Recent developments in the Octopus code for strong light-matter coupling

The Octopus code [1,2] is a finite-differences real-space code designed to fully take advantage of the flexibility and versatility of real-space grids and provide developers with a framework to easily implement and test new ideas and methods in the field of electronic excited states properties and dynamics, while ensuring optimal execution performance and parallelization.

In this talk I will give an overview of the recent advances in the Octopus code regarding several novel approaches in the field of strong light-matter interactions [3]. Such new methods are essential to correctly describe the coupling of light to chemical systems, quantum materials, or nanoplasmonic systems, among others, when the electron-photon interaction has to be considered explicitly.

[1] A. Castro *et al, "octopus: a tool for the application of time-dependent density functional theory"*, Phys. Stat. Sol. B **243** 2465-2488 (2006)

[2] X. Andrade *et al*, "*Real-space grids and the Octopus code as tools for the development of new simulation approaches for electronic systems*", Phys. Chem. Chem. Phys. **17** 31371-31396 (2015)

[3] N. Tancogne-Dejean *et al*, "*Octopus, a framework for exploring the ultrafast quantum electron-ion dynamics in extended and finite systems*", to be submitted.