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Novel Raman resonance in ladder spin systems

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We consider Raman intensity in spin S two-leg- spin-ladder, with the goal to understand recent experiments[1,2]. We argue that the Raman intensity has a pseudo-resonance peak whose width is very small at large S . The pseudo-resonance originates from the existence of a local minimum in the magnon excitation spectrum, and is located slightly below twice the magnon energy at the minimum. The physics behind the peak is surprisingly similar to that in the excitonic scenario for the neutron and Raman resonances in a d -wave superconductor. We also consider mid-infrared X-ray scattering in 2D systems and compare the results with recent measurements [3].

- [1] A. Gozar et al, Phys. Rev. Lett. **87**, 197202 (2001).
- [2] S. Sugai and M. Suzuki, Phys stat sol (b) **215**, 653 (1999).
- [3] J. P. Hill, G Blumberg et al, [unpublished]

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