brown dwarfs. Brown dwarfs are cool objects that have surface temperatures intermediate between those of stars and those of giant planets such as Jupiter. The L-type class of brown dwarfs is characterized by the presence of metal hydrides such as CrH and FeH, and the absence of metal oxides such as TiO and VO. We have a continuing project on the computation of molecular opacities for metal hydrides by combining laboratory measurements with theoretical calculations. For FeH, we have calculated the transition dipole moments for the near infrared $E^4\Pi$–$A^4\Pi$ and $E^4\Pi$–$X^4\Delta$ electronic transitions in order to obtain line intensities and molecular opacities. We also have telescope time at Gemini South to use the Phoenix infrared spectrograph to look at the Zeeman effect in the $E^4\Pi$–$A^4\Pi$ transition near 6000 cm^{-1} to determine magnetic field strengths in M- and L-type objects.