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Photo-induced charge state switching of the nitrogen-vacancy center in diamond[1] LUKE HACQUEBARD, LOUTFI KURET, LILIAN CHILDRESS, McGill University — As a strong candidate for quantum computation and metrology applications, the nitrogen-vacancy (NV) defect center in diamond has gained much interest in the solid-state community. The NV center can exist in two different charge states (NV^0 and NV^-) which have very different optical and spin properties, where typically only the negatively charged state is desired since it provides the triplet ground state used for many experimental applications. Since most experiments involving NV centers use lasers for readout or manipulation it is important to understand the photo-induced charge state ionization and recombination processes at different wavelengths and powers. We developed a charge state readout and initialization method using a 594 nm laser with optimized duration and power, which was used to investigate the ionization and recombination processes from other laser sources. We report charge state switching data from a single NV center when illuminating with 594 nm CW, 532 nm CW, 532 nm pulsed and 766 nm pulsed lasers. We also explore the spin dependence of ionization through the use of applied microwaves.

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Luke Hacquebard
McGill University

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