ROTATIONAL DYNAMICS OF SMALL MOLECULES IN QUANTUM SOLIDS AND LIQUIDS

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Reports from several groups describing the rovibrational spectroscopy of small molecules isolated in solid parahydrogen (pH_2) have begun to illuminate the unique rotational dynamics obtained in quantum solids, e.g.: the first observation of nearly free rotation in a solid by non-hydride dopant species. Moreover, detailed analysis of spectra of six CO isotopomers in pH_2 reveals clear trends that cannot be explained by existing models developed to describe molecular rotations in classical solids. Very similar results were recently reported for CO isotopomers in liquid helium nanodroplets,[a] begging the question: "what could rotations of small molecules in quantum solids and liquids have in common?"

[a] K. von Haeften, S. Rudolph, I. Simanovski, M. Havenith, R.E. Zillich, and K.B. Whaley, in press.