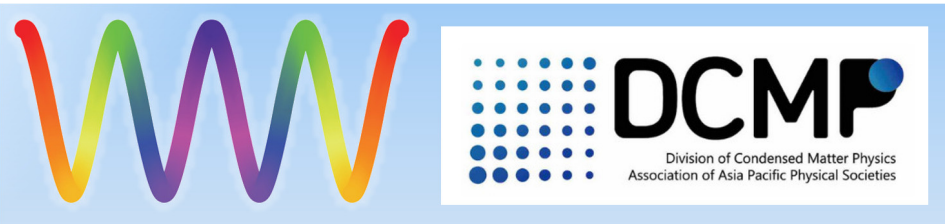

Contribution ID: **114** Type: **Contributed Oral**

Spin spirals versus spin stripes in underdoped cuprate superconductors: muon spin relaxation data confirms spirals and is inconsistent with stripes

Tuesday, 10 February 2026 11:30 (15 minutes)

All cuprate superconductors are based on doping of parent Mott insulators which are collinear antiferromagnets. With doping by holes or electrons the insulator becomes a poor conductor, called a “pseudogap metal” or a “Mott metal”, that supports unconventional high temperature superconductivity.

It is well established in neutron scattering that with doping by holes the systems develop incommensurate spin ordering. The ordering can be static, quasistatic, or dynamic (nematic state). The ordering period is proportional to doping and generally is incommensurate with the lattice. There is no doubt that the ordering is a fundamental property of the pseudogap state that must be understood.

There are two competing models (visualizations) of the ordering, (i) spin stripes and (ii) spin spirals. Experiments with polarized neutrons were inconclusive to distinguish between these models. The cuprate $La_{2-x}Ba_xCuO_4$ ($x = \frac{1}{8}$) plays a special role in the story because the elastic neutron scattering in this case is especially strong indicating large static magnetic moment. The static moment is large because the generally incommensurate structure in this compound is commensurate with period 8 lattice spacing and hence pinning to the lattice suppresses spin quantum fluctuations.

The large static magnetic moment allows us to use μSR to distinguish between the spirals and the stripes. I perform analysis of available μSR data and show that the data is consistent with spin spirals and inconsistent with spin stripes. I also determine value of the magnetic moments in the spin spiral.

Field of Condensed Matter

Magnetism

Author: Prof. SUSHKOV, Oleg (University of New South Wales)

Presenter: Prof. SUSHKOV, Oleg (University of New South Wales)

Session Classification: Superconductivity

Track Classification: Contributed talk sessions: Superconductivity