Magnetization Process of Antiferromagnetic Heisenberg Model on Spatially Anisotropic Kagome Lattice

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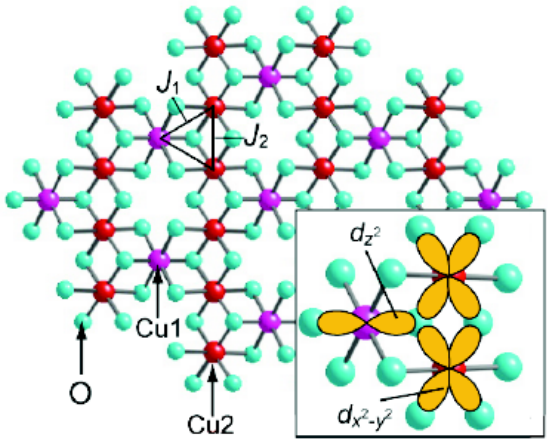
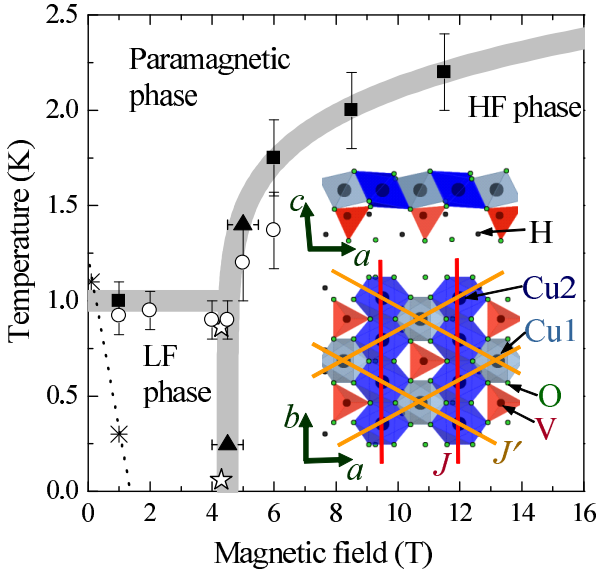
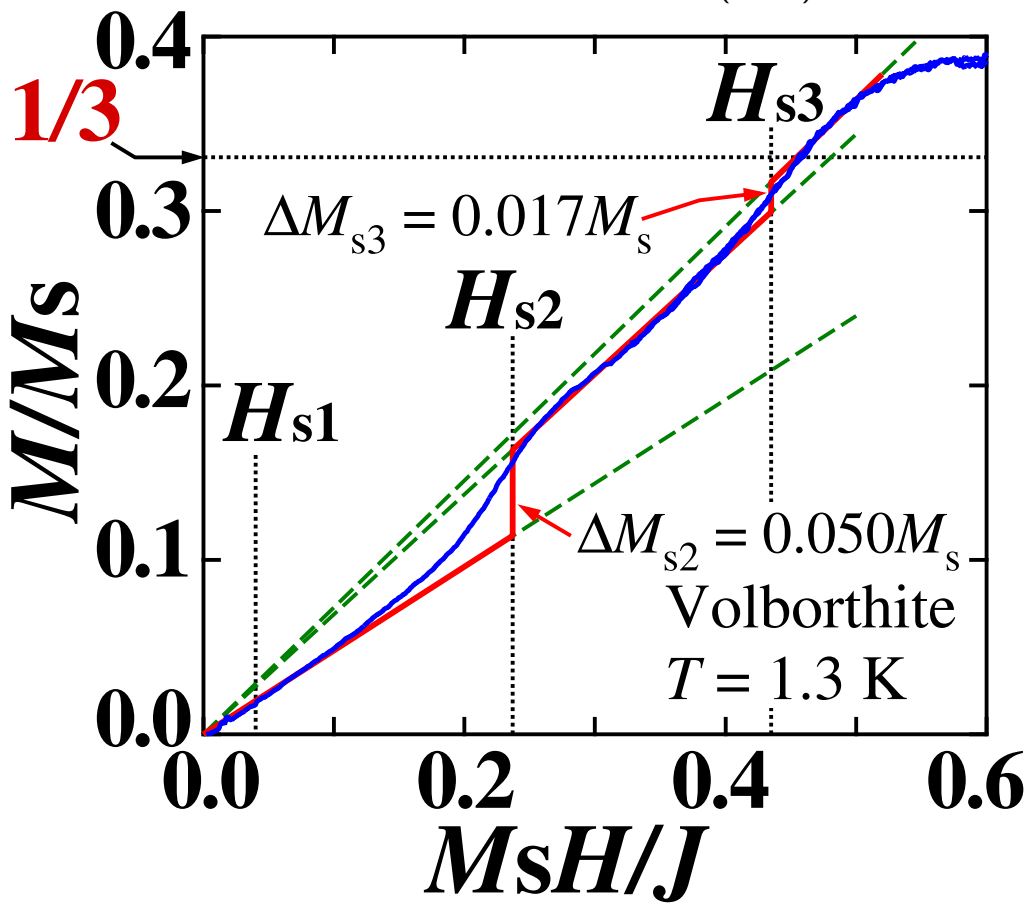
Kagome antiferromagnets: volborthite



