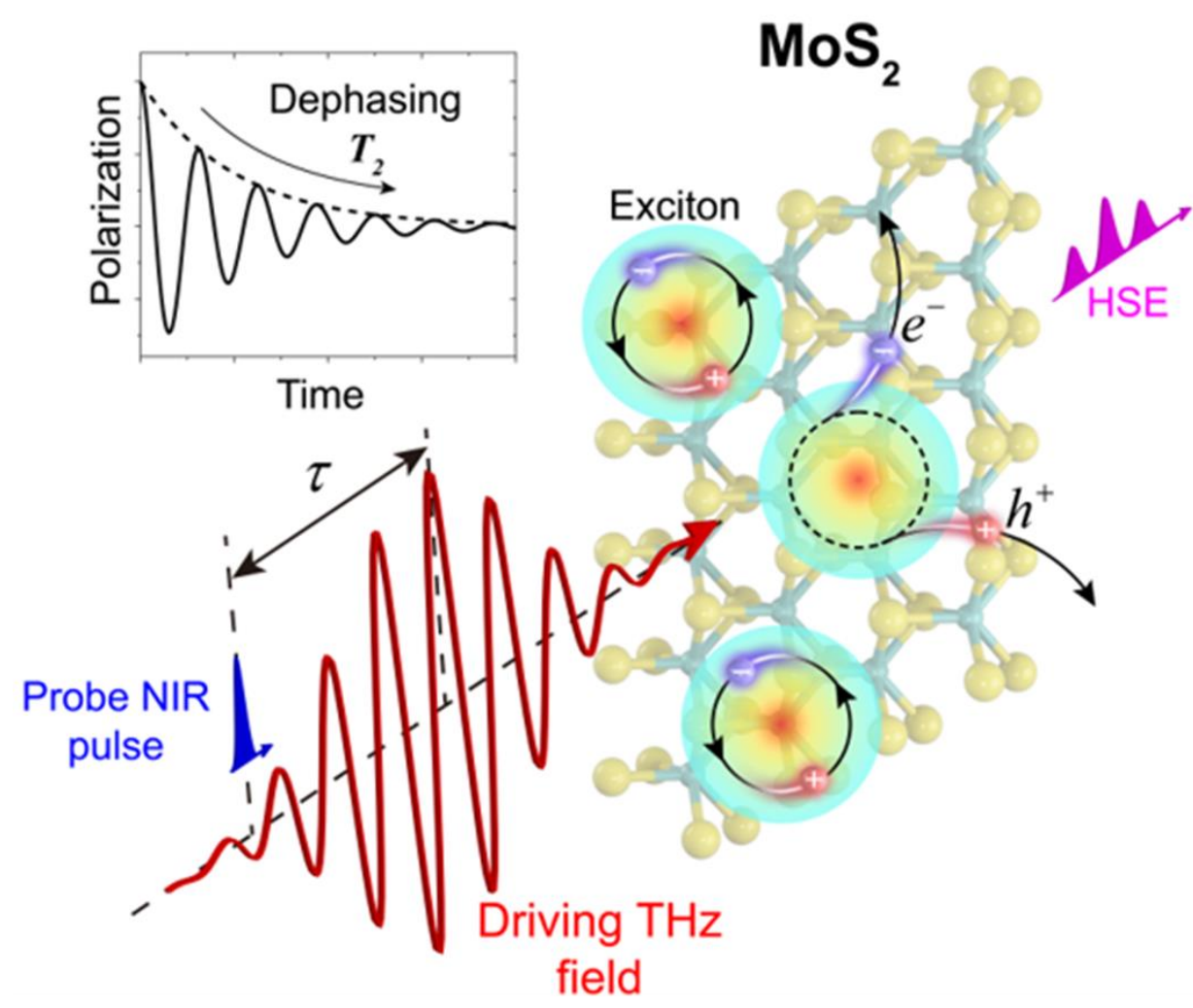
