Large anomalous Hall effect in a non-collinear antiferromagnet Mn$_3$Sn at room temperature$^1$ TOMOYA HIGO, NAOKI KIYOHARA, ISSP, University of Tokyo, SATORU NAKATSUJI, ISSP, University of Tokyo and PRESTO, JST — Recent development in theoretical and experimental studies have provided a framework for understanding the anomalous Hall effect using Berry-phase concepts, and this perspective has led to predictions that, under certain conditions, a large anomalous Hall effect may appear in spin liquids and antiferromagnets [1, 2]. In this talk, we will present experimental results showing that the antiferromagnet Mn$_3$Sn, which has a non-collinear 120-degree spin order, exhibits a large anomalous Hall effect [3]. The magnitude of the Hall conductivity is $\sim 20 \, \Omega^{-1} \, \text{cm}^{-1}$ at room temperature and $> 100 \, \Omega^{-1} \, \text{cm}^{-1}$ at low temperatures. We found that a main component of the Hall signal, which is nearly independent of a magnetic field and magnetization, can change the sign with the reversal of a small applied field, corresponding to the rotation of the staggered moments of the non-collinear antiferromagnetic spin order which carries a very small net moment of a few of $m\mu_B$. [1] N. Nagaosa et al., Rev. Mod. Phys. 82, 1539 (2010). [2] Y. Machida et al., Nature 463, 210 (2010). [3] S. Nakatsuji, N. Kiyohara and T. Higo, Nature, doi:10.1038/nature15723, (2015).

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