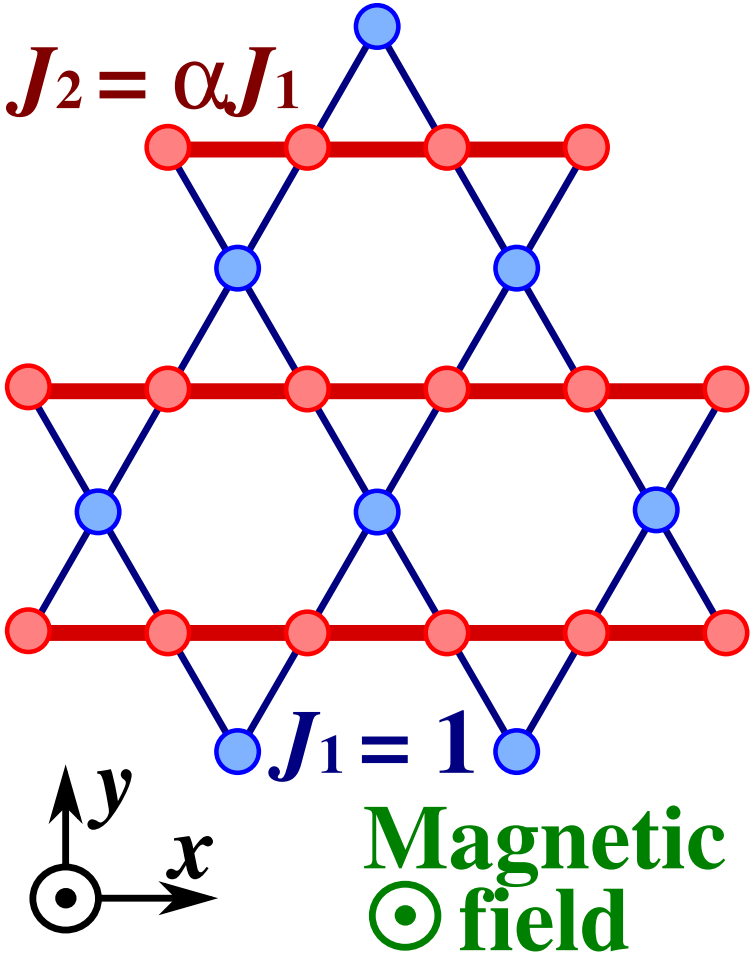


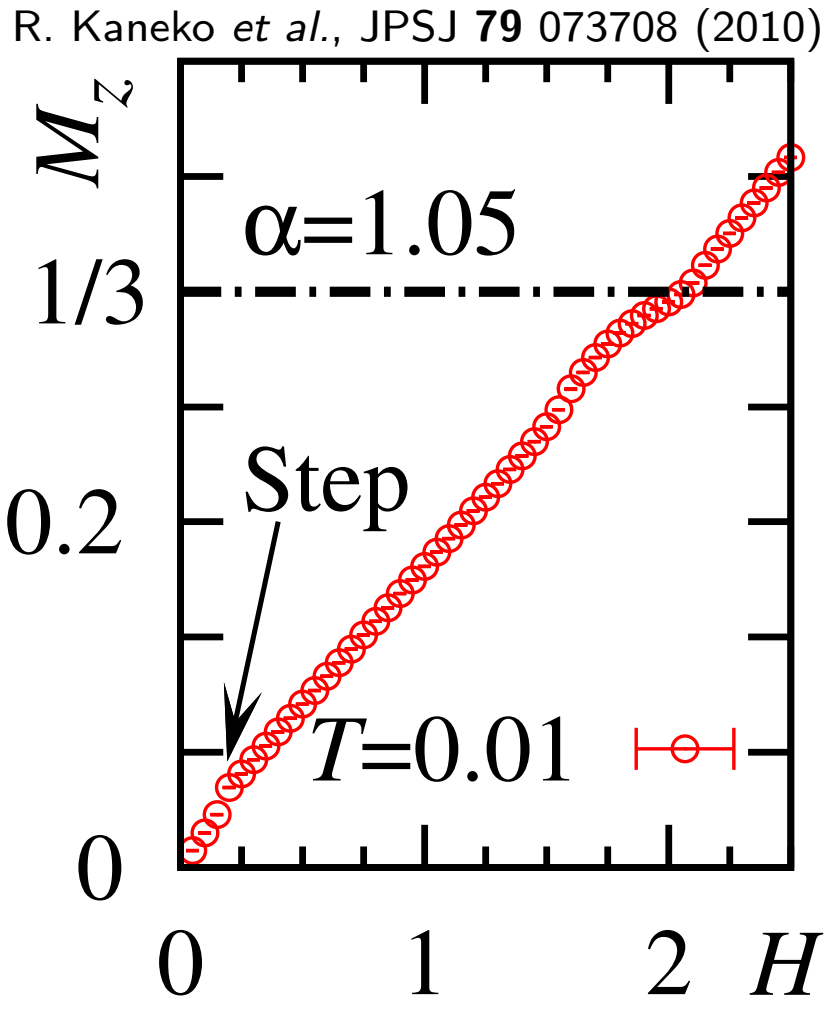
H. Yoshida *et al.*, JPSJ **78** 043704 (2009)
M. Yoshida *et al.*, PRL **103** 077207 (2009)
Y. Okamoto *et al.*, PRB **83** 180407(R) (2011)
