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Electrically-generated electron spin polarization for non-reciprocal integrated photonic devices CHRISTOPHER TROWBRIDGE, BENJAMIN NORMAN, VANESSA SIH, University of Michigan — Electron spin polarization based photonic devices offer promising advantages over current technologies. Spin orbit coupling allows for an all-electrical means of control over light in semiconductor waveguides. Electrically generated spin polarization results in a circular dichroism near the absorption edge which results in non-reciprocal Faraday rotation. We investigate the requirements for manipulating light in semiconductor waveguides using electrically-generated spin polarization. Ultimately, device performance will be limited by the magnitude of achievable Faraday rotation, birefringence, and absorption. We show that one can limit birefringence by appropriate waveguide design and that substantial Faraday rotation is accessible sufficiently far below the band edge for material absorption to be minimal.

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