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Spin-Phonon coupling in a candidate 2D atomic crystal magnetic semiconductor[1] YAO TIAN, University of Toronto, HUIWEN JI, ROBERT CAVA, Princeton University, KENNETH BURCH, Boston College — $Cr_2Ge_2Te_6$ is a particularly interesting material since it is in the very rare class of ferromagnetic semiconductors and possesses a layered, nearly two dimensional structure due to van Der Waals bonds. The van Der Waals bonds make it a candidate two dimensional atomic crystal, which is predicted as a platform to study 2D semiconducting ferromagnets and for single layered spintronics devices. Spin-phonon coupling can be a key factor for the spin relaxation in a spintronics devices. We use polarized temperature dependent Raman scattering to study $Cr_2Ge_2Te_6$. The spin-phonon coupling has been confirmed in three ways: below T_C we observe a split of two phonon modes due to the breaking of time reversal symmetry; an anomalous hardening of an additional three modes; and dramatic decrease of the phonon lifetimes upon warming into the paramagnetic phase. Our results also suggest the possibility of probing the magneto-elastic coupling using Raman spectroscopy, opening a door for the further study of exfoliated 2D $Cr_2Ge_2Te_6$. We gratefully acknowledge support from the National Science Foundation (Grant No. DMR-1410846)

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