

High energy transfer polarized inelastic neutron scattering of $\text{YBa}_2\text{Cu}_3\text{O}_{6.6}$

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YBCO ($\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$) has become one of the most studied high temperature superconducting systems. The high superconducting temperature, T_c , values present result in an energy scale of magnetic interactions that is well within the range for detailed studies using thermal triple-axis neutron scattering instruments. We have chosen to examine a large single crystal of the underdoped material $\text{YBa}_2\text{Cu}_3\text{O}_{6.6}$ with a $T_c = 63$ K. The C5 spectrometer was used with the sample oriented in the HHL scattering plane. The spectrometer was operated with a final energy of 14.7 meV and two pyrolytic graphite filters located between the sample

and the analyzer. The spectrometer was configured with Helium-3 polarization and analysis. Constant wave-vector scans were performed at the (0.25 0.25 7) wave-vector. These were performed while measuring the spin-flip scattering. The magnetic guide field was applied along both the scattering wave-vector, horizontal field, and in the vertical orientation, vertical field. The difference of these two measurements corresponds to half the magnetic signal. Other non-magnetic cross-sections should cancel out using this process. Figure 1 illustrates the difference in the horizontal and vertical field constant wave-vector scans.

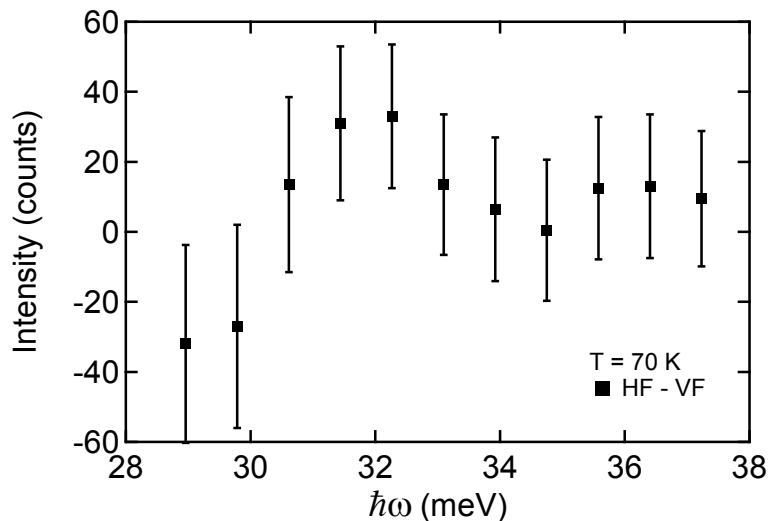


Figure 1 Difference of horizontal field and vertical field orientation spin-flip scattering measurements for $\text{YBa}_2\text{Cu}_3\text{O}_{6.6}$ as measured using the C5 spectrometer.