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E/T-scaling of the spin fluctuations in the Zn-Mg-Ho magnetic quasicrystal[1] TAKU J. SATO, ISSP-NSL, University of Tokyo, AN PANG TSAI, IMRAM Tohoku University — We report inelastic neutron-scattering results on the icosahedral Zn-Mg-RE (RE: rare-earth) magnetic quasicrystals. In the Zn-Mg-RE quasicrystals, slowing down of spin dynamics starts at considerably high temperatures (about 50 K) with developing antiferromagnetic correlations, nevertheless, the spins stay paramagnetic until low-temperature freezing transitions ($T_{\rm f} = 1.95$ K for RE = Ho), indicative of strong frustration effect. Neutron inelastic scattering further reveals that for RE = Ho, the scattering function $S(Q, \hbar\omega)$ is almost temperature independent for $\hbar\omega > 0$ in a wide temperature range up to 200 K. Corresponding dynamic susceptibility for $\hbar\omega < 1.5$ meV is scaled as $\mathrm{Im}\chi(\hbar\omega, T)T^{1/3} \propto (\hbar\omega/T)^{-1/3}Z(\hbar\omega/T)$, where $Z(\hbar\omega, T) = \tanh(\alpha\hbar\omega/T)$ is the scaling function. This $\hbar\omega/T$ (or E/T) scaling is identical to those frequently observed in systems near a quantum critical point, such as UCu_4Pd. In view of the frustration-reduced low freezing temperature of the Zn-Mg-Ho quasicrystal, the E/T-scaling may also be indicative of the quantum criticality in this magnetic quasicrystal.

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Taku Sato
Neutron Science Laboratory, ISSP, University of Tokyo

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