Laser ARPES measurements of Sr_2RuO_4 under uniaxial strain

Andrew Hunter[1], Carsten Putzke[2], Philip Moll[2], Anna Tamai[1] and Felix Baumberger[1,3]
[1]*Department of Quantum Matter Physics, University of Geneva, Geneva, Switzerland*
[2]*Laboratory of Quantum Materials (QMAT), Institute of Materials (IMX), Ecole Polytechnique Fédérale de Lausanne (EPFL), 1015 Lausanne, Switzerland*
[3]*Swiss Light Source, Paul Scherrer Institute, Villigen, Switzerland*

Sr_2RuO_4 has evolved into a key-model system for correlated electron physics following the discovery of its superconductivity - long believed to harbour p-wave triplet pairing - 28 years ago. The normal state of Sr_2RuO_4 is exceptionally well characterized and is generally regarded as the cleanest Fermi-liquid system amongst all transition metal oxides. Recent transport experiments discovered that a compressive strain of $\sim$ 0.6 % causes the superconducting transition temperature of Sr_2RuO_4 to increase from 1.5 K to 3.4 K concomitant with the development of a pronounced non-Fermi-liquid behaviour in the normal state. This behaviour is commonly attributed to a Lifshitz transition in one of the three Fermi surface sheets [1–3]. Here, we report a new generation of ARPES experiments under strain based on a thermally actuated strain cell and a micro-structured tapered sample prepared with focused ion beam milling. Coupled with a micro-focused laser source, this allows the measurement of the quasi-continuous variation of strain on a single sample. We use this new capability to image the Lifshitz transition and to monitor the evolution of the quasiparticle dispersion and self-energy upon approaching the non-Fermi-liquid regime.

[1] A. Steppke *et al.,* Science **355**, 6321 (2017).
[2] M. Barber *et al.,* Phys. Rev. Lett. **120**, 076602 (2018).
[3] V. Sunko *et al.,* npj Quantum Mater. **4**, 46 (2019).