

MM 23: Quasicrystals

Time: Tuesday 11:45–12:30

Location: H5

MM 23.1 Tue 11:45 H5

Hydrodynamic structure factor of quasicrystals — •ANDREAS CHATZOPOULOS and HANS-RAINER TREBIN — Institut für Theoretische und Angewandte Physik, Universität Stuttgart, Germany

A theory of the hydrodynamic structure factor for quasicrystals is developed and exploited. Based on the hydrodynamic equations for icosahedral quasicrystals we introduce the terms of dynamic correlation and response. The phononic and phasonic diffuse part of the dynamic structure factor are examined in detail in frequency and time domain. We present a complete set of solutions for the hydrodynamic equations. Out of the diffusive modes we separately study the phasonic diffusion, the anisotropy of the phasonic diffusion constants and the general solution for phason wall diffusion. All results include phonon-phason coupling.

MM 23.2 Tue 12:00 H5

Transmission of Light in Dielectric Multilayers based on Metallic Means Sequences — •STEFANIE THIEM^{1,2}, MICHAEL SCHREIBER¹, and UWE GRIMM² — ¹Institