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Magnetic field tunability of spin polarized excitations in a high temperature magnet BRIAN HOLINSWORTH, Univ of Tennessee, Knoxville, HUNTER SIMS, Oak Ridge National Lab, JUDY CHERIAN, DIPANJAN MAZUMDAR, NATHAN HARMS, BRANDON CHAPMAN, Univ of Tennessee, Knoxville, ARUN GUPTA, University of Alabama, Birmingham, STEVE MCGILL, National High Magnetic Field Lab, JANICE MUSFELDT, Univ of Tennessee, Knoxville — Magnetic semiconductors are at the heart of modern device physics because they naturally provide a non-zero magnetic moment below the ordering temperature, spin-dependent band gap, and spin polarization that originates from exchange-coupled magnetization or an applied field creating a spin-split band structure. Strongly correlated spinel ferrites are amongst the most noteworthy contenders for semiconductor spintronics. $NiFe_2O_4$, in particular, displays spin-filtering, linear magnetoresistance, and wide application in the microwave regime. To unravel the spin-charge interaction in $NiFe_2O_4$, we bring together magnetic circular dichroism, photoconductivity, and prior optical absorption with complementary first principles calculations. Analysis uncovers a metamagnetic transition modifying electronic structure in the minority channel below the majority channel gap, exchange splittings emerging from spin-split bands, anisotropy of excitons surrounding the indirect gap, and magnetic-field dependent photoconductivity. These findings open the door for the creation and control of spin-polarized excitations from minority channel charge charge transfer in $NiFe_2O_4$ and other members of the spinel ferrite family.

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