

Graz Advanced School of Science
PHYSICS COLLOQUIUM OF THE UNIVERSITY OF GRAZ AND
THE GRAZ UNIVERSITY OF TECHNOLOGY

Prof. Dr. Carsten Rockstuhl

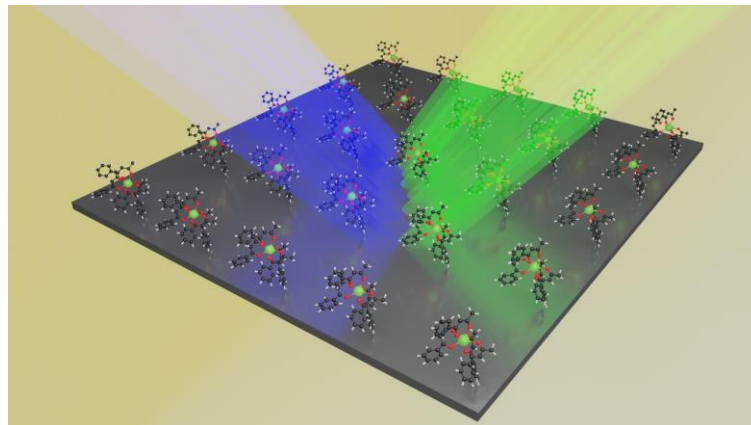
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Light Scattering in Nanophotonic Systems

Abstract:

Gustav Mie outlined more than 100 years ago a quasi-analytical solution for light scattering at a sphere. It constitutes a algebraic solution to Maxwell's equations, where the incident and scattered fields are expanded into a suitable basis set. A matrix then expresses the relation between the amplitude coefficients of the incident and scattered fields. The matrix is diagonal for a sphere. Still, this transition, or T-matrix, can be obtained numerically for more complicated objects. Even though mature at first glimpse, the topic continues to be vibrant, and many extensions have been made to explore light-matter interactions out of intellectual curiosity and to develop applications.

This presentation outlines these recent developments. It looks into four-dimensional metamaterials (made from periodically arranged objects made from a time-varying material) or photonic devices made from molecules, where the molecular properties are described with a T-matrix calculated using time-dependent density functional theory. Finally, we present efforts from a larger number of community members to define a standard for storing and distributing T-matrices. This would be one contribution from our community to lower our research's carbon footprint and enable data-driven research.



A nonlinear photonic material that converts incident light to a different frequency made from a periodic arrangement of molecules on a surface. Copyright by Dr. Marjan Krstić

Date: Tuesday, October 15, 2024
Institute of Physics, University of Graz, Universitaetsplatz 5

Meet the speaker: 3:45 p.m. Seminar room 05.13, 1st floor

Lecture: 4:15 p.m. Lecture Hall 05.01, ground floor

Host: Prof. Thomas Weiss