DY 20: Talk S. Rotter

Time: Tuesday 9:30–10:00 Location: EB 107

Invited Talk DY 20.1 Tue 9:30 EB 107

Light fields in complex media: mesoscopic physics meets wave control — •Stefan Rotter — TU Wien, Vienna, Austria

In my talk I will explain how insights from mesoscopic scattering theory can be used to understand and engineer the behaviour of waves in complex media [1]. In particular, I will focus on the concept of time-delay in scattering, which we recently employed to show that the mean path length of light in a medium is independent of whether this medium is transparent or opaque [2]. The concept of scattering time-delay can also be used for novel wave front shaping protocols such as for engineering transmission channels through multi-mode fibres [3] or through strongly scattering media [4,5] with an extreme spectral robustness as required in communication technology. A suitable generalisation of such ideas allows to construct wave fronts that focus on a designated target inside a disordered medium [6] with potential applications in imaging. I will conclude my talk with an outlook on the possibilities to engineer waves in non-Hermitian media with gain and loss, where completely new functionalities are currently emerging [7,8].

[1] S. Rotter and S. Gigan, Rev. Mod. Phys. 89, 015005 (17).
[2] R. Savo, et al., Science 358, 765 (17).
[3] W. Xiong, et al., PRL 117, 053901 (16) & PRX 7, 041053 (17).
[4] B. Gérardin et al., PRB 94, 014209 (16).
[5] J. Böhm, et al., arXiv:1706.08926
[6] P. Ambichl, et al., PRL 119, 033903 (17).
[7] K. G. Makris, et al., Light Sci. Appl. 6, e17035 (17).
[8] J. Doppler, et al., Nature 537, 76 (16).