Supplemental Information to:

Charge-density-wave quantum critical point under pressure in 2*H*-$TaSe_2$

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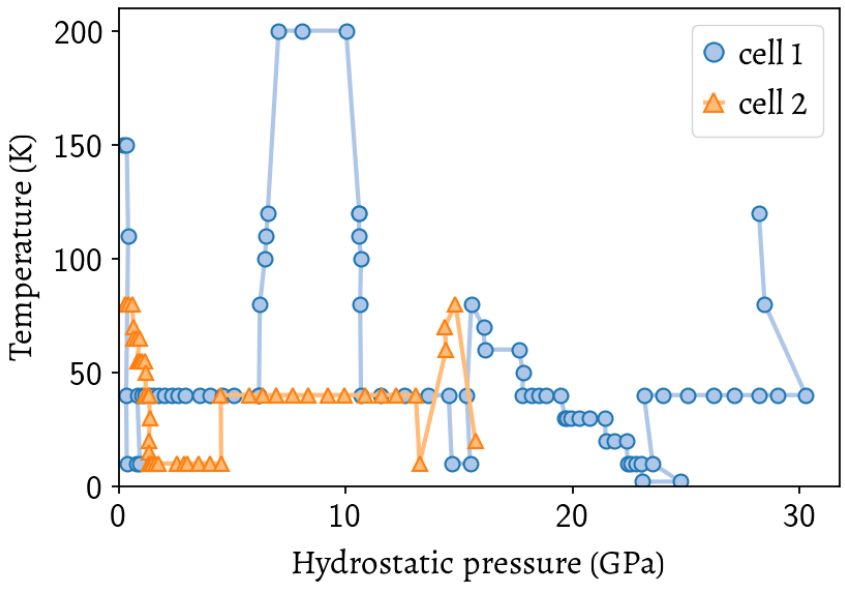
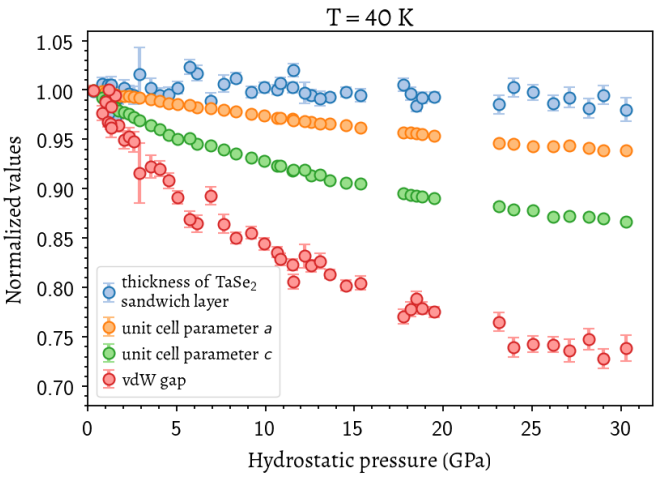


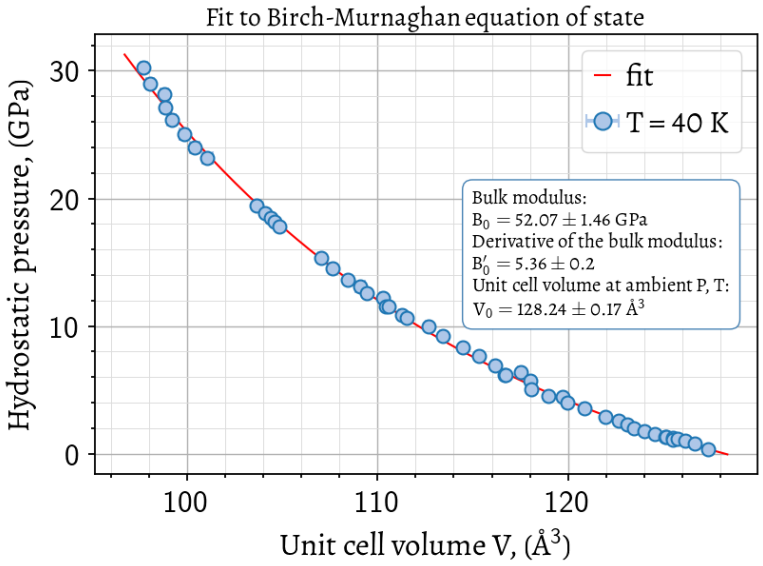
Suppl. Fig. 1. Sequence of temperature-pressure points measured with XRD at beamline ID15b for DAC 1 (circles) and DAC 2 (triangles).



