DETECTIONS OF HYDROGEN DIMER ABSORPTION FEATURES AT 2 MICRONS IN THE SPECTRA OF SATURN AND NEPTUNE

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Recent high-resolution 2.10- to 2.13 micron spectra of Saturn show several clear hydrogen dimer absorption features in addition to a narrow hydrogen molecule 1-0 S(1) absorption. The observations were made at the United Kingdom Infrared Telescope (UKIRT) in 1996 with a grating spectrometer, CGS4. We also obtained spectra of Neptune in the same spectral range, and found noisy but definite hydrogen dimer absorption features. The detections of hydrogen dimers from ground-based observations opens a new and easy way to monitor ortho-para ratio of hydrogen molecules in jovian tropospheres compared with expensive space far-infrared observations. The derived ortho-para ratios of hydrogen molecules will be important parameters to infer the quantitative characteristics of jovian convective motions. The detection of jovian dimer through the 2-micron window also suggests possibility to detect inert gases such as Argon utilizing sharp spectral structures of hydrogen-argon dimer. Since inert gases do not have spectral structures in infrared, it has been difficult to derive their abundances in the atmospheres of jovian planets.