TOWARD A CONTINUOUS-WAVE SOLID HYDROGEN RAMAN LASER FOR MOLECULAR SPECTROSCOPY APPLICATIONS

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We will present our recent work toward the construction of a continuous-wave solid *para*-H_2 Raman laser for operation first in the visible and later in the mid-infrared. Solid *para*-H_2 promises to be a good choice for the gain medium in a Raman laser due to its exceptionally high Raman gain coefficient. This not only presents a novel use of an interesting molecular system, but it also offers the potential for the first widely tunable laser source for high resolution spectroscopy in the 5-10 μm range. High resolution spectroscopy requires a tunable continuous-wave laser source. However, up until now, most work in using *para*-H_2 as a Raman laser gain medium has taken place either with high power pulsed lasers or continuous-wave lasers which require ultra-high finesse cavities. We seek to take advantage of solid *para*-H_2's high Raman gain coefficient to construct a continuous-wave Raman laser with a much lower finesse cavity ($F \approx 150$). In this presentation, we will talk about our recent work in measuring the index of refraction of solid *para*-H_2 in the wavelength range 430-1100 nm in preparation for building such a laser. Some details regarding the design and planning for this laser will also be discussed. Finally, current progress and anticipated work on the development of a continuous-wave solid *para*-H_2 Raman laser will be presented.