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Local cooling and control of a 2D nuclear spin lattice using NV centers in diamond[1] TAMARA SUMARAC, ELANA URBACH, Harvard University, HELENA KNOWLES, Cambridge University, JAVIER SANCHEZ-YAMAGISHI, IGOR LOVCHINSKY, SOONWON CHOI, RENATE LANDIG, ALEXEI BYLINSKII, HONGKUN PARK, MIKHAIL LUKIN, Harvard University
— Two dimensional materials can provide a regular nuclear spin lattice, which makes them an excellent platform for studying interacting 2d spin dynamics. Traditional NMR techniques are not sensitive enough to measure small sample volumes of thin materials. Nitrogen vacancy (NV) centers in diamond can act as nanoscale magnetic field sensors with the ability to measure magnetic field created by very few nuclear spins. This makes the NV center an ideal probe for studying nuclear spin dynamics in 2d materials. In this experiment we use an NV center combined with an external radio frequency field to locally initialize, control and readout nuclear spin states inside hexagonal boron nitride (hBN), with a goal of developing a room temperature platform for studying many-body dynamics.

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