Final assignment & final meeting Nanophotonics course 2018

Meeting place: Room A1.06
Meeting date: May 24
Time: 13:00 – 17.00

Assignment: Each team is asked to present a 'key question' that you will find listed below. The purpose of this assignment is to read a set of papers, and then, on basis of the papers, to understand how the key question connects to basic concepts from the lecture, and how it goes beyond the lecture material.

Instructions: prepare a presentation that satisfies the following requirements:

- Each team member clearly and independently contributes to the presentation.
- 12 minutes per team – in addition there will be 3 minutes for questions.
- The source material quoted can be used for illustrative purposes – however you will need to go beyond just presenting the paper. Feel free to add extra literature. For the presentation: focus on the target questions – it is OK not to discuss *all* the points and figures of each paper.
- Bring your presentation on a USB device (such as a memory stick).

Splitting up tasks and putting together three completely independent results for the first time at the final symposium is not a workable solution. In case of question when preparing your presentation come by AMOLF anytime.
Please report if the link does not work (f.koenderink@amolf.nl)

Team		Question	Source Link
1	Falco Floris U	It is well known that planar interfaces should obey Snell's law, i.e., parallel momentum conservation. How does the Capasso paper then manage to claim anomalous refraction? Compare this to the layered system proposed by Verhagen. In which case is momentum conservation broken? Remember Huygens principle.	Capasso Verhagen
2	Yorick Floris T	Band structures and dispersion relations are everywhere in physics – photons, electrons, phonons… How do you measure one directly? Summarize the methods in the paper. Which of these methods uses parallel momentum conservation? Which of these methods can look beyond the light line? How is that possible without an NSOM?	Fourier Folding Bands Lasing lattices (Focus on the dispersion, not the lasing) Nanowire dispersion
3	Menno Harm	Explain Stochastic Optical Reconstruction Microscopy (STORM), Stimulated emission depletion (STED) microscopy, and the scattering lens.	STORM STED Scatteringlens

		Which of these methods does not actually break the diffraction limit at all? Which of these methods cheats instead of beats the Abbe limit?	
4	Joris Hongyu	Changes in the environment of a physical system (e.g. plasmonic structure, cavity, etc) can be translated into shifts of the system's resonances. Explain how this property is used in the linked papers. How does sensitivity relate to polarizability and Purcell factor? Which system should have best sensitivity?	Plasmon sensor Vollmer
5	Beniamino Susan	A black body radiates light when you heat it. It is typically believed to be among the most *incoherent* sources you can think of (temporally incoherent, meaning, broad spectrum, and spatially, meaning, no angular preference)." Also, no object can radiate more than a blackbody without violating the 2nd law of thermodynamics. Explain these facts, and tell us why all these myths are wrong.	SusumaNoda ShanhuiFan
6	Jeroen Cyrian	Plasmonics relies on free electrons in metals. Given the density of electrons in metals, plasmons are in the visible. The two papers present distinct mechanisms to replicate plasmonics in the deep infrared. Which of these two methods actually uses plasmons? Why does it work at 100x lower frequency? What is the mechanism behind the other method?	THzplasmons midIrSPhP
7	Tomas Rosa	Coupled oscillators usually give rise to anticrossing of eigenfrequencies. With precise control over loss, gain, and complex coupling, you can also engineer so-called *exceptional points*". Explain how cavities with loss and gain map on coupled oscillators. On basis of *exceptional point* physics how you get *better lasers by adding loss*.	WGMOzdemir BrandstettEPlaser