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Critical scattering in classical and nearly quantum critical systems

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We report on a study of critical scattering in classical and nearly quantum critical antiferromagnets (AFs). The energy width of the critical scattering was determined by high-resolution neutron spin-echo at TRISP at the MLZ. The classical systems studied include the $s=5/2$ AFs MnF_2 and Rb_2MnF_4 with quasi 2D and 3D spin interactions, respectively. Discrepancies between experiment and theory observed in previous three-axis studies could be resolved by our high-resolution measurement. For a study of quantum critical systems, we chose the $\text{Ce Cu}_{6-x} \text{Au}_x$ series, which has a quantum critical point at $x=0.1$ and shows AF ordering for larger x . First measurements at $\text{Ce Cu}_{5.8} \text{Au}_{0.2}$ ($T_N=0.22\text{K}$) show a hitherto unexplained dynamical critical exponent.

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