Double metamagnetic transition in Sr$_4$Ru$_3$O$_{10}$ investigated by low temperature magnetization measurements$^1$ DAGMAR FRANZISKA WEICKERT, LEONARDO CIVALE, MARCELO JAIME, BORIS MAIOROV, ROMAN MOVSHOVICH, Los Alamos National Laboratory, R. FITTIPALDI, V. GRANATA, A. VECCHIONE, University of Salerno, Via Giovanni Paolo II, I-84084 Fisciano, Italy, TENG TAN, Temple University, Philadelphia, Pennsylvania 19122, USA, MYRON SALAMON, University of Texas at Dallas, Richardson, TX 75080, Dallas, USA — We report a study of the magnetization of the n=3 member of the Sr$_{n+1}$Ru$_n$O$_{3n+1}$ Ruddlesden-Popper series down to $^3$He temperatures. Sr$_4$Ru$_3$O$_{10}$ exhibits ferromagnetism below 105 K with magnetic moments aligned along the crystallographic c-direction in the tetragonal crystal structure. Metamagnetism is observed at about 2 T below 50 K when a magnetic field is applied in the ab-plane. A recent study on high quality samples revealed that the metamagnetism has a substructure [1]. We extend the studies to very low temperatures and found i) a clear double peak in dM/dH, ii) that the metamagnetism is accompanied by a reduction of the magnetic moment and iii) no further splitting of the metamagnetic anomalies to the lowest temperatures of 0.46 K. Furthermore, the measurements indicate a shift of both metamagnetic signatures to higher fields by rotating from $H//ab$ to $H//c$. We will discuss the phase diagram and possible ordered states.


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