

Einladung zum Physikalischen Kolloquium

03.05.2024 **Alexander Kildishev, Purdue University**
»Inverse-designed Spaces for Light«
Einführung: C. Rockstuhl

Abstract

After a brief review of previous work based on the innovative methods of transformation optics, I will present a new class of elliptic omnidirectional concentrators focusing light on a disk, a thin strip, or a rod. Our ray-tracing and full-wave simulations of new elliptic designs show flawless focusing and absorbing performance at complete acceptance angles. The study expands the theory of a circular omnidirectional concentrator—an optical analog of a ‘black hole’—previously developed by our team and then experimentally demonstrated in microwaves, at optical spectral bands, and in acoustics. A related study includes a *gradient nanofocusing hyperlens* employing a cylindrical effective medium theory.

Then, the focus will be put on new approaches built on multiphysics and AI-driven computational environments that give tighter integration between different phenomena involved in light-matter interaction and offer a broader range of new modeling and inverse design opportunities. Existing challenges and several specific research aims for future pursuit will also be outlined.

Author



Prof. Alexander V. Kildishev works on theory and numerical modeling for nanophotonics. He has had several breakthrough results on negative refractive index metamaterials, optical artificial magnetic structures, loss compensation in metamaterials, plasmonic nanolasers, optical metasurfaces, optical cloaks, and hyperlenses. He has been included on the Highly Cited Researchers List for the years of 2018, 2022, and 2023 in Web of Science (WOS), which recognizes world-class researchers selected for their exceptional research performance with multiple highly cited papers that rank in the top 1% by citations in the cross-field category.

Prof. Kildishev is a Fellow of Optica (OSA). His current h-factor is 72 WOS, 84 Google Scholar. Publications include 9 book chapters, about 200 publications in peer-reviewed journals, with more than 95 invited seminar talks and conference presentations. He is a co-inventor of about 40 issued and pending patents (21 US patents, the lead inventor in 10 granted US patents), and the co-author of 11 software online simulation tools (with above 3,000 users and 56,000 jobs).

<https://www.webofscience.com/wos/author/record/L-5725-2019>

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