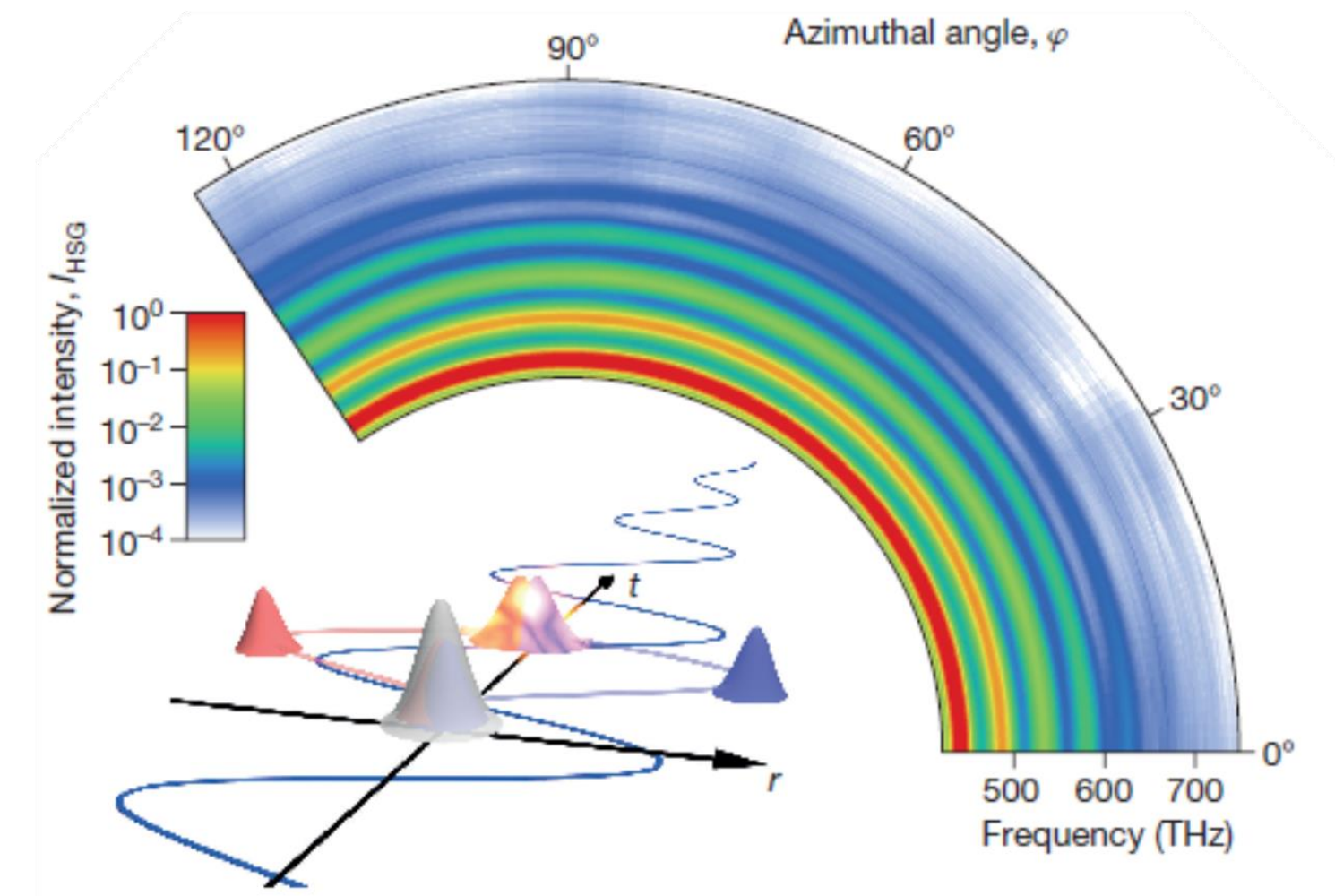
