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Magnetic Excitons in Heavy Fermion SemiMetals PETER RISEBOROUGH, Physdics Dept. Temple University — A magnetic exciton is a precursor magnetic exciton, similar to an antiparamagnon in a metal, which exists in strongly correlated semiconductors. The magnetic exciton has a spectrum which resembles the broadened dispersion relation of an antiparamagnon for excitation energies greater than the semi-conducting gap, but becomes sharp for energies less than the semi-conducting gap. The narrowness of the spectral feature is due to the absence of decay channels into the continuum of electron-hole pairs. Such excitations have been observed by inelastic neutron scattering experiments on the heavy-fermion semiconductors SmB6 and YbB12. However, magnetic excitons have not been observed in cerium based heavy-fermion semiconductors nor has their occurrence been linked to the vicinity of a quantum critical point. Recently, magnetic excitons have been observed in a class of heavy-fermion semimetals, which are defined as having a non-zero density of states within the gap. The identification of the excitations as precursor excitations has been confirmed by the discovery of related materials that have an antiferromagnetically ordered state. We examine, theoretically, the spectral features of a model of a heavy fermion semi-metal and discuss the effects of doping.

Peter Riseborough
Physdics Dept. Temple University

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