The ground state in two-dimensional anti-ferromagnetic solid ^{3}He in high magnetic field

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A low-density solid ^{3}He film adsorbed on graphite surface is one of the most ideal two-dimensional (2D) quantum spin systems with nuclear spin S =1/2 on a triangular lattice. Because of the hard-core potential between ^{3}He atoms, the higher order multiple spin exchange processes as well as two-particle exchange play important roles. The competition between them, in addition to the geometrical frustration inherent to a triangular lattice structure, makes the anti-ferromagnetic solid ^{3}He strongly frustrated. Experimentally the heat capacity[1] and susceptibility[2] measurements of anti- ferromagnetic 4/7 phase in the second layer solid ^{3}He adsorbed on graphite indicate that the ground state is a gapless spin liquid. Then how is the behavior in high magnetic fields? The present status of our experimental studies in high magnetic fields will be presented.

[1] K. Ishida *et al*., Phys. Rev. Lett. **79**, 3451 (1997)
[2] R.Masutomi *et al*., Phys. Rev. Lett. **92**, 025301 (2004).