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A Phenomelogical Theory of Quantum Tricritical Point: Applications to a Heavy-Fermion Compound $YbRh_2Si_2$ TAKAHIRO MISAWA, Department Applied Physics, Univ. of Tokyo, YOUHEI YAMAJI, MASATOSHI IMADA — We construct a phenomelogical theory of quantum tricritical point (QTCP) of itinerant antiferromagnets by extending the self-consistent renormalization theory. We have shown that a novel non-Fermi liquid behavior comes out at the QTCP where a continuous phase transition changes into a first-order one at zero temperature. In contrast to the conventional quantum criticality proposed by Moriya, Hertz and Millis, a remarkable feature of the QTCP is the divergence of the ferromagnetic susceptibility at the antiferromagnetic phase transition under the magnetic field. In a heavy-fermion compound $YbRh_2Si_2$, enhancement of the ferromagnetic susceptibility near the antiferromagnetic quantum critical point has been an unsolved puzzle. We have shown that the quantum tricriticality naturally explains this puzzling enhancement. In particular, singularities of ferromagnetic susceptibility and the magnetization curve near the QTCP are well consistent with the experimental results.

Takahiro Misawa
Department Applied Physics, Univ. of Tokyo

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