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What can we learn from not so high pressure physics?

Andrey Podlesnyak[1], Matthias Frontzek[1], Liusuo Wu[1], Mark Lumsden[1]
[1]*Neutron Sciences Directorate, Oak Ridge National Laboratory, Oak Ridge, United States*
E-mail: podlesnyakaa@ornl.gov

Moderate pressure in the range 1 - 3 GPa has a large impact on physical properties of matter. The combination of high pressure techniques with elastic and inelastic neutron scattering proves to be a powerful tool in many research fields including magnetic phase transitions, unconventional superconductivity, colossal magnetoresistance, insulator to metal transitions, spin-state transitions, quantum critical points, etc. Designing high-pressure cells for neutron scattering is difficult due to a number of constrains, i.e. large sample volume, hydrostaticity, low neutron transparency, low temperature. The piston-cylinder clamp pressure cells overcome many limitations and enable high-pressure neutron scattering experiments on a wide range of new materials. First, we discuss scientific areas where moderate pressure techniques can play a significant role. The specific materials covered in more details will be multiferroic compounds and low-dimensional quantum magnets. We demonstrate that hydrostatic pressure can drastically change the magnetic ground state, resulting in a sequence of magnetic phase transitions. Magnetic interactions in quantum magnets built from organic molecules are rather sensitive to moderate pressure due to high compressibility of the molecular framework. Thus, pressure can be used to initiate profound change in their magnetic properties. We also describe the current situation in clamp pressure cell technology, specifically looking at design and materials of construction. Finally, we present the available clamp pressure cells developed for low temperature and high magnetic field neutron scattering studies at Spallation Neutron Source, Oak Ridge National Laboratory, along with the data regarding pressure range, transmission and thermal behavior.

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