

Hyperuniformity of Quasicrystals, Disordered Solids, and Related Patterns

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This tutorial will begin with a review of the notion of hyperuniformity, an order metric originally defined in terms of spectral intensity that was first introduced for gauging crystalline and disordered point patterns [1]. As an example of a practical application, we will discuss its use in designing photonic solids with isotropic, complete photonic band gaps [2-3]. The focus will then turn to applying the hyperuniformity metric to quasicrystals and related patterns for which the hyperuniformity criterion must be generalized because the support of the spectral intensity is dense and discontinuous [4-5]. These results reveal that a remarkable range in the degree of hyperuniformity is possible in quasicrystals and, in some cases, the surprising absence of hyperuniformity altogether. The relevance of this diversity for physical properties and applications will be discussed [6].

PJS gratefully acknowledges the many contributions of his collaborators, C. Lin, E. Orguz, J. Socolar, and S. Torquato, whose work is reviewed in this presentation.

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