PS-A2

Effects of three-magnon interaction on the excitation spectrum and transport

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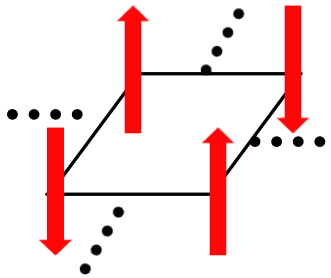
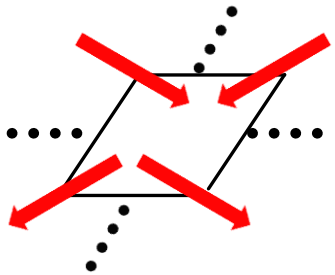
Three-Magnon Interactions

Square Lattice Heisenberg Antiferromagnets

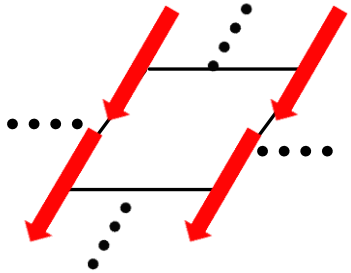


Néel

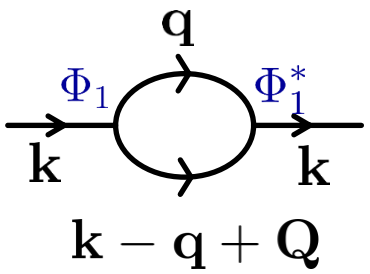


Noncollinear

Magnetic Field



Saturation Field



The strength of the interaction

