

Mott transition in the Hubbard model on the anisotropic kagomé lattice: Variational cluster approach

A. Yamada^a, K. Seki^a, R. Eder^b, and Y. Ohta^a

^aDepartment of Physics, Chiba University, Chiba 263-8522, Japan

^bKarlsruhe Institute of Technology, Institute for Solid State Physics, 76021 Karlsruhe, Germany

We study the Mott transition and ferrimagnetism in the Hubbard model on the anisotropic kagomé lattice using the variational cluster approximation. The phase diagram of the model at half-filling and zero temperature is thereby analyzed. We find that the ferrimagnetic phase rapidly grows as the geometric frustration is relaxed, and the Mott-insulating phase disappears in moderately frustrated region, indicating that the ferrimagnetic fluctuations stemming from the relaxation of the geometric frustration is enhanced by the electron correlations. In the metallic phase, heavy fermion behavior is observed and mass enhancement factor is computed. Enhancement of effective spatial anisotropy by the electron correlations is also confirmed in moderately frustrated region, and its effect on the heavy fermion behavior is examined.

Reference:

[1] A. Yamada, K. Seki, R. Eder, and Y. Ohta, Phys. Rev. B, in press (2011).