THE PHYSICS COLLOQUIUM

Thursday 20 June 2024, 4:00 p.m.
Nijenborgh 4, Lecture Hall 5111.0080

Exciton resonance tuning in atomically-thin metasurfaces

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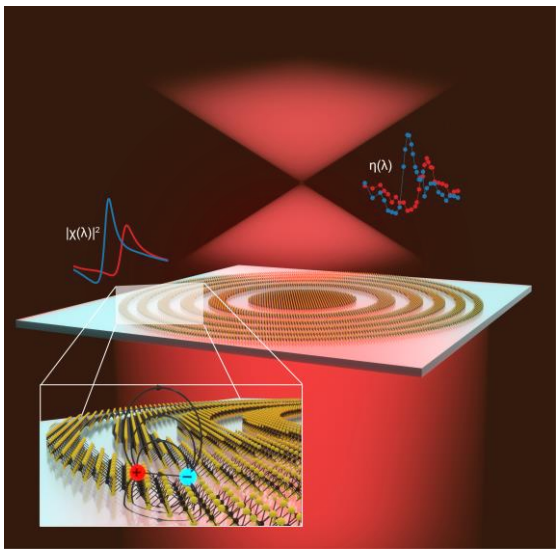
Since the development of diffractive optical elements in the 1970s research has focused on replacing bulky optical elements such as lenses and grating by thin counterparts. Over the last decade, nanophotonic metasurfaces rapidly advanced the development of flat optical elements based on the realization that resonant optical antenna elements enable local phase control. Present applications of metasurface flat optical elements include lenses, polarization control, and beam steering. Next-generation applications of flat optics such as light detection and ranging (LIDAR), dynamic holography, and computational imaging require dynamic control over optical functionalities, e.g. the focal position or efficiency of optical elements. However, most nanophotonic structures are static after design and fabrication.

Here, we demonstrate how exciton resonances in monolayer 2D transition-metal dichalcogenides (TMDs) like WS2 can function as a new type of tunable resonant light-matter interaction in nanophotonic metasurfaces. Due to their sub-nm thickness, these materials are highly tunable through external control. In this presentation, I will first present dynamic electrical tuning of the focusing efficiency of an atomically-thin lens through manipulating of the excitonic material resonance. Second, I will show how we can use these atomically thin lenses to directly study the influence of exciton decay rates on the metasurface functionality and spectral line shape.



Join us for coffee starting 3:30 p.m. Refreshments will be served after the lecture.
For more information contact the host: Antonija Grubisic-Cabo (a.grubisic-cabo@rug.nl)
Website: http://www.rug.nl/research/vsi/colloquia/

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