→ **tuned** from zero to large value

Appearance of Rotons

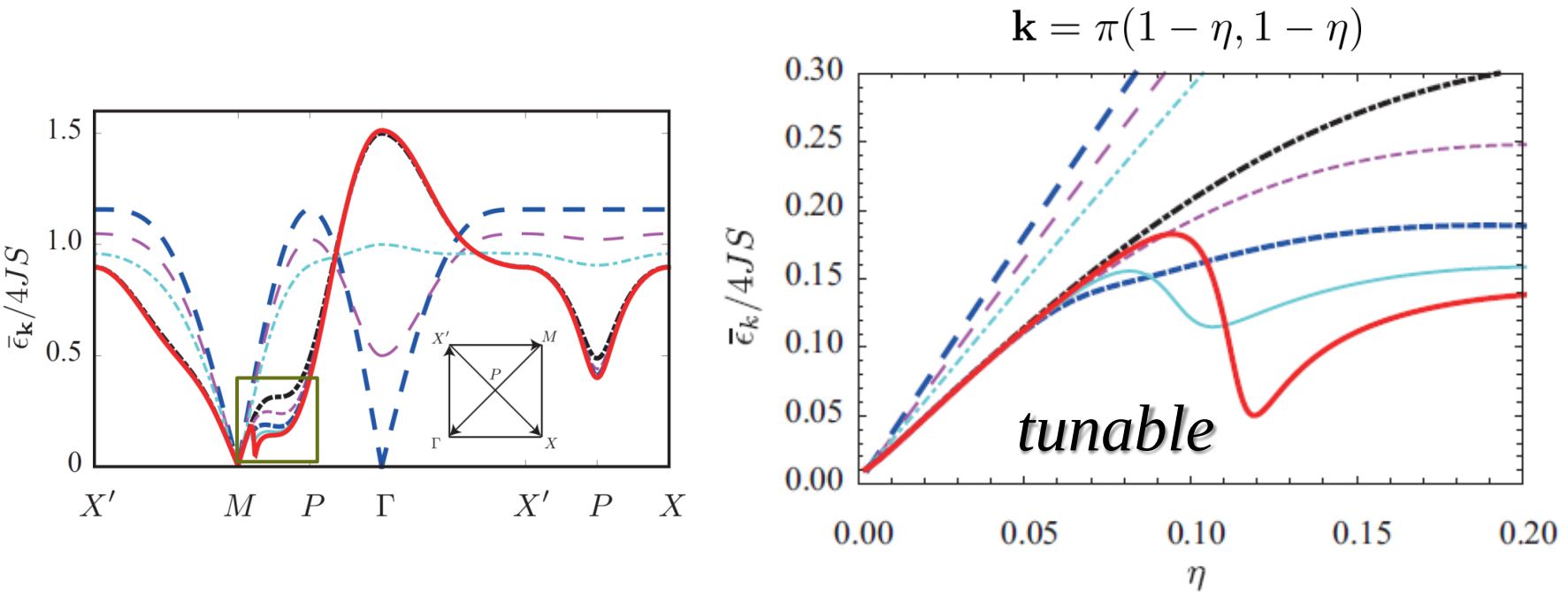


Fig. 1 Appearance and Softening of rotons

Yurika Kubo and Susumu Kurihara, Phys. Rev. B **90**, 014421 (2014)

Novel Quantum Phase

might appear after the roton softening

Appearance of Rotons

$$A(\mathbf{k},\omega) = \frac{1}{\pi}\frac{\zeta_k}{(\omega - \bar{\epsilon}_{\mathbf{k}})^2 + \zeta_k^2}$$

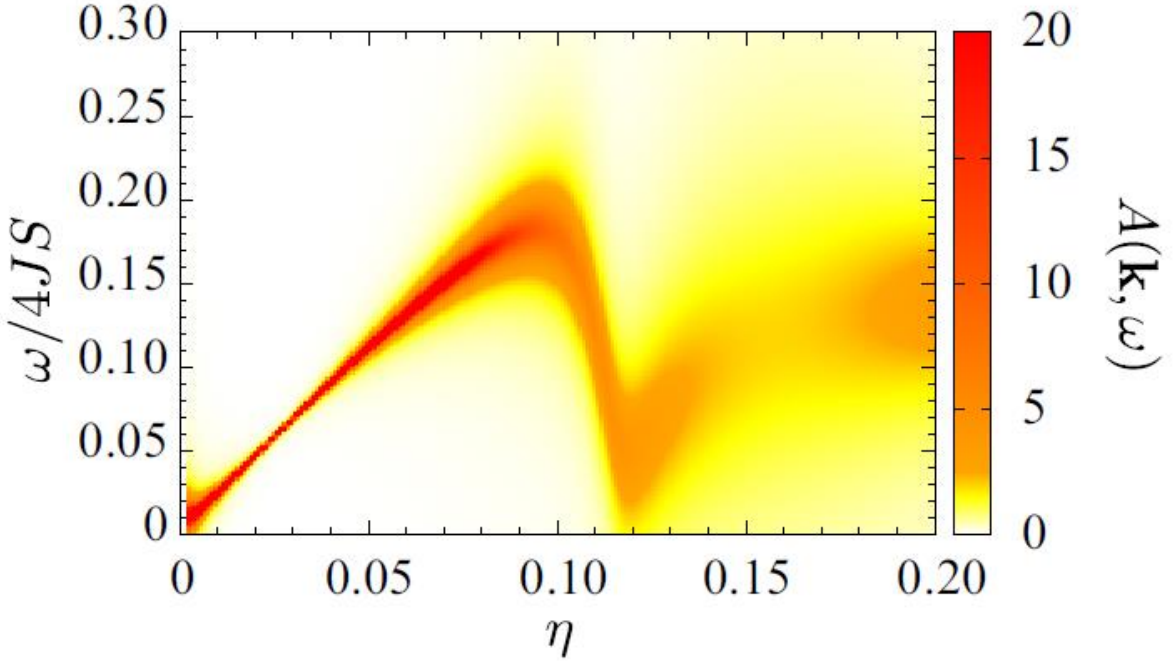
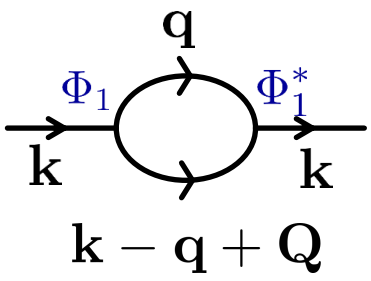


