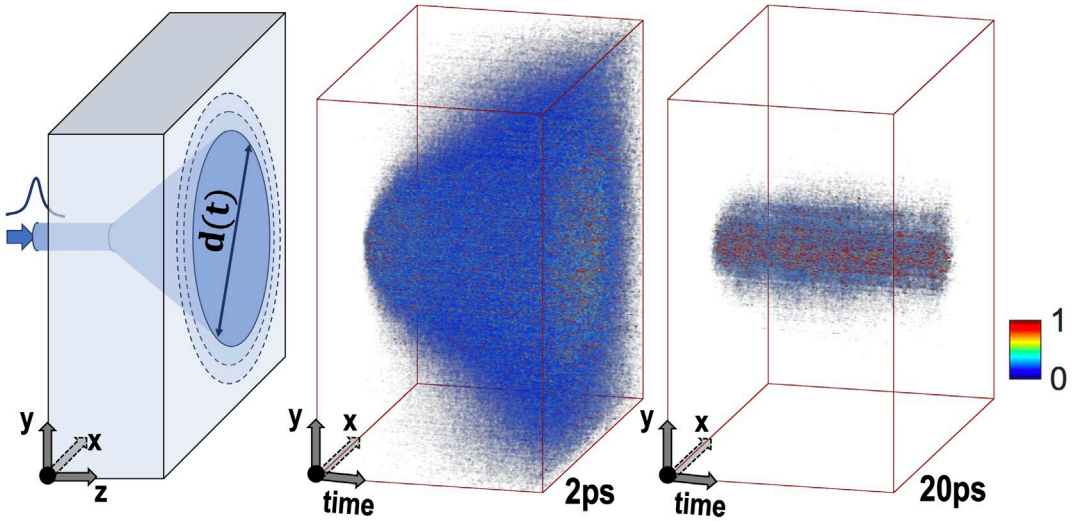
DMR-1905442

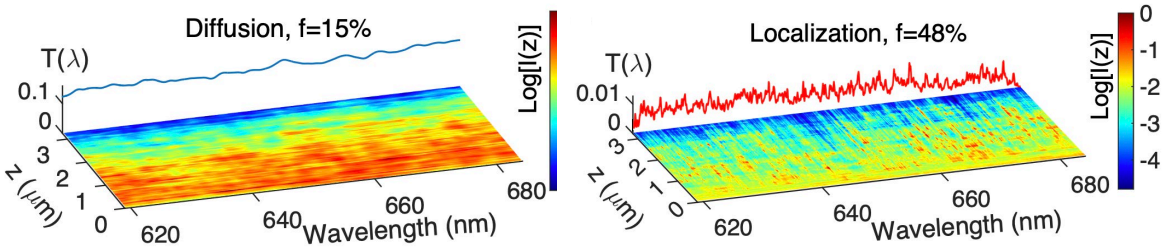
Wave transport via eigenchannels of complex media

Alexey G. Yamilov, Missouri University of Science and Technology

Beam spreading | Diffuse spreading | Transverse localization



Spatial and spectral fluctuation of light intensity



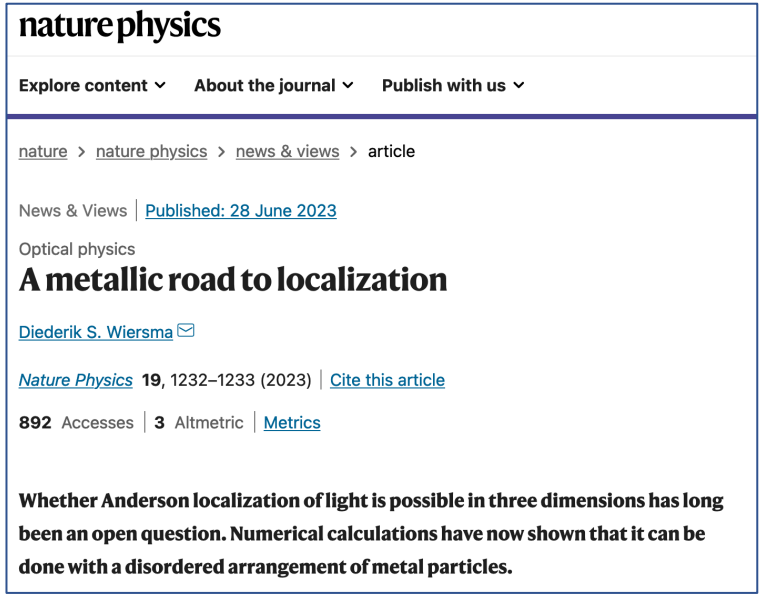
- Anderson localization of vector electromagnetic waves in three-dimensional disordered systems has been a matter of a controversy over the past forty years.
- We finally closed this long-lasting debate by providing a definite answer to the possibility of 3D light localization in a comprehensive numerical study.
- Our numerical simulations showed that it is impossible to localize light in 3D dielectric materials, explaining the failures of the intense experimental efforts in the past three decades.
- We acquire unambiguous evidence of 3D localization of electromagnetic waves in random packings of metal spheres - a system that has been long ignored by the entire community searching for light localization.
- This study opens a wide range of avenues in both fundamental research related to Anderson localization and potential applications using 3D localized light

