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Electronic excitations in four structurally similar but magnetically different Nickel chain compounds V.C. LONG, Y.H. CHOU, I.A. CROSS, A.C. KOZEN, L.A. LAVIOLET, C.A. MILLER-SHELLEY, J.R. MONTAGUE, E.P. PLUMB, Colby College, S.A. MCGILL, X. WEI, National High Magnetic Field Lab, B.R. LANDRY, K.R. MAXCY-PEARSON, M.M. TURNBULL, C.P. LANDEE, Clark University, R.D. WILLETT, Washington State University — We report the low temperature zero-field and magnetic field- dependent optical spectra of four Ni^{2+} chain compounds: NENP (Ni[*en*]$_2NO_2ClO_4$), NENB (Ni[en]$_2NO_2BF_4$), NTNB (Ni[*tn*]$_2NO_2BF_4$), and NINO (Ni[tn] $_2NO_2ClO_4$). The four differ in the counterions isolating the chains and the rings coordinated to the Ni^{2+} ions. Despite the structural similarities, only three of the compounds exhibit the Haldane gap typical of a spin-1 chain; the fourth, NTNB, behaves like spin glass, likely due to finite chain effects.[1] We focus on the near infrared spin-forbidden (SF) electronic $d-d$ transitions and the visible Ni^{2+}-to-NO_2^- charge transfer (CT) band. The zero-field absorption spectra differ in the *en* and *tn* ring compounds but are nearly identical in compounds with identical rings. The SF and CT band absorption intensities depend on field in a way that reflects the magnetic ground state. In the Haldane compounds, the onset of intensity changes occurs above the crossover field, whereas in NTNB the field-dependent absorption intensities respond to any finite field.[1] R.D. Willett and C. J. Gomez-Garcia, EMRS2007, Strasbourg.

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