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Micromachined samples for uniaxial strain studies with laser-ARPES

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Uniaxial strain is an important tuning parameter in condensed matter physics, as modest pressures can induce fundamentally different characteristics in materials reversibly and reproducibly [1-3]. However, it has long been a technical challenge to systematically study the effects of uniaxial strain in experiments such as angle resolved photoemission spectroscopy (ARPES) [4-6].

We introduce a novel and generally applicable route to studying uniaxial strain by macroscopically shaping a sample with a Helios G4 PFIB such that it gains a tapered profile. This profile allows us to induce a variation in strain within the sample by applying pressure with a thermally actuated pressure cell. The induced strain gradient can then be resolved in experiments with a spatially local probe, unlocking the potential for systematic studies of the effect of uniaxial strain. We present micro-focused laser-ARPES results for Sr_2RuO_4 – a keystone material in condensed matter physics – under uniaxial strain to study the evolution of a van Hove singularity across the chemical potential.

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[4] J. A. Sobata, Y. He, Z. X. Shen; *Angle-resolved Photoemission studies of Quantum Materials;* Reviews of Modern Physics **93** (2021), 025006.

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