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Critical scattering in classical and quantum critical systems

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We report on a study of critical scattering in classical and nearly quantum critical antiferromagnets (AFMs). The energy width of the critical scattering was determined by high-resolution neutron spin-echo at TRISP at the MLZ in Munich. The classical systems studied include the s=5/2 AFMs Rb2MnF4 and MnF2 with quasi 2D and 3D spin interactions, respectively. Both compounds are Heisenberg AFMs with a small uniaxial anisotropy resulting from dipolar spin-spin couplings, which leads to a crossover in the critical dynamics close to the Neel-Temperature (TN). By means of our high-resolution measurement we were able to identify the dynamical critical exponents z for both longitudinal and transverse fluctuations. Thus discrepancies between experiment and theory observed in previous three-axis studies could be resolved. For a study of quantum critical systems, we chose the CeCu(6-x)Au(x) series, which exhibits a quantum critical point at x=0.1 seperating nonmagnetic (x<0.1) and magnetically ordered ground states (x>0.1). First measurements at CeCu5.8Au0.2 (TN=0.22K) show a hitherto unexplained dynamical critical exponent.

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