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# Two-component superconductivity in $Sr_2RuO_4$ studied by uniaxial and hydrostatic pressure $\mu$SR

*Monday, 29 August 2022 15:00 (20 minutes)*

After two decades of research, the symmetry of the superconducting state in $Sr_2RuO_4$ is still under strong debate. The long time favoured spin-triplet px + i py state is ruled out by recent NMR experiments (1). However, in general time-reversal-symmetry breaking (TRSB) superconductivity indicates complex two-component order parameters. Probing $Sr_2RuO_4$ under uniaxial pressure offers the possibility to lift the degeneracy between such components (2). One key prediction for $Sr_2RuO_4$, a splitting of the superconducting and TRSB transitions under uniaxial pressure has not been observed so far.
Here, we report results of muon spin relaxation (μSR) measurements on $Sr_2RuO_4$ placed under uniaxial stress (3). We observed a large pressure-induced splitting between the onset temperatures of superconductivity ($T_c$) and TRSB ($T_{TRSB}$). Moreover, at high stress beyond the van Hove singularity, a new spin density wave ordered phase is observed.
To distinguish between a symmetry protected chiral state (d+id) and non-chiral accidentally degenerated order parameters (d+ig, f+ig) we also report $\mu$SR studies under symmetry conserving hydrostatic pressure. In these experiment no splitting between $T_c$ and $T_{TRSB}$ is observed (4).
In this talk we discuss the implications on the superconducting order parameter in $Sr_2RuO_4$.

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