P. Sindzingre, arXiv:0707.4264
O. Janson *et al.*, PRB **82** 104434 (2010)



What is the possible origins of the magnetization steps?

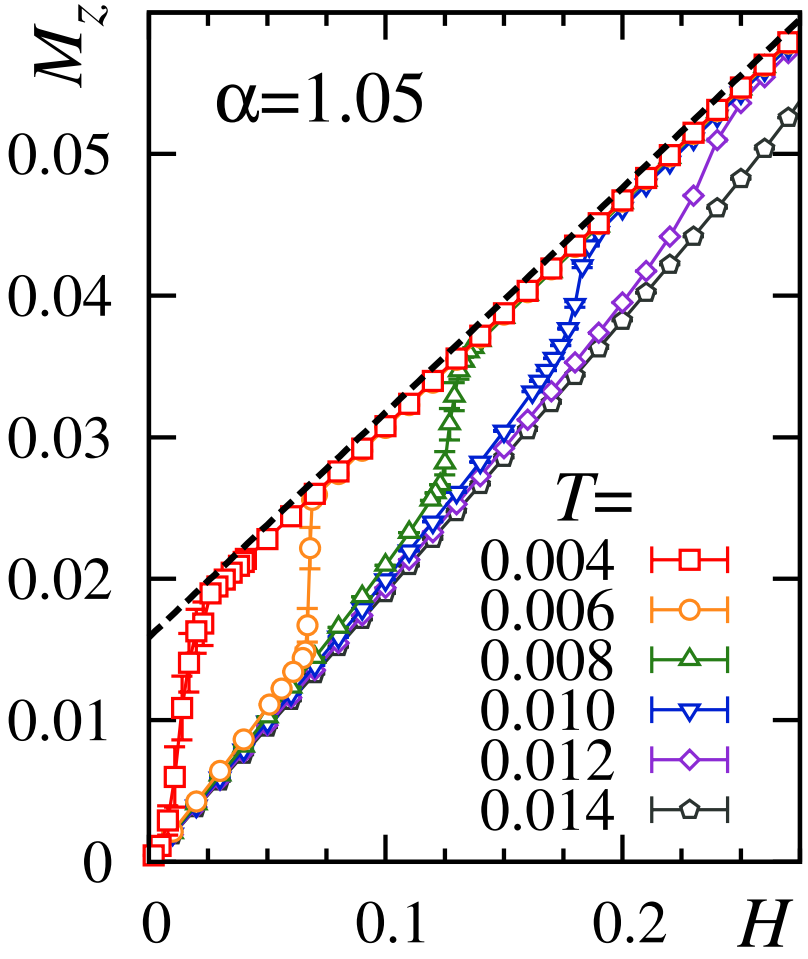
Magnetization step in anisotropic kagome

