

137. Title: Measurement of Optically Pumped (CH₃OH)-O-18 Laser Frequencies Between 3 and 9 THz

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Abstract: The (CH₃OH)-O-18 isotopic form of methanol has been reinvestigated as a source of far-infrared (FIR) radiation using an optically pumped molecular laser system designed for wavelengths below 100 μ m. With this system, four FIR laser emissions have been discovered, ranging in wavelength from 33.15 to 51.97 μ m. The 33.15- μ m line is the shortest known laser wavelength generated by optically pumped (CH₃OH)-O-18. These lines are reported with their operating pressure, polarization relative to the CO₂ pump laser, and their relative strength. The frequencies of these new laser emissions, along with eight previously reported lines, were measured using heterodyne techniques and are reported with fractional uncertainties up to $\pm 2 \times 10^{-7}$. The offset frequency of the CO₂ pump laser was measured with respect to its center frequency for each FIR laser emission.