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Inelastic neutron scattering measurements on the triangular lattice antiferromagnet CuFe1-xGaxO2 in the paraelectric and multiferroic phases

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The intensive efforts to study multiferroic materials in recent years have led to a better understanding of the fundamental physical processes and interactions leading to the complex behavior in those compounds. In this talk, I will focus on the recent neutron scattering measurements and calculations of the spin dynamics of the triangular lattice antiferromagnet $CuFe_{1-x}Ga_xO_2$. In pure $CuFeO_2$ a low-temperature collinear spin structure is stabilized by long range magnetic interactions. The spin wave spectra show dynamics precursory to the multiferroic phase. When this system is doped with a few percent of nonmagnetic gallium, its low-temperature phase has a complex noncollinear (CNC) spin order and becomes multiferroic. The CNC phase appears to have distorted screw-type magnetic configuration that is stabilized by the displacement of the oxygen atoms. The spin dynamics and the spin order in this material, as well as their implications to the origin of the ferroelectricity will be discussed [1,2].

[1] J. T. Haraldsen, et al., *Phys. Rev. B*, **82**, 020404 (2010).

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