

# Seminar on Condensed Matter Theory

Group of Theoretical Physics at the Department of Condensed Matter Physics  
of Charles University has a pleasure to invite you to attend the seminar

**on 11 October 2018 at 14:00**

at Faculty of Mathematics and Physics of Charles University, Ke Karlovu 5, 121 16 Praha 2

**Lecture Hall F2**



**Mgr. Petr Klenovský, Ph.D.**

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## **Optical properties of nanostructures: A Hitchhiker's guide to approximations in solid state physics**

joined with Nanoseminar (note different time and place)

In this talk I will first provide a brief review of solid-state theory, its origins in atomic physics, and its connection to the relevant optical experiments, mainly photoluminescence. Particular emphasis will be taken to the relation of the certain approximations that will be made throughout development of the theory to the amount of information or physical knowledge that can be gained from optical spectra. Starting from the single-particle  $k.p$  theory for bulk crystals that is fit to explain macro-photoluminescence of those crystals all the way to the method of configuration interaction (CI) enabling to quite precisely describe tiny changes in energies due to the recombination of several interacting fermions, seen e.g. in the micro-photoluminescence spectra of (not only) quantum dots. Thereafter, the focus will be devoted to using the aforementioned computation complex to explain results of several quantum dot experiments aimed at applications in quantum cryptography.

Klenovsky P., et al., Sci. Rep. 7, 45568 (2017)

Klenovsky P., et al., Phys. Rev. B 97, 245314 (2018)

