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High resolution spectroscopy of solid hydrogen using a PPLN
difference-frequency laser system

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It has been well known that solid parahydrogen exhibits extremely sharp linewidth in infrared absorption spectra. Not only hydrogen molecules themselves, but also molecules embedded in solid parahydrogen show narrow linewidths that give us quite rich information on intermolecular interaction, molecular motion, and relaxation dynamics of molecules in quantum solid. Recently, we have found that molecular clusters show even narrower linewidths than isolated molecules in solid parahydrogen. Here, we used a newly constructed difference-frequency laser system using a PPLN(Periodically Poled Lithium Niobate) crystal to observe sharp transitions in solid parahydrogen. The performance of the PPLN DFG system will be discussed.