Suppl. Fig. 2. Pressure dependence of various structural parameters as deduced in our structural refinements for the high-temperature unit cell at T = 40 K. All parameters are normalized to their respective value at the lowest pressure investigated, p_{min} = 0.3 GPa. The size of the van-der-Waals (vdW) gap and the thickness *d* of a single $TaSe_2$ sandwich layer are derived from the *z* parameter of the Se atomic site [see Fig. 4(d)] and the c axis lattice parameter [see Fig. 4(c)] according to:

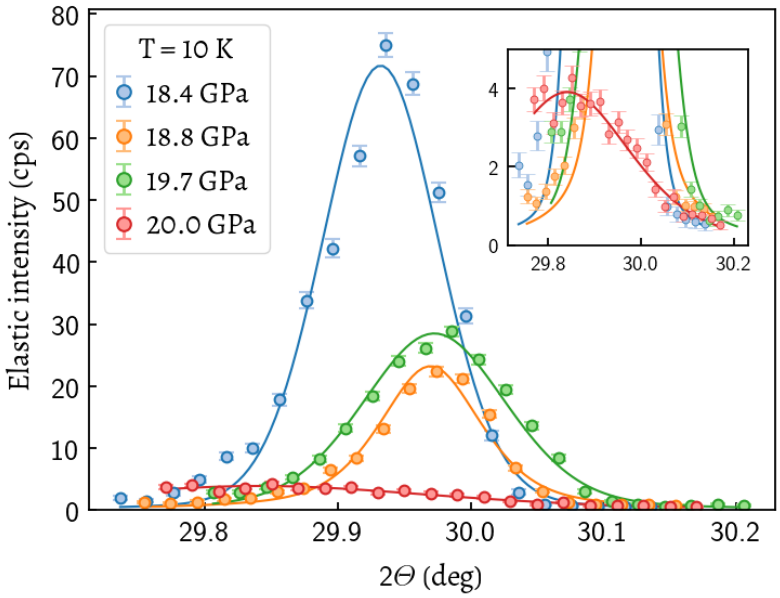
$$vdW = 2 * c * z$$

$$d = 0.5 * c * (1 - 4 * z)$$

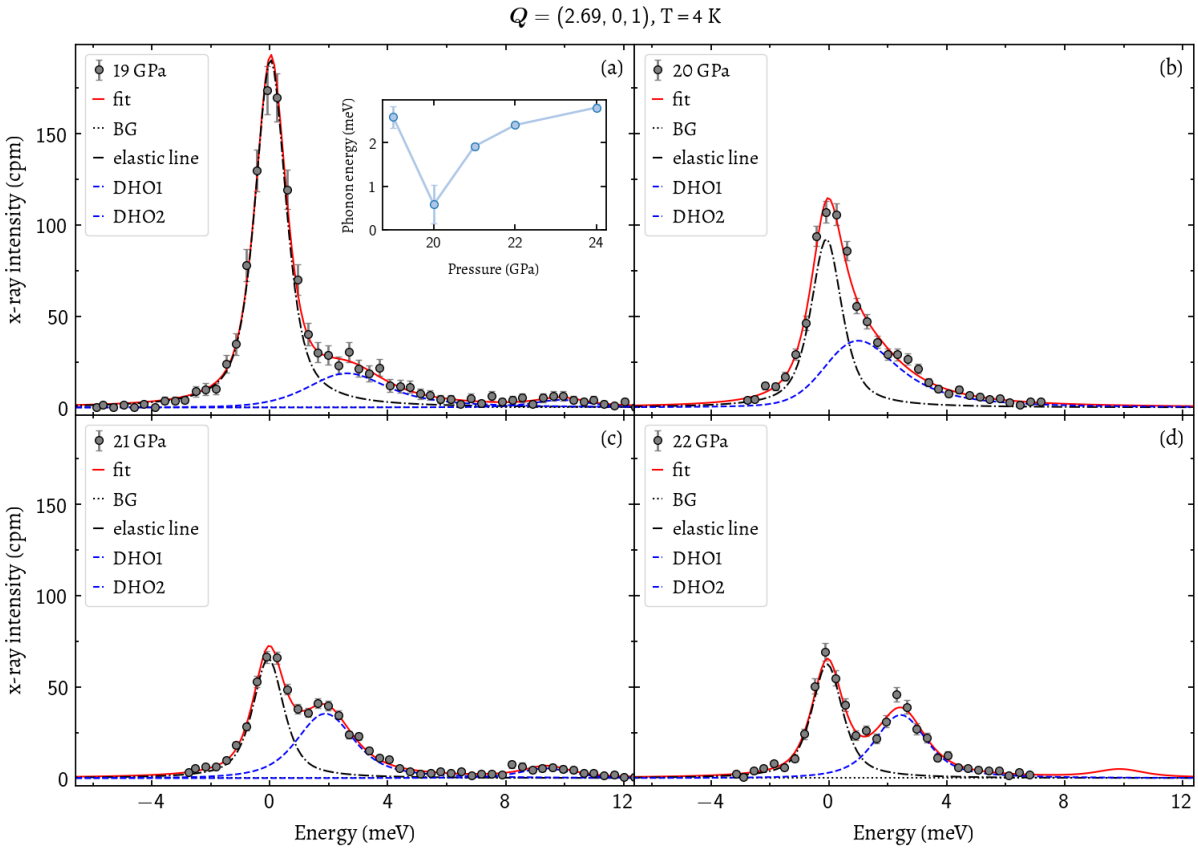


Suppl. Fig. 3. Birch-Murnaghan fit of the pressure-dependent unit cell volume of 2*H*-$TaSe_2$ (see equation below). The resulting parameters are given in the legend. The fit was performed using the third-order Birch-Murnaghan equation of state (see equation 1; providing insights into the material's compressibility and structural stability), where *p* = pressure, *V* = volume at a given pressure, V_0 = volume at zero pressure, B_0 = Bulk modulus at zero pressure and B_0' = derivative of the bulk modulus with respect to pressure.

$$p(V) = \frac{3B_0}{2}\left[\left(\frac{V_0}{V}\right)^{7/3} - \left(\frac{V_0}{V}\right)^{5/3}\right]\left\{1 + \frac{3}{4}(B_0' - 4)\left[\left(\frac{V_0}{V}\right)^{2/3} - 1\right]\right\} \quad (1)$$



Suppl. Fig. 4. Scattering intensity of elastic scans (zero energy transfer) through the CDW superlattice peak at **Q** = (2.69,0,1) obtained on the ID28 HERIX spectrometer at ESRF, France. The inset focuses on the low-intensity observed at *p* = 20 GPa.



Suppl. Fig. 5. Energy scans at **Q** = (2.69,0,1) obtained on the ID28 HERIX spectrometer at ESRF, France, for various pressures, *p* = 19 GPa – 22 GPa. Solid red lines represent fits to the data consisting of a resolution-limited pseudo-Voigt function at zero energy transfer (black dash-dotted) and DHO functions, convoluted with the experimental resolution, for the phonons (blue dashed). The inset in (a) shows the observed pressure dependence of the energy of the CDW soft phonon mode for *p* = 19 GPa – 24 GPa.