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Single Fluorine Impurities in ZnSe: Magneto-optics and Spin Qubit Applications DARIN SLEITER, SUSAN M. CLARK, KRISTIAAN DE GREVE, Stanford University, KAORU SANAKA, THADDEUS D. LADD, Stanford University and National Institute of Informatics, Tokyo, Japan, ALEXANDER PAWLIS, KLAUS LISCHKA, University of Paderborn, YOSHIHISA YAMAMOTO, Stanford University and National Institute of Informatics, Tokyo, Japan — We report on the optical detection and investigation of single donors in ZnSe. By isolating the donors in quantum well mesas, we are able to probe them individually using magneto-optics in both Voigt and Faraday geometry. The structure of interest is the electron bound to a F^{19} neutral donor, which has been proposed as a strong candidate for a semiconductor-based qubit. The donor electron is optically accessible through the bound exciton transition, allowing the possibility of ultrafast optical spin control and detection. We present our recent spectroscopic and $g^2(0)$ experimental results and discuss their spin qubit applications.

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