Supplementary materials for "3D Fermi surfaces from charge order in layered CsV_3Sb_5"

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I. FABRICATION PROCESS OF MEMBRANE-BASED MICROSTRUCTURES

The fabrication of the suspended microstructure starts by cutting a cross-sectional slice of the platelet in the ac-plane by FIB milling. A Xe-ion beam is used to avoid ion implantation, and a low-voltage polish step at 5 kV reduces the amorphization layer into the nm-range[1]. This slab is then transferred to a commercial SiN_x transmission electron microscopy window (SPI). The 500×500 μm wide window in a Si frame is spanned by a 200 nm thin membrane. After Au-evaporation, the sample is further patterned into a symmetric transport geometry and the remaining window is cut into a meandering spring, to further soften the mount guided by finite element simulations. We have fabricated both in-plane and out-of-plane aligned microbars that are maximally decoupled from its mechanical support[Fig. 1(f)]. They feature a minimal residual pressure that allows to probe reliably transport bars of materials which easily cleave ($\approx$ 9.8 bar, see SEC. II).

II. ESTIMATION OF STRAIN DUE TO THERMAL CONTRACTION FOR MEM-BASED MICROSTRUCTURE

We now estimate the displacement applied to the sample from the thermal contraction of the SiN_x spring and the outer Si frame when cooling the device to cryogenic temperatures. The thermal contraction coefficient of $SiN_x(\varepsilon_{SiN})$ and $Si(\varepsilon_{Si})$ upon cooling from 300 K to 4 K are 0.0342% and 0.0208% respectively. Assuming the sample itself has a typical thermal contraction coefficient $\varepsilon_{Samp} \approx 0.1\%$, one can easily calculate the total thermal contraction of the SiN_x spring:

$$dL_{Samp} = L_{Samp} \times \varepsilon_{Samp} = 80\ nm \tag{S1}$$

$$dL_{SiN} = L_{SiN} \times \varepsilon_{SiN} = 70\ nm \tag{S2}$$

$$dL_{Si} = L_{Si} \times \varepsilon_{Si} = 60\ nm \tag{S3}$$

$$dL_{total} = dL_{Samp} + dL_{SiN} - dL_{Si} = 90\ nm \tag{S4}$$

Since the spring constant of the the SiN_x spring is determined as 110 N/m by Comsol multi-physics simulation, the pressure due to thermal contraction can be calculated as:

$$P_{samp} = k \cdot dL/A = 9.8\ bar \tag{S5}$$

where A stands for the cross section of the spring.

III. DETAILS OF BAND STRUCTURE CALCULATIONS

First-principles density functional theory (DFT) calculations were performed using the Quantum Espresso package (QE)[2]. We used the generalized gradient approximation with the Perdew-Burke-Ernzerhof parameterization[3] together with projector-augmented wave pseudopotentials generated by Dal Corso[4]. In all cases, we used an energy cutoff of 90 Ry with a Methfessel-Paxton smearing[5] of 0.02 Ry. The structural relaxation was done with a 18x18x2 grid neglecting spin-orbit coupling (SOC) and was stopped when pressures are below 0.01 kBar. The bands were computed adding SOC in top of the previous parameters. For the calculation of the Fermi surface we performed a wannierization of the system using Wannier90[6] and then computed the Fermi surface in a 200x200x100 grid using the obtained tight binding model.

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