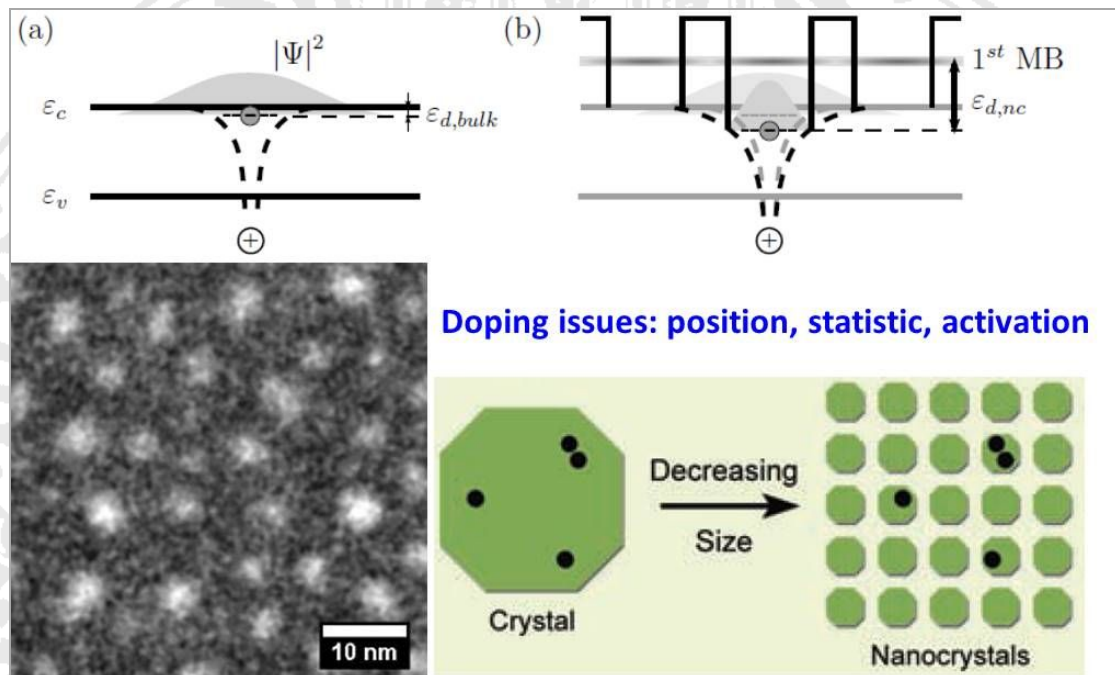


PHYSIKALISCHES KOLLOQUIUM

AM 18. JUNI 2018 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



SIZE CONTROLLED SI QUANTUM DOTS

PROF. DR. MARGIT ZACHARIAS

IMTEK, TECHNISCHE FAKULTÄT, UNIVERSITÄT FREIBURG

The fabrication of $\text{SiO}_x/\text{SiO}_2$ superlattices combined with thermal annealing enables the size and density control of Si quantum dots [1]. The layered-arranged Si quantum dots represent a model system to systematically study the photonic and electronic properties of indirect gap quantum dots prepared in a CMOS compatible way. Hence, the model system is used to understand the interplay of absorption and recombination, the carrier kinetics and the electronic transport properties for matrix embedded Si quantum dots. Starting with the temperature dependence of the size depending band gap [2] the interplay of radiative and non-radiative recombination will be discussed for high quantum yield [3-5]. Doping of quantum dots and the respective experimental techniques for its quantification is at the very limit of the nowadays experimental possibilities. Systematic doping experiments with P and B will be presented which will be analyzed for doping efficiency, in-cooperation into the Si NCs and self-purification effects [6, 7].

- [1] M. Zacharias et al. Appl. Phys. Lett. 80 (2002) 661.
- [2] A. M. Hartel et al. Phys. Rev. B 85, 165306 (2012).
- [3] A.M. Hartel et al. Rev. B 87, 035428 (2013).
- [4] J. Valenta et al J. Appl. Phys. 122 144303 (2017)
- [5] M. Greben et al. Beilstein J. Nanotechnol. 8, 2315 (2017).
- [6] D. Hiller et al. Scientific Reports 7, 863 (2017).
- [7] D. Hiller et al. Scientific Reports 7, 8337 (2017).