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magnetic structure of Mn₂GaC thin film by neutron diffraction

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Mn₂GaC (space group P6₃/mmc) is a laminated material consisting of Mn₂C layers interleaved with Ga layers. The competition between antiferromagnetic and ferromagnetic interactions within the Mn₂C planes gives rise to complex magnetic behaviors. It orders magnetically below T_N = 507 K and shows another magnetic transition at T_C = 220 K. We employed neutron diffraction to study the nature of the magnetic order with single crystal neutron diffractometer D10 at ILL and WISH at ISIS. We identified two sets of reflections that are consistent with two propagation vectors, $q_1 = (0, 0, 2/3)$ and $q_2 = (0, 0, 0.54)$ at both 300 K and 1.5 K, where q_1 is predominant at 300 K while q_2 is stronger at 1.5 K. By fitting the integrated intensity of the magnetic reflections and by considering the presence and absence of certain peaks, we proposed a transverse spiral structure along c axis.

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