Contribution ID: **176** Type: **Poster**

Evolution of the magnitude of the exchange and Dzyaloshinskii-Moriya interactions under pressure in chiral magnet MnSi

Monday, 29 August 2022 18:40 (20 minutes)

The intermetallic compound MnSi exhibits a number of properties that have attracted strong interest. In particular it magnetically orders below 29.5 K to an exotic long-pitch helical structure. This type of order is due to the presence of the Dzyaloshinskii-Moriya interaction, authorized by the absence of inversion symmetry in the crystal structure, that coexists with a dominant ferromagnetic exchange interaction.
As often observed in strongly correlated magnets, the properties of MnSi are strongly influenced by the application of a relatively modest pressure. The MnSi ordering temperature decreases with pressure up to ~1.5 GPa, above which value its ground state is non-magnetic.
Here we report on recent zero-field μSR measurements aimed at determining the evolution of the magnetic order under pressure. Up to 1.3 GPa, the high statistics asymmetry spectra can be analysed using the model derived a couple of years ago for the interpretation of room pressure measurements [1]. Thanks to a prior determination of the muon site and of the muon coupling parameters, the parameters entering the model are directly those of the magnetic structure.
For each pressure, we find the ordered magnetic moment m to decrease as T^2 from its low temperature value, similar to earlier results obtained at room pressure [2]. This decrease is the signature of the excitations of spin waves (helimagnons) as the temperature is raised. The quadratic temperature dependence reflects the form and anisotropy of the helimagnon dispersion relation. From the slope of $m(T)$ vs T^2 we determine the two parameters of the dispersion relation, from which we quantitatively deduce the magnitude of the exchange and Dzyaloshinskii-Moriya interactions at each pressure. Finally the spectra recorded at 1.44 GPa are discussed.
[1] P. Dalmas de Reotier et al, Phys. Rev. B 93, 144419 (2016).
[2] A. Yaouanc et al, Phys. Rev. Research 2, 013029 (2020).

Primary authors: Dr DALMAS DE REOTIER, Pierre (Univ. Grenoble Alpes); YAOUANC, Alain (Univ. Grenoble Alpes); LAPERTOT, Gérard (Univ. Grenoble Alpes); Prof. ANDREICA, Daniel (Babes-Bolyai University); Dr GUPTA, Ritu (Laboratory for Muon Spin Spectroscopy, Paul Scherrer Institute, CH-5232 Villigen PSI, Switzerland); Dr KHASANOV, Rustem (Laboratory for Muon Spin Spectroscopy, Paul Scherrer Institute, CH-5232 Villigen PSI, Switzerland); Dr AMATO, Alex (Laboratory for Muon Spin Spectroscopy, Paul Scherrer Institute, CH-5232 Villigen PSI, Switzerland)

Presenter: Dr DALMAS DE REOTIER, Pierre (Univ. Grenoble Alpes)

Session Classification: Posters

Track Classification: Strongly correlated electron systems