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Neutron scattering investigations on quantum spin systems

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Magnetic neutron scattering experiments have been playing important role to probe the quantum ground state magnetism in condensed matter physics. In this review talk, I would like to highlight series of inelastic neutron magnetic scattering investigations on low-dimensional magnetic systems clarifying the roles of classical fluctuations and quantum fluctuations. They include the investigations on non-linear soliton excitations in one-dimensional spin chain systems, on quantum renormalization of spin-wave excitations, on spin on excitations in S=1/2 anti-ferromagnetic Heisenberg chain, on Haldane gap for antiferromagnetic integer spin Heisenberg chain and on spin dimer systems. In these examples, the microscopic knowledge of spin fluctuations provided by neutron scattering, including polarized neutron scattering, was essential to recognize the key features of macroscopic quantum ground state magnetism. The state-of-the-art scattering instruments at modern neutron facilities worldwide designed to perform these key experiments will be also briefly introduced.

Biography

Kazuhisa Kakurai has completed his PhD from TU Berlin working at the Hahn-Meitner Institut, Berlin. He joined the Institute for Solid State Physics of the University of Tokyo as an Assistant Professor and became a Professor in 1997. He was the Director General of the QuBS Directorate at the JAEA until 2014 and now serves as a General Adviser in the QuBS Center, JAEA in Tokai, Japan. Currently, he is also Visiting Scientist at CEMS, RIKEN in Wako, Japan.

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