Publication: Yamilov, Skipetrov, Hughes, Minkov, Yu, Cao, Anderson localization of electromagnetic waves in three dimensions, Nature Physics 19, 1308 (2023)

DMR-1905442

Wave transport via eigenchannels of complex media

Alexey G. Yamilov, Missouri University of Science and Technology



nature physics

Explore content ▾ About the journal ▾ Publish with us ▾

nature › nature physics › news & views › article

News & Views | Published: 28 June 2023

Optical physics

A metallic road to localization

Diederik S. Wiersma

Nature Physics **19**, 1232–1233 (2023) | Cite this article

892 Accesses | **3** Altmetric | Metrics

Whether Anderson localization of light is possible in three dimensions has long been an open question. Numerical calculations have now shown that it can be done with a disordered arrangement of metal particles.

OPTICA | Formerly OSA

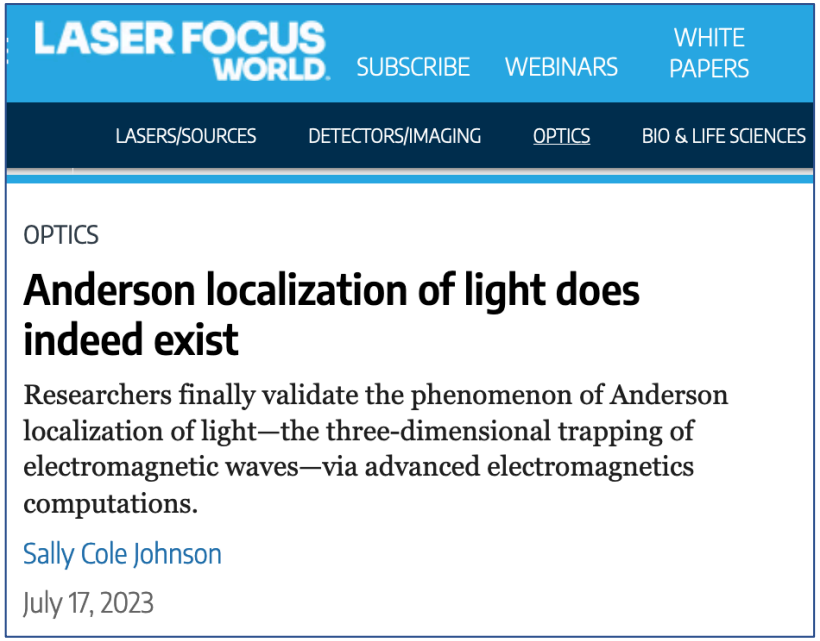
OPTICS & PHOTONICS NEWS

NEWS / SIMULATION CAPTURES ELUSIVE LOCALIZATION OF LIGHT

RESEARCH NEWS

Simulation Captures Elusive Localization of Light

Stewart Wills



LASER FOCUS WORLD SUBSCRIBE WEBINARS WHITE PAPERS

LASERS/SOURCES DETECTORS/IMAGING OPTICS BIO & LIFE SCIENCES

OPTICS

Anderson localization of light does indeed exist

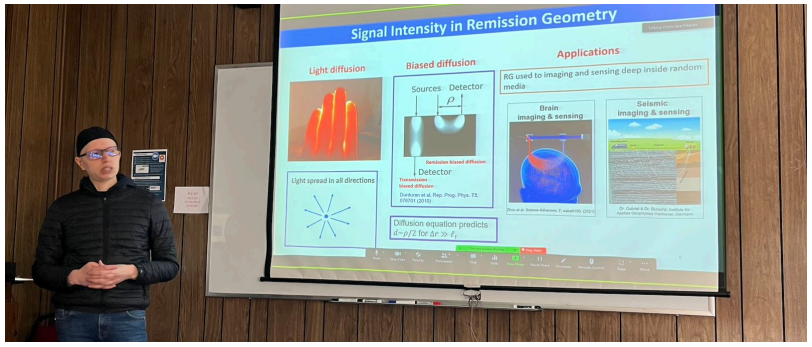
Researchers finally validate the phenomenon of Anderson localization of light—the three-dimensional trapping of electromagnetic waves—via advanced electromagnetics computations.

Sally Cole Johnson

July 17, 2023

The discovery of 3D Anderson localization has been featured in News & Views in Nature Physics magazine, Optics & Photonic News, Laser Focus World, and other news publications:
https://www.nature.com/articles/s41567-023-02122-3
https://www.optica-opn.org/home/newsroom/2023/june/simulation_captures_elusive_localization_of_light/
https://www.laserfocusworld.com/optics/article/14296281/anderson-localization-of-light-does-indeed-exist

Rohin McIntosh presented his work at the DisoMAT workshop in June 2023.



Pablo Jara (supported by the grant at S&T) has passed comprehensive examination