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Spin Dynamics, Critical Scattering and Magnetoelectric Coupling Mechanism of $Mn_4Nb_2O_9$

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The spin dynamics of $Mn_4Nb_2O_9$ were studied by using inelastic neutron scattering. A spin-dynamic model is proposed to explain the observed spin-wave excitation spectrum. The model indicates that the exchange interactions along the chain direction are weakly ferromagnetic while the exchange interactions between the neighbour chains are strongly antiferromagnetic. Such a antiferromagnetic configuration in the hexagonal plane cause spin frustration with a spin gap of about 1.4 meV at the zone centre. The Mn^{2+} ions in this material demonstrate a very weak easy-axis single-ion anisotropy. Critical scattering in the vicinity of T_N was studied. On the basis of the magnetic structure and spin-dynamic models, the weak magnetoelectric coupling effect in $Mn_4Nb_2O_9$ is ascribed to the weak magnetostriction due to the subtle difference between Mn^{2+} ions on the Mn_I and Mn_{II} sites.

Level of Expertise

Experienced Researcher

Presenter Gender

Man

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He/Him

Which facility did you use for your research

Australian Centre for Neutron Scattering

Students Only - Are you interested in AINSE student funding

No

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

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