Collinear antiferromagnetism in trigonal SrMn$_2$As$_2$ revealed by single crystal neutron diffraction A. KREYSSIG*, P. DAS*, N. S. SANGEETHA*, Z. A. BENSON*, T. HEITMAN+, D. C. JOHNSTON*, A. I. Goldman*, *Ames Laboratory, Dept. of Phys. and Astro., Iowa State University, IA, USA; +University of Missouri Research Reactor, MO, USA — FeAs-based compounds and related materials have been an area of intense research in understanding the complex interplay between magnetism and superconductivity. Here we report on the magnetic structure of SrMn$_2$As$_2$ that crystallizes in a trigonal structure (P$\bar{3}$m1) and undergoes an antiferromagnetic (AFM) transition at $T_N \approx 120$ K. The temperature dependence of the magnetic susceptibility remains nearly constant below $T_N$ with $H \parallel c$ while it decreases significantly with $H \parallel ab$. This shows that the local Mn moments order and lie in the $ab$ plane instead of aligning along the $c$ axis as in BaMn$_2$As$_2$. Single crystal neutron diffraction measurements on SrMn$_2$As$_2$ determined that the Mn moments are collinearly aligned in a G-type AFM order with AFM alignments between a moment and all nearest neighbors in the basal plane and also perpendicular to it. This manifests that G-type AFM order is robust for Mn122 systems despite different symmetries, i.e. tetragonal for BaMn$_2$As$_2$ and trigonal for SrMn$_2$As$_2$.

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