

Large anomalous Hall effect induced by spin-chirality fluctuation in an ultraclean frustrated antiferromagnet PdCrO₂

Jun Sung Kim

Physics Department, Pohang University of Science and Technology

Magnetic frustration, realized in the special geometrical arrangement of localized spins, often promotes topologically nontrivial spin textures in the real space and induces significantly large unconventional Hall responses. This spin Berry curvature effect in itinerant frustrated magnets mainly works with a static spin order, limiting the effective temperature range below the magnetic transition temperature and inducing relatively small anomalous Hall conductivity and angle. Here we show that an ultraclean triangular-lattice antiferromagnet PdCrO₂ exhibits a large anomalous Hall response in the paramagnetic state, which is maintained far above the Neel temperature (T_N). The reported enhancement of anomalous Hall response is attributed to the skew scattering of highly mobile Pd electrons to fluctuating but locally-correlated Cr spins with a finite spin chirality. Our findings point at an alternative route to realizing high-temperature giant anomalous Hall responses, exploiting magnetic frustration in the ultraclean regime.