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Geometrical Frustration in Rare-Earth Face-Centered Cubic Crystals VERONIKA FRITSCH, JOE D. THOMPSON, JOHN L. SARRAO, Los Alamos National Laboratory, Los Alamos, NM 87544 — In a 3-dimensional solid the simplest form of magnetic frustration is spins on a tetrahedron with antiferromagnetic coupling. A face-centered cubic (fcc) lattice is a simple example of a network of edge-sharing tetrahedra; however, most fcc compounds exhibit well-defined magnetic order, dominated by next-neighbor (nn) and next-nearest-neighbor (nnn) interactions. To minimize the effects of nnn interactions and maximize frustration, the network of edge-sharing tetrahedra has to be divided into sub-networks of corner-sharing tetrahedra, as is realized in pyrochlore and spinel structures. A further example of a fcc-lattice split in two sub-networks of corner-sharing tetrahedra are the intermetallic ternaries $RE\mathrm{InCu}_4$ (RE = heavy rare-earth). Here the rare-earth ions occupy a fcc-lattice, where half of the tetrahedra are filled with an In-ions and the other half with a Cu-tetrahedron. The extent of frustration in these systems is determined by the magnetic moment of the rare-earth ion and second by their separation distance, which can be tuned with chemical substitution, e.g. Ni for Cu. We present measurements of electrical resistivity, magnetic susceptibility and specific heat on single crystals of the title compounds with the trivalent rare-earth ions Gd, Dy, Ho and Er, demonstrating geometrical frustration of their spin and orbital angular momentum.

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