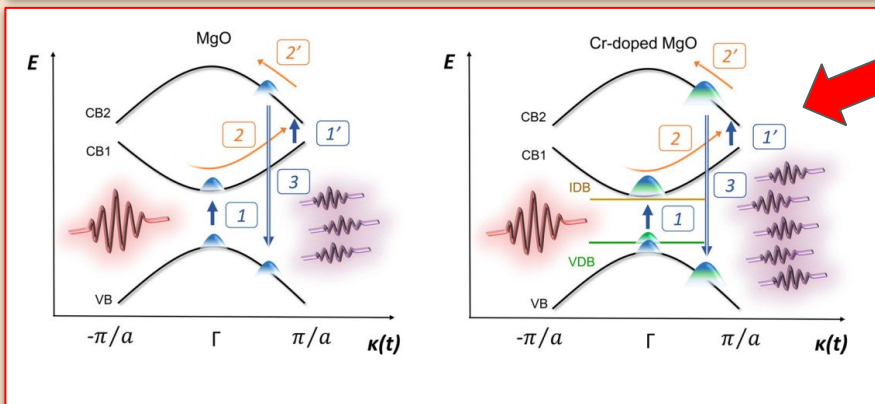
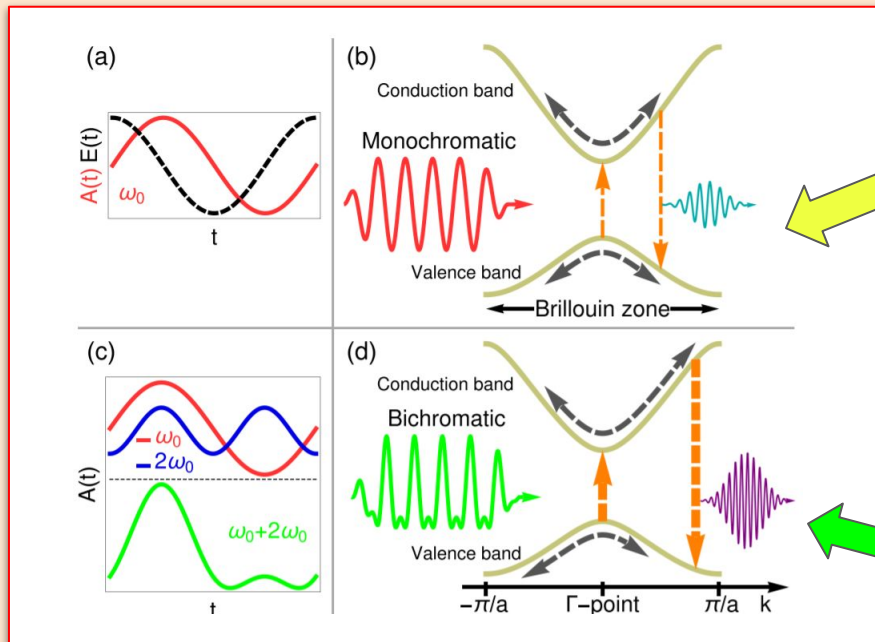


Bachelor or Master project

Title: High harmonic generation in doped semiconductors by two-color pulses

Supervisor: Dr. Francisco Navarrete (francisco.navarrete@uni-rostock.de)

Group: Quantum theory and many particle systems (AG Bauer)



- An intense laser pulse which interacts with a semiconductor can produce radiation with a frequency many times higher than that of the light with which the solid was irradiated, which is known as high-harmonic generation (HHG).
- Using a two-color laser this effect can be enhanced in intensity and frequency [1].
- Doped semiconductors exhibit an enhancement of the HHG mechanism, compared to the pristine sample [2].

The combination of both doping and bichromatic lasers might further improve the efficiency of the process!

- **Goal:** Study of the interaction of intense, few-cycle, infrared lasers with semiconductors to explore the enhancement of harmonic generation in doped samples by the use of lasers composed of two different frequencies.
- **Methodology:** the solution of the time-dependent Schrödinger equation for different model materials and different laser parameters, and the analysis of the frequency spectra. The numerical algorithms will be provided.
- **Time commitment:** 70% numerical + 30% bibliographical research and theoretical modeling.

[1] Navarrete and Thumm, Phys. Rev. A 102, 063123 (2020)

[2] Nefedova et. al., Appl. Phys. Lett. 118, 201103 (2021)