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Probing magnetic noise from currents and spins in 2d layered materials using diamond NV centers JAVIER SANCHEZ-YAMAGISHI, BO DWYER, TROND ANDERSEN, HONGKUN PARK, MIKHAIL LUKIN, Harvard University — Diamond NV centers are ultra-sensitive magnetometers which can be read out optically and operate from room to cryogenic temperatures. I will discuss our recent progress using NV centers to measure local magnetic noise emanating from spins and electrical currents in 2d layered materials. By fabricating high-quality graphene devices on the diamond surface, we can probe the local structure of the graphene electrical conductivity by monitoring the magnetic noise due to thermal fluctuations in the electron sea as we vary both the electron temperature and chemical potential. I will discuss how this measurement technique can be used to study electronic behavior in the ballistic, diffusive and hydrodynamic transport regimes.

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