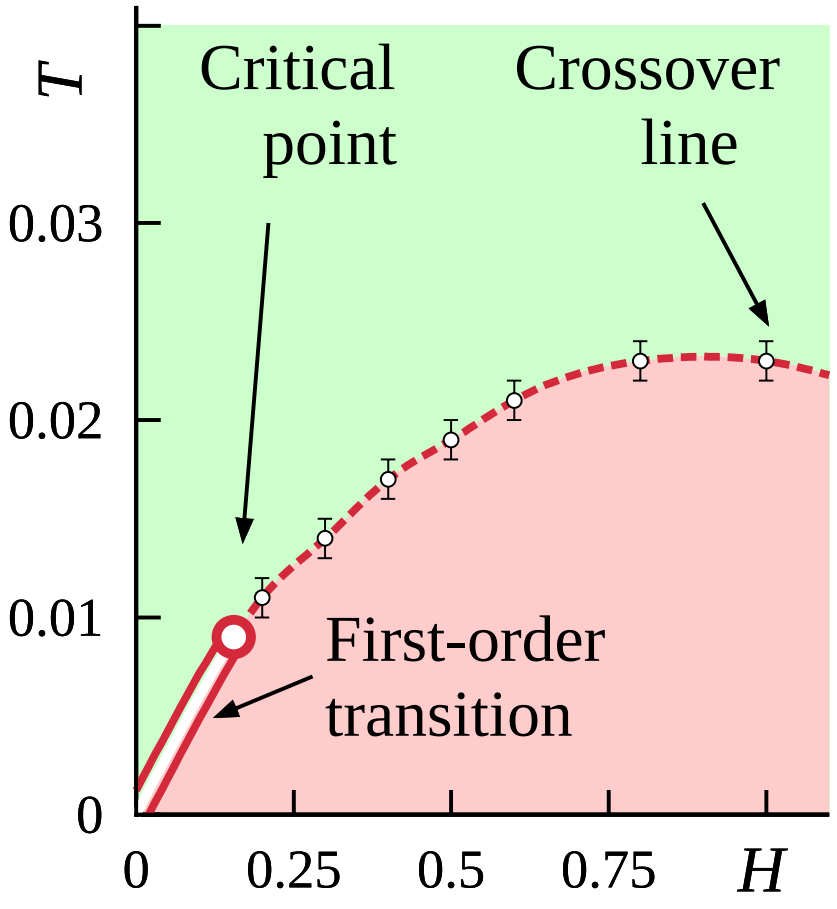




By using the MC method, we find
an anisotropy-induced magnetization step.

