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Elastic and inelastic neutron scattering studies on $Sr_2FeSi_2O_7$ KAZUKI IIDA, ISRAEL KLICH, SUNGDAE JI, JOOSEOP LEE, NAOYUKI KATAYAMA, TOM JACKSON, SEUNGHUN LEE, Univeristy of Virginia, DORON BERGMAN, California Institute of Technology, SUNG CHANG, NIST Center for Neutron Research, DUC LE, Helmholtz Zentrum Berlin, ENRICO FAULHABER, ASTRID SCHNEIDEWIND, Technische Universitat Munchen, TAEHWAN JANG, YOONHEE JEONG, Pohang University of Science and Technology, SANGWOOK CHEONG, Rutgers University — Evolution of static and dynamic spin correlations in a new multiferroics material $Sr_2FeSi_2O_7$ under an external magnetic field was investigated by elastic and inelastic neutron scattering techniques. An external magnetic field up to $B = 14$ Tesla induces four different magnetic and ferroelectric phases in $Sr_2FeSi_2O_7$. The static magneto-electric coupling can be understood as the p-d hybridization proposed for a related material $Ba_2CoGe_2O_7$. By analyzing the neutron scattering data obtained from a single crystal of $Sr_2FeSi_2O_7$ under magnetic field, we have determined the spin structure and the effective spin Hamiltonian in this material. The spin structure and spin wave excitations show interesting changes as upon ramping up the system enters the field-induced phases for $B > 6.5$ Tesla, which will also be discussed.

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