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**Single Crystal Inelastic Neutron Scattering Measurements of the Unconventional Superconductor $Ba_{0.6}K_{0.4}Fe_2As_2$**[1] J.P. CASTELLAN, S. ROSENKRANZ, R. OSBORN, F. WEBER, E.A. GOREMYCHKIN, I.S. TODOROV, H. CLAUS, D.Y. CHUNG, Argonne Nat. Lab., M.G. KANATZIDIS, Northwestern University, T. GUIDI, Rutherford Appleton Lab — Iron arsenide superconductors have attracted a great deal of interest because of their similarities with high-Tc copper oxides. In both the copper oxides and iron arsenides, the parent compounds are antiferromagnetically ordered and superconductivity arises by suppressing this antiferromagnetic order by chemical doping. An important feature of the copper oxide superconductors is the existence of a resonant magnetic excitation. This resonance is localized both in energy and wavevector and is predicted to occur only when there is a change of sign of the superconducting energy gap on different parts of the Fermi surface. Following our observation of the resonance below Tc in a polycrystalline sample of Ba0.6K0.4Fe2As2 [Nature **456**, 930 (2008)], we have now performed inelastic neutron scattering measurements in a composite single crystal confirming that the resonance is centered at the Γ-M point with modulations along the *c*-axis.

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