Laser ARPES measurements of Sr_2RuO_4 under uniaxial strain

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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.

References

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