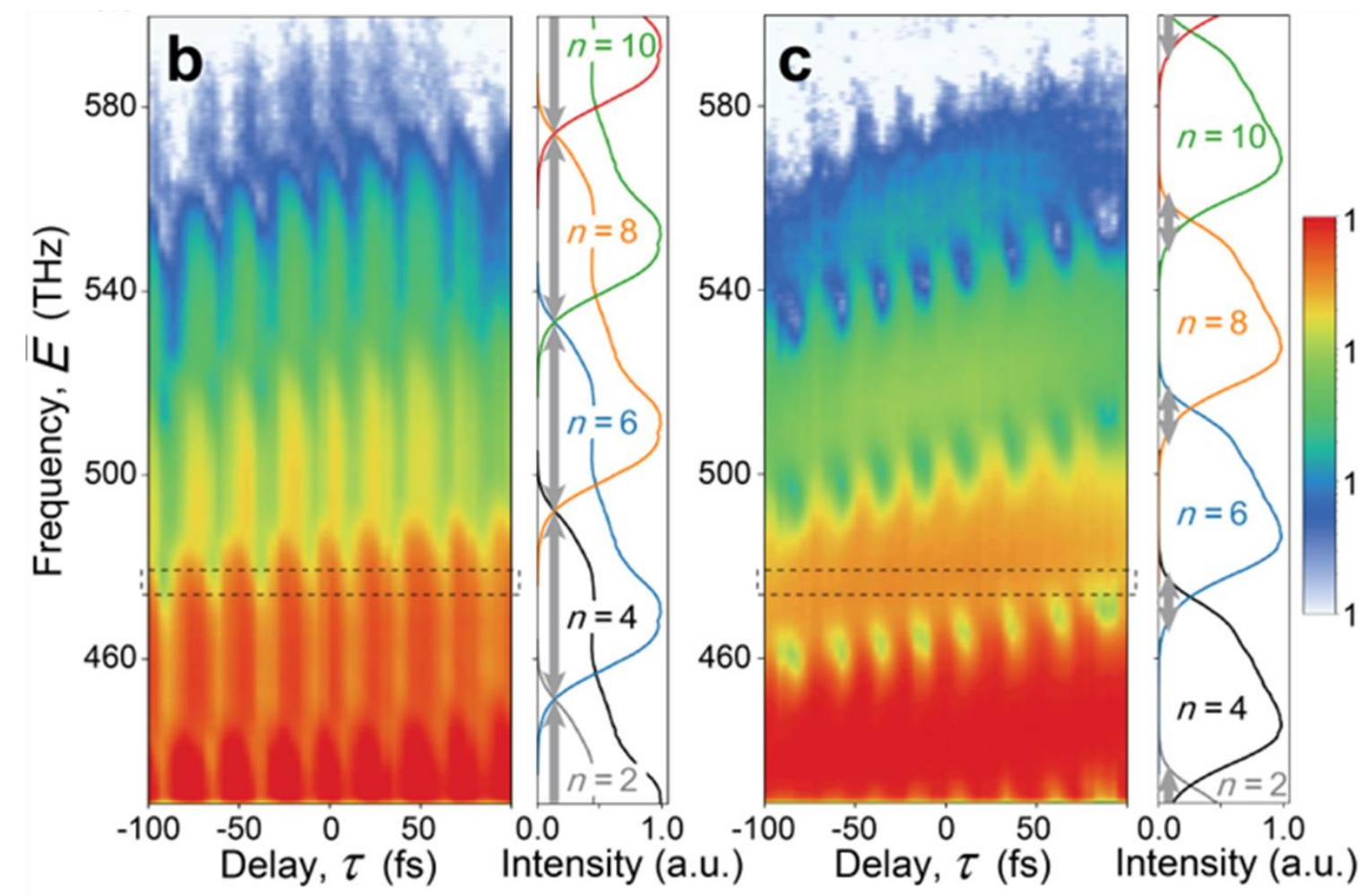


