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Scattering and absorption in 2D optics

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Stellingen

Behorende bij het proefschrift “Scattering and absorption in 2D optics”

- I. Numerical simulations do not always allow one to obtain a complete physical picture of the simulated processes.
(Chapter 2 of this thesis)
- II. Valuable information can be contained in the frequency, polarization, source location and propagation direction of coherent light, but also in the statistics of the speckle pattern it produces.
(Chapter 4 of this thesis)
- III. When attempting to describe light propagation in ordinary complex media, the use of diffusion models is a compromise between a pragmatic approach and an exact description of transport.
(Chapter 4 of this thesis)
- IV. The backscattering mechanism of rough thin films is richer than expected, and correction terms to the first order Born approximation for scattering are accessible experimentally.
(Chapter 5 of this thesis)
- V. In the context of random media, the concept of an *optical mode* most appropriately indicates, as stated by Wiersma, a complex field distribution in a cavity-like random scattering medium. Any other meaning is misleading.
(D. S. Wiersma, Nature Photonics 7, 188–196 (2013))
- VI. The role of near-field interactions in light transport in random media suggests that analogues of quasi-cylindrical waves also exist in textured thin-film solar cells.
(R. Rezvani Naraghi, PRL 115, 203903 (2015))
- VII. The results that Liew et al. achieve in altering the photocurrent generated by a photovoltaic device by using wavefront shaping are

interesting for the potential they demonstrate, yet they do not constitute an example of *coherent control of absorption*.

(S. F. Liew et al., ACS Photonics 3 (3), 449–455 (2016))

- VIII. Despite being often used to define roughness in solar-cell devices, the surface-profile variance and statistics, and the lateral correlation length are not sufficient as descriptors of a textured surface scattering properties, particularly in layered structures.
(L. C. Andreani, Solar Energy Mat. & Solar cells, 135, 78 (2015))
- IX. Assumptions are always present in research and their identification is as important as posing the right questions. This task is part of a researcher's responsibility and can be of critical importance, particularly when conducting experiments.
- X. In the current intellectual climate it is imperative that the scientific method is taught to younger generations.
- XI. Scientific research is a collective endeavor and benefits particularly from the diverse and complementary set of skills that scientists as human beings can provide. As a consequence, it is a mistake to give any definition of the prototypical scientist.

Flavio Mariani
Leiden, 6th of March 2018