ESRF	**Experiment title:** Pressure modulated Kohn anomaly in quasi-one-dimensional $ZrTe_3$	**Experiment number**: HC-4956
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Report:

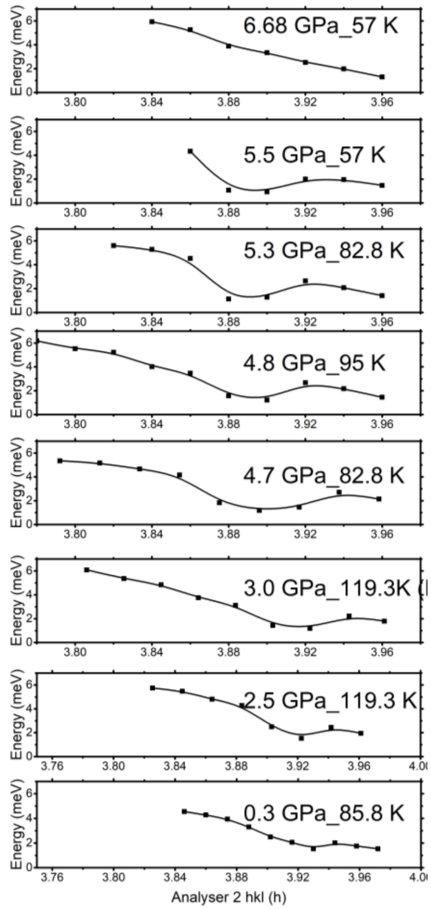

Fig.1. Phonon dispersion from (40$\bar{1}$) in the direction $\vec{q}_P$ (a*=3:93 at 0 GPa) from these conditions with $T > T_{CDW}$ in $ZrTe_3$ under pressure. Note that $ZrTe_3$ shows a pronounced Kohn Anomaly even at 5.5 GPa and quenched at 6.68 GPa. *P* and *T* are recalibrated.

We have performed meV-resolution non-resonant inelastic x-ray scattering (IXS) on single crystal $ZrTe_3$ in a DAC with pressure (*P*) and low temperature (*T*). The phonon dispersion along the CDW modulation vector and the IXS spectra were determined by each momentum transfer $\vec{Q}$ which is close to the strong Bragg spot $\vec{G}$ =(40$\bar{1}$), and along a straight line from (40$\bar{1}$) through $\vec{q}_P$ (a*=3.93) and beyond.

In this experiment, a strong Kohn Anomaly (KA) is observed with increasing pressure and quenched at 6.68 GPa (Fig.1). For pressures below 5 GPa, measurement *T* slightly above the T_{CDW} of the phase diagram has given us clear and exploitable data. But, at higher pressure the strategy needs refinement, due to after the CDW quenched (5 GPa) the KA looks also strong at 5.5 GPa. In fact, due to the hard control of *P* during the cooling or warming *T*, the isobar *T*-dependent KA experiments will be necessary to verify the origin of CDW quenching in $ZrTe_3$.

In the new experiment we will measure $ZrTe_{2.97}Se_{0.04}$ (0 pressure) as well as pure $ZrTe_3$ (6 GPa) as a function of temperature down to much lower temperature (T_{min} = 10 K). The comparison of disorder-stabilized $ZrTe_{2.97}Se_{0.04}$ to pressure-stabilized pure $ZrTe_3$ well above the quenching pressure of 5 GPa will allow the distinction between a structural disorder origin of CDW quenching in pure materials against a more generic misbalancing of the CDW by only slight structural compression.

This experiment was performed by DESY scientists (Yongsheng Zhao, Moritz Hoesch, Jan Schunck) with strong support from beamline staff scientists. The precise line-up of authors in the publication is under consideration, but all efforts will be duly acknowledged and co-authorship offered where appropriate.