## Previous work

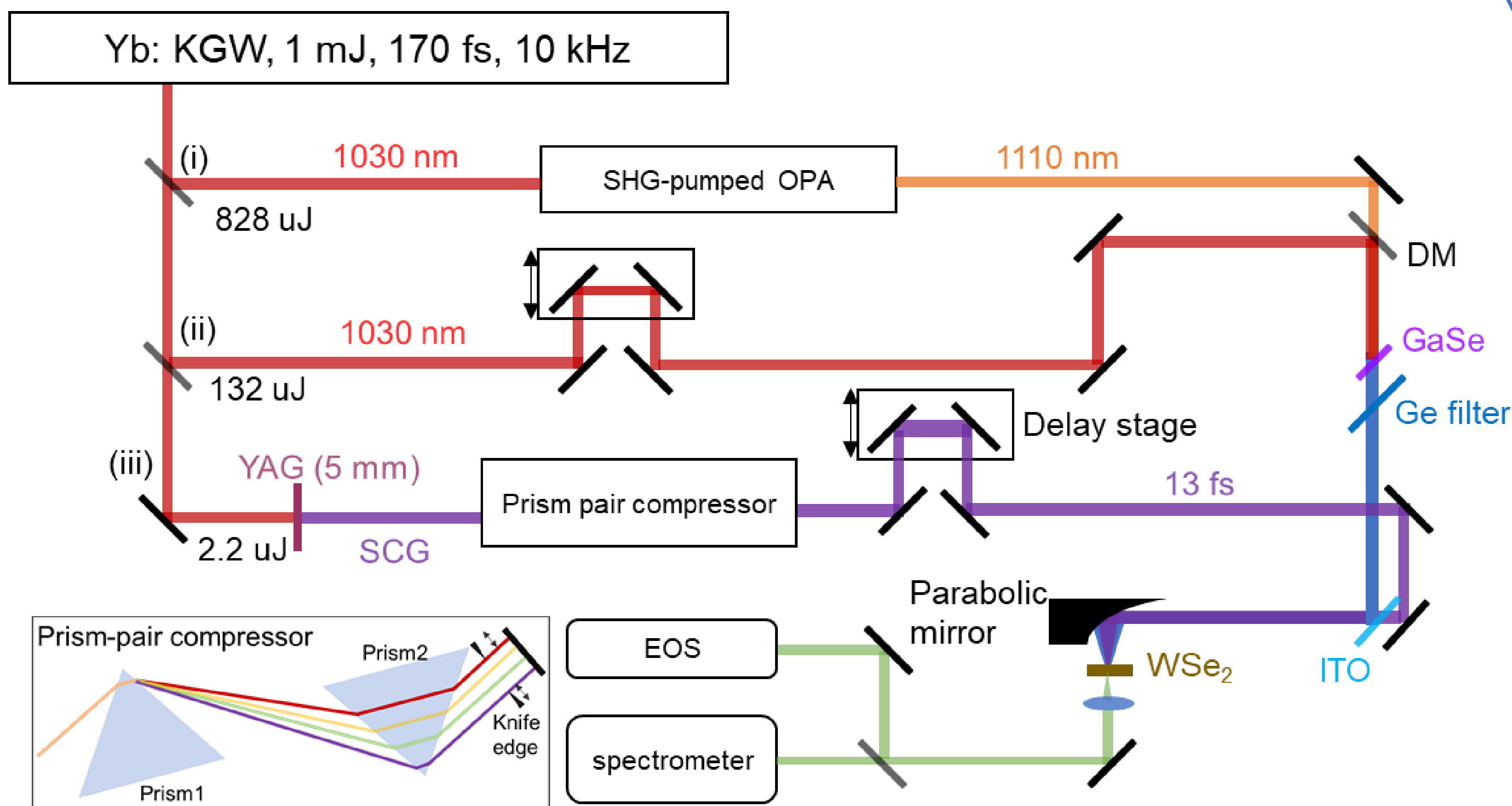


Time- and spectrum-resolved quantum-path interferometry reveals exciton dephasing in MoS<sub>2</sub> under strong-field conditions (In submission)



Lightwave-driven quasiparticle collisions on a subcycle timescale. Nature 533, 225–229 (2016)

