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Probing Anderson localization of light via decay rate statistics in aperiodic Vogel spirals[1] ARISTI CHRISTOFI, Department of Electrical and Computer Engineering, Boston University, 8 Saint Marys street, Boston, MA 02215 USA, FELIPE A. PINHEIRO, Universidade Federal do Rio de Janeiro, Rio de Janeiro-RJ, 21941-972, Brazil University of Southampton, Highfield, Southampton SO17 1BJ, UK, LUCA DAL NEGRO, Department of Electrical and Computer Engineering Photonics Center, Boston University, 8 Saint Marys street, Boston, MA 02215 USA — We systematically investigate the spectral properties of different types of two-dimensional aperiodic Vogel spiral arrays of pointlike scatterers and three-dimensional metamaterials with Vogel spiral chirality using rigorous Greens function spectral method. We considered an efficient T-matrix approach to analyze multiple-scattering effects, including all scattering orders, and to understand localization properties through the statistics of the Greens matrix eigenvalues. The knowledge of the spectrum of the Green matrix of multi-particle scattering systems provides important information on the character of light propagation and localization in chiral media with deterministic aperiodic geometry. In particular, we analyze for the first time the statistics of the eigenvalues and eigenvectors of the Green matrix and extract the decay rates of the eigenmodes, their inverse participation ratio (IPR), the Wigner delay times and their quality factors. We emphasize the unique properties of aperiodic Vogel spirals with respect to random scattering media, which have been investigated so far.

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Aristi Christofi
Boston University

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