Fig. 2 Spectral weight at h=0.7568

Yurika Kubo and Susumu Kurihara, Phys. Rev. B **90**, 014421 (2014)

Nonlinear Effects on Spin Conductivity



Two-Magnon states also play role in spin conductivity due to strong three-magnon interactions

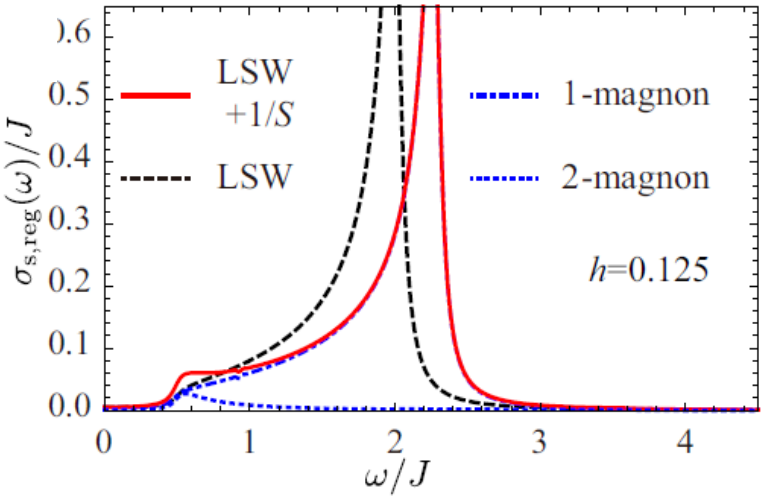


Fig. 3-1 spin conductivity in low fields

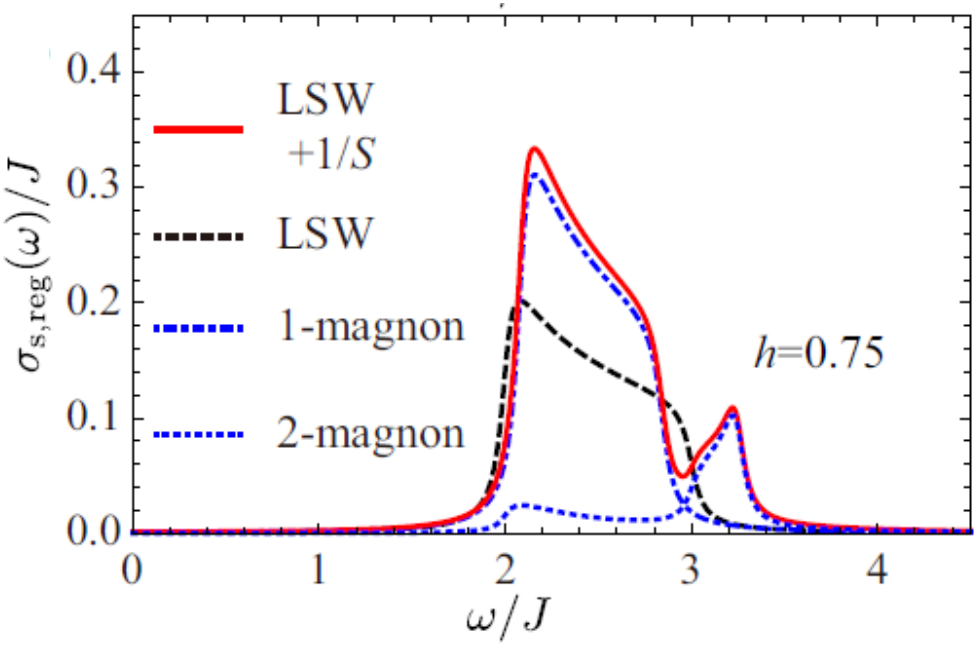


Fig. 3-2 spin conductivity in high fields

Yurika Kubo and Susumu Kurihara, J. Phys. Soc. Jpn. **82**, 113601 (2013)

Yurika Kubo and Susumu Kurihara, SCES proceeding (submitted)

Summary

Effects of strong three-magnon interactions

- Appearance & Softening of “Roton”
  → a precursor of phase transition?

- Two-Magnon Sideband in Spin Conductivity