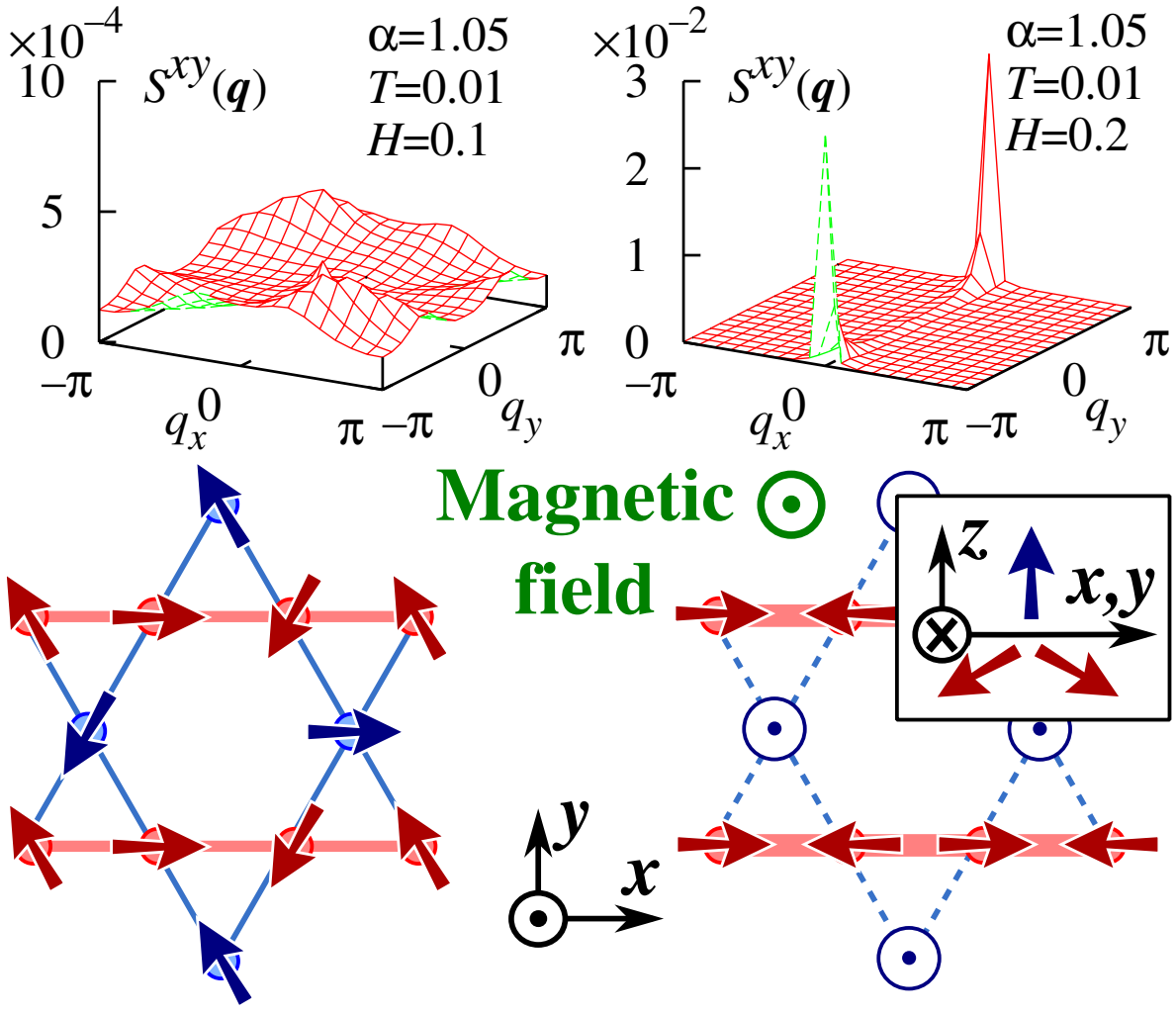
Magnetization step in anisotropic kagome





The first-order transition occurs near zero fied and near zero temperature.

Sudden change in $S(q)$ around transition



Sudden change may be detected in neutron scattering and NMR experiments.

In poster presentation, ...

In addition to the results on the classical model, we study

- effects of quantum fluctuations, and
- effects of additional exchange interactions.