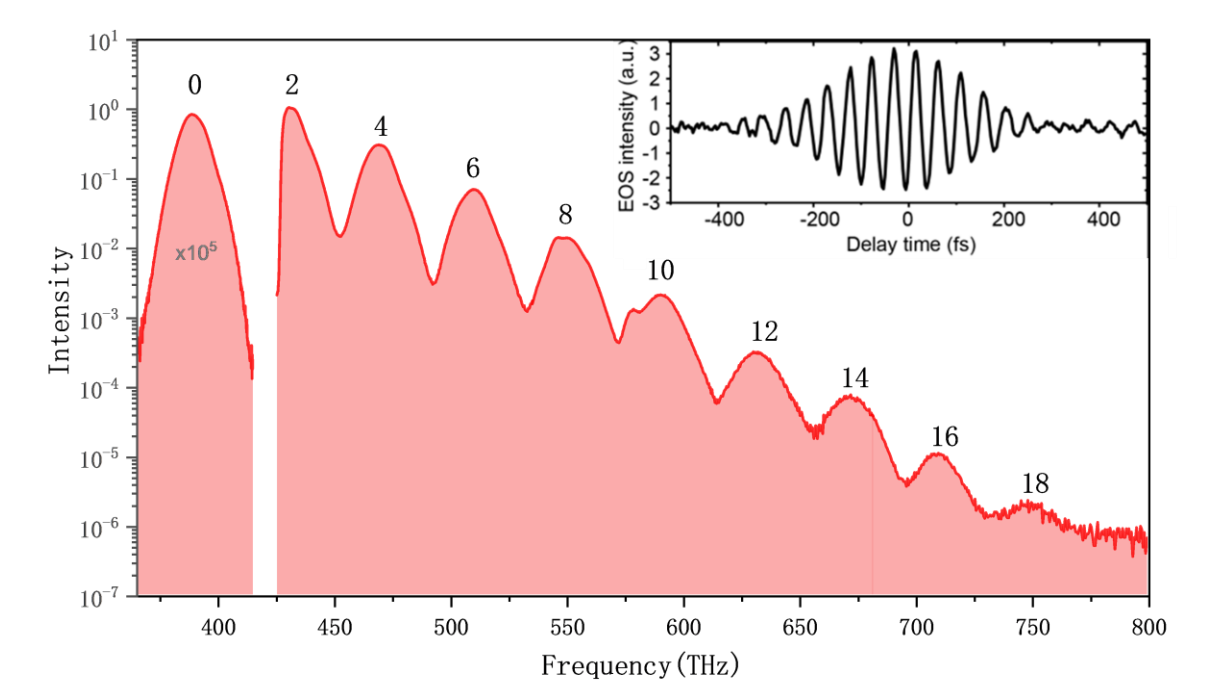
## High-order sideband emission



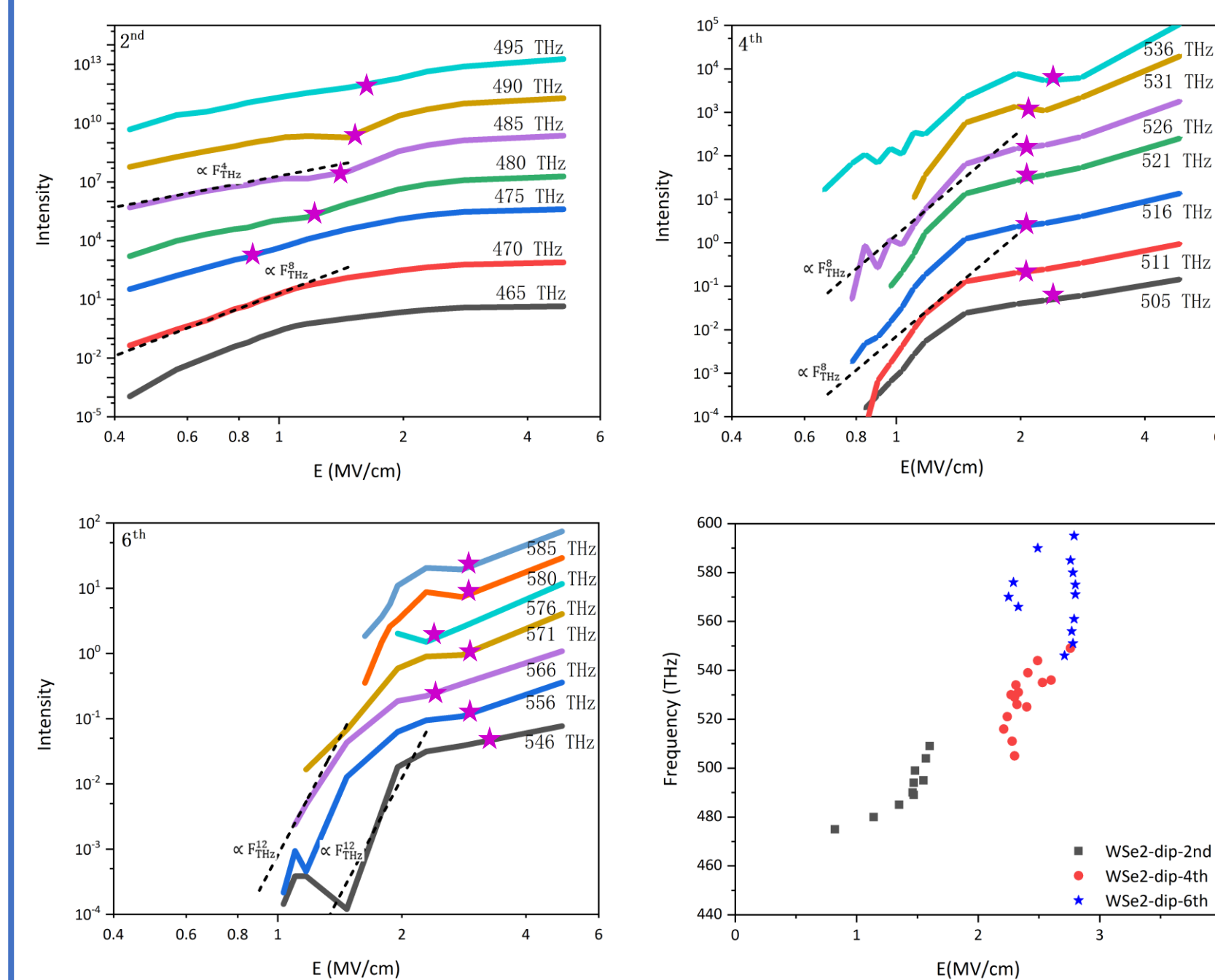
Schematic of the experimental setup.

Inset: Schematic of the prism-pair compressor for compressing the SCG beam.

## THz intensity variations

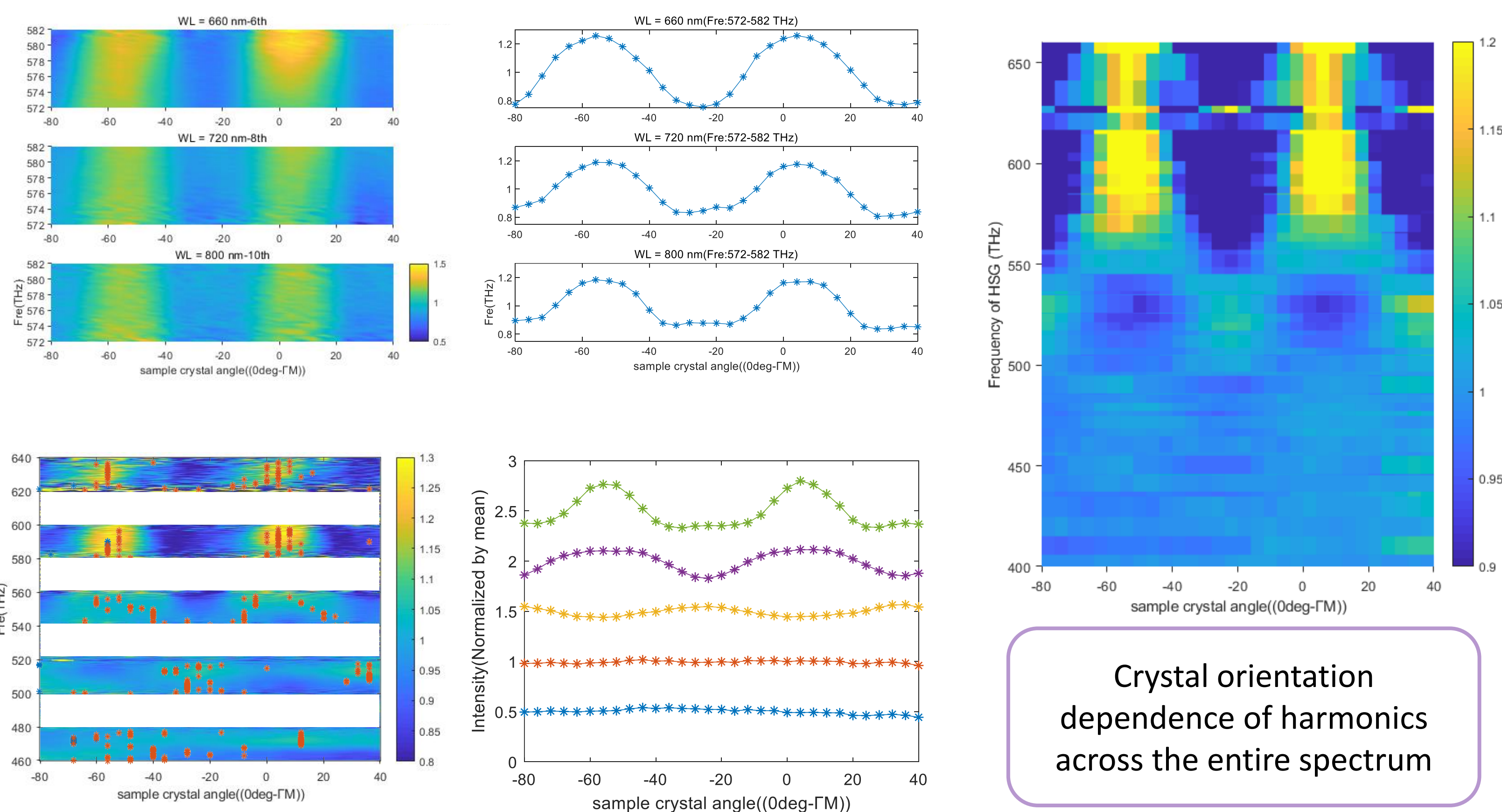


The HSE spectrum excited by  $F_{THZ}=5$  MV/cm. Inset: Typical EOS trace of the terahertz pulse.



Recorded high-order sideband intensity  $I_{HSE}$  of orders two to six as a function of driving peak field strength  $E_{peak}$ . Solid lines follow a perturbative scaling law,  $I_{HSE} \propto E^{2n}$ .

## Crystal dependence of bulk WSe<sub>2</sub>



Crystal orientation dependence of harmonics across the entire spectrum

The manifestation of harmonics signals at different orders within the same frequency range; The 2-10<sup>th</sup> harmonic signals generated by the excitation light fixed at 700nm vary with crystal orientation.

## Conclusion

1. We constructed an intense multi-cycle terahertz pulse and near-infrared pump-probe system with stable carrier-envelope.
2. The dependence curve of harmonics from WSe<sub>2</sub> material on terahertz intensity exhibits distinct inflection points, suggesting a possible correlation between their frequency-dependent characteristics and the coherence of WSe<sub>2</sub> at different K-points in the band structure.
3. We observed a pronounced crystal orientation dependence in the intensity of harmonics generated at different SCG wavelengths.