Supplementary Information

Coherent ultrafast spin-dynamics probed in three dimensional topological insulators

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1. Element resolved band structure

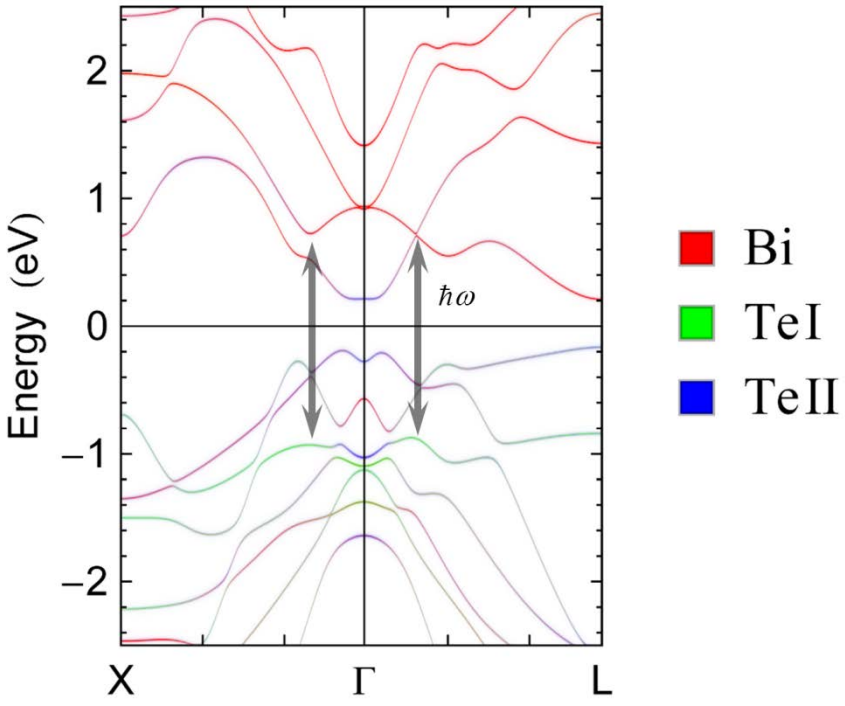

Fig. 1 Calculated band structure: showing Bi and Te character of the states that can be related to the optical transitions for the wavelength λ= 800 nm (photon energy 1.55 eV).

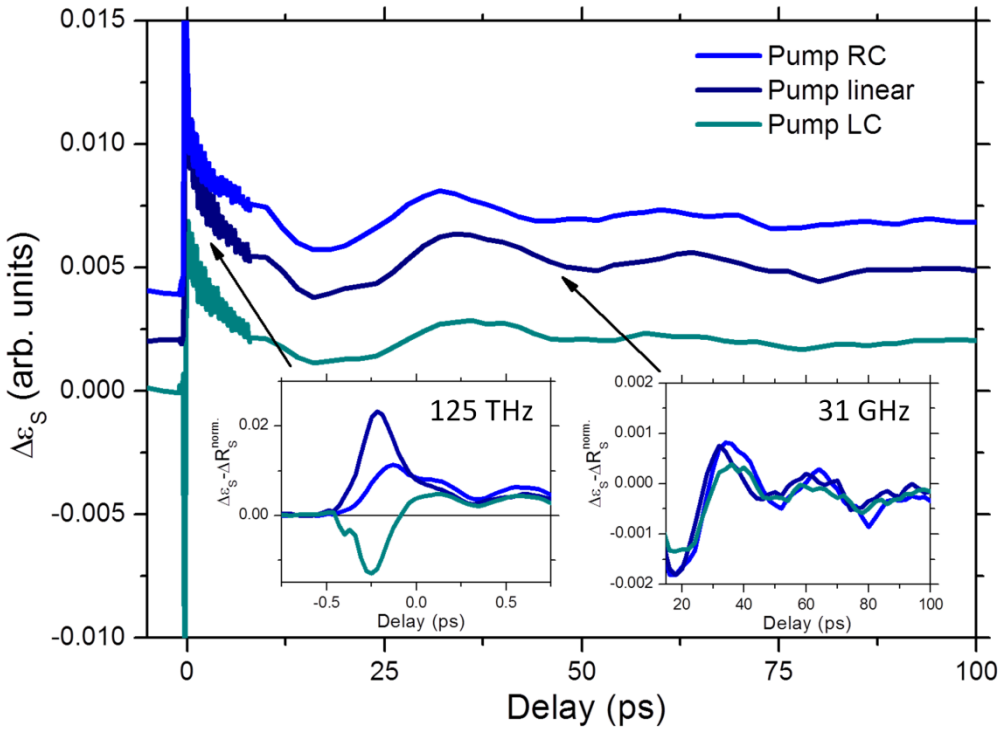

Fig. 2 Time resolved birefringence a) Dynamics on short and long time scales for left circularly (LC), linearly and right circularly (RC) polarized pump pulses. Inset left: polarization dependence on the ultrafast time scale. Inset right: the dynamic mode at 31 GHz shows no dependence on the pump-pulse's handedness.