

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**A comparison of homogeneous and inhomogeneous absorption broadening in Nd doped Gadolinium Gallium Garnet**<sup>1</sup> CHRISTOPHER FERRI, SAYANTANI GHOSH, Department of Physics, University of California, Merced — We perform a temperature dependent optical absorption study of the  ${}^4I_{9/2} \rightarrow {}^4F_{3/2}$  ( $Z_n \rightarrow R_n$ ) transition of the Neodymium dopant in Neodymium(III) doped Gadolinium Gallium Garnet. Absorption spectra are acquired for these transitions as a function of temperature from 12K to 300K. The absorption peaks are subsequently fit with Voigt profiles to measure the homogeneous and inhomogeneous broadening for each transition. We find that for the  $Z_1 \rightarrow R_2$  transition the homogeneous and inhomogeneous broadening are of the same order. Below 80K, for the  $Z_1 \rightarrow R_1$  transition, the homogeneous broadening is below the resolution of our spectrometer ( $1.85 \text{ cm}^{-1}$ ) resulting in a lower bound of  $\sim 18\text{ps}$  for the excited state lifetime which is likely much slower. Furthermore, because of the resolution limit, the ratio of inhomogeneous broadening to homogeneous broadening for this transition has a lower bound of  $\sim 6$ .

<sup>1</sup>This work was funded by NSF grant DMR-1056860.

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Date submitted: 14 Nov 2014

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