NEW INFRARED TRANSITIONS OF SOLID PARAHYDROGEN IN THE SPECTRAL REGION 7900 - 9900 cm^{-1}

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In our most recent measurements of infrared transitions of solid parahydrogen with low ortho impurities, using a White-type external multireflection system [a] for a sample path length of 38 cm, we have detected new extremely weak features in the spectral region 7900 - 9900 cm^{-1}. Among them are the single transition

- $Y_{1\leftarrow 0}(0)$ at 7991.85 (1) cm^{-1}

and the double transitions

- $Q_{1\leftarrow 0}(0) + Q_{1\leftarrow 0}(0)$ at 8306.0 (1) cm^{-1}
- $U_{1\leftarrow 0}(0) + Q_{1\leftarrow 0}(1)$ at 9407.67 (5) cm^{-1}
- $Q_{1\leftarrow 0}(0) + S_{1\leftarrow 0}(0)$ at 9747.8 (1) cm^{-1}
- $U_{1\leftarrow 0}(1) + Q_{1\leftarrow 0}(0)$ at 9837.34 (5) cm^{-1}.

The $Y_{1\leftarrow 0}(0)$ transition is the second transition with $\Delta J = 8$ observed in a molecular spectrum after the $Y_{0\leftarrow 0}(0)$ transition [b] and is even weaker than the latter by an appreciable factor. Intensity parameters will be reported for all of these transitions. The data were taken at a sample temperature of 12.3 K.

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[a] R. Steinhoff, K. V. S. R. M. Winnewisser, Appl. Optics 32, 6577-6581 (1993).

[b] R. A. Steinhoff, B. P. Winnewisser and M. Winnewisser, Phys. Rev. Lett. 73, 2833 - 2836 (1994).