

Study and analysis of the magnetic properties of MnSb_2Te_4

Ana Gelashvili^{1,2}, *Alexander Shengelaya*^{1,2}

E-mail: Ana.gelashvili@tsu.ge

¹ Department of Physics, Faculty of Exact and Natural Sciences,

Ivane Javakhishvili Tbilisi State University,

1 Ilia Tchavtchavadze Ave, 0179 Tbilisi, Georgia

² Ekvter Andronikashvili Institute of Physics, TSU,

6 Mikheil Tamarashvili St, 0177 Tbilisi, Georgia

The interest in MnSb_2Te_4 arose in the context of studying the topological ferromagnetic insulator MnBi_2Te_4 . Since antimony (Sb) is a chemically related element of bismuth (Bi), it was expected that substituting bismuth with antimony in MnBi_2Te_4 to form MnSb_2Te_4 would preserve the antiferromagnetic character. However, experiments have shown that MnSb_2Te_4 exhibits ferromagnetic behavior.

In MnSb_2Te_4 , atomic site-mixing often occurs, causing Mn^{2+} ions to occupy crystallographic positions that are not typical for them. X-ray diffraction (XRD) and neutron diffraction experiments have revealed anti-site mixing between Mn and Sb atoms, which significantly contributes to Mn–Mn ferromagnetic interactions. This anti-site mixing between Mn and Sb may lead to the emergence of a ferrimagnetic state.

Such atomic intermixing is highly dependent on the synthesis conditions and methods used to prepare the samples. Active research is still ongoing to show the relationship between sample synthesis conditions and magnetic properties. In this direction, we aimed to contribute by investigating the magnetic properties of MnSb_2Te_4 synthesized using one such method.