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**Spin orbital singlet system $FeSc_2S_4$ under pressure**[1] ALUN BIFFIN, LNS, Paul Scherrer Institut, DMITRY CHERNYSHOV, ESRF, EMMANUEL CANEVET, TOM FENNELL, JONATHAN S. WHITE, LNS, PSI, RUSTEM KHASANOV, HUBERTUS LUETKENS, LMU, PSI, ALOIS LOIDL, University of Augsburg, VLADIMIR TSURKAN, Univ. Augsburg & Academy of Sciences of Moldova, CHRISTIAN RÜEGG, LNS, PSI & University of Geneva — The role of orbital degrees of freedom in quantum magnets is receiving intense focus recently, with the understanding that spin-orbit coupled systems can display physics qualitatively different from their spin only counter parts. An example is the spin-orbital singlet (SOS) state, which can provide an alternative to the conventional spin and orbitally ordered groundstates of quantum magnets. In such a scenario, the relative strengths of the exchange interaction and spin orbit coupling parameters determine the low temperature structure, with the former preferring ordered moments and the latter a non-magnetic singlet. Moreover the quantum critical point separating these two phases is rather unique in that it marks the onset of criticality in both the spin and orbital sectors. This SOS picture has recently been applied to $FeSc_2S_4$, where despite strong antiferromagnetic exchange between Jahn-Teller active $Fe^{2+}$ ions no experimental signature of spin or orbital order has been detected. Building on our previous neutron scattering measurements, we have used hydrostatic pressure in neutron scattering, muon spin rotation and x-ray diffraction measurements to probe the unique phase diagram of $FeSc_2S_4$. My talk will focus on the results and interpretation of these experiments

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