Contribution ID: **225**   Type: **Oral presentation**

Unveiling local magnetic correlations: the development of magnetic pair distribution function at CSNS

The magnetic pair distribution function (mPDF) analysis of neutron total scattering data has recently emerged as a powerful method for investigating the local magnetic correlations in materials. Similar to the atomic pair distribution function (PDF) method, the mPDF utilizes the Fourier transform of the magnetic neutron scattering cross section to obtain information about magnetic structures at the sub-nanometer length scale in real space. Without the long-range symmetry constraints, the mPDF method is promising for revealing short-range magnetic correlations, such as those in strongly correlated electron systems or geometrically frustrated magnets. Here, we introduce the development of the mPDF method at the MPI beamline of the China Spallation Neutron Source. This method will significantly enhance the neutron scattering technique for the study of magnetic materials.

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Session Classification: Software