



# Innsbruck Physics Colloquium

## A NanoPhotonics View into Light-Harvesting Niek van Hulst



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The conversion of sunlight photons to electrons is the essence of the natural photosynthesis that powers life. Dedicated antennas funnel the sun's energy towards reaction centres. Amazingly, nature reaches almost perfect photon-to-electron conversion efficiency, while it regulates down at high light level for protection and survival. We can learn a lot of the design of nature. However, how does nature dynamically re-organize the membrane architecture, its packing, order, diffusion, on light stress? Which pathways are taken to charge separation? What is the role of fluctuations, coherences, colour and vibrations?

Here first I'll present nanophotonic and plasmonic approaches to enhance the response of light harvesting complexes, to probe their ultrafast dynamics, to make single complexes stand out amongst the broad heterogeneous distributions, and even probe photon correlations.

Next, I'll present various attempts to develop nanoscale ultrafast imaging tools, to visualize the dynamic light-response of the light-harvesting membrane architecture, the changes in packing density, the (dis)order, the diffusion, the pathways to charge separation, and ultimately get more insight in the design of nature.

Finally, I will expand into spatio-temporal-spectroscopic methods detecting charges, essentially photocurrent microscopy, to resolve the transfer from the light-harvesting antenna complexes all the way to the reaction centres.

This work is part of the project ERC Advanced Grant 101054846 *FastTrack*.

### **DK-ALM Pre-Talk: Elena Poli**

*Rotating dipolar supersolids*

**Time & Location: Tuesday, 03.12.2024, 16:30 h, HS C**

**Snacks will be provided in between the pre-talk and the colloquium.**