

# Physikalisches Kolloquium

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**»Symmetry-based methods and electromagnetic helicity for understanding, engineering, and envisioning light-matter interactions«**

*Einführung: C. Rockstuhl*

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Symmetry is one of the most general and useful concepts in physics. Correspondingly, symmetry-based results are among the most general statements that can be made about a given physical system. While this is routinely exploited in advanced theoretical physics, the use of symmetry as the primordial tool for understanding and engineering light-matter interactions in optics and photonics is a less common approach.

In my talk, I will show how the systematic consideration of symmetries and conservation laws help us advance our theoretical understanding, and obtain useful guidelines for system design. I will illustrate the discussion with theoretical results on and practical designs for improved anti-reflection in solar cells, and enhanced sensing of chiral molecules.

The electromagnetic helicity, a.k.a the polarization handedness of light, will be a main character throughout my talk. In the last part, I will discuss the unexpected material counterpart of electromagnetic helicity, and the concept and design of most electromagnetically chiral cavities. I will finish with future applications of these two ramifications of electromagnetic helicity, some more speculative than others.

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**Freitag, 11.06.2021, 16:00 Uhr,  
live über Zoom.**