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Spin-torque oscillation in magnetic insulator probed by single-electron spins MARK KU, HUILIANG ZHANG, Harvard-Smithsonian Center for Astrophysics, FRANCESCO CASOLA, Harvard-Smithsonian Center for Astrophysics and Department of Physics, Harvard University, TOENO VAN DER SAR, CHUNHUI DU, Department of Physics, Harvard University, KEIGO ARAI, Harvard-Smithsonian Center for Astrophysics and Department of Physics, Harvard University, CAROLINE ROSS, Department of Materials Science and Engineering, MIT, AMIR YACOBY, Department of Physics, Harvard University, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics and Department of Physics, Harvard University — Spin-torque oscillation (STO) in magnetic insulators is under intensive investigation because of excellent material properties (low damping, no electromigration, etc.), with potential applications in storage devices, spintronics, and magnonics. Coherent auto-oscillation inside magnetic insulators (e.g., Yttrium Iron Garnet, YIG) has been observed recently; however many questions remain due to lack of a proper diagnostic tool. Nitrogen-Vacancy (NV) centers in diamond provide a versatile magnetic sensing modality with nanoscale spatial resolution. We used NV centers to probe a Platinum/YIG hybrid microstructure and quantify the magnetic damping variation under pure spin current spin injection, detect magnetization auto-oscillation, and observe STO mutual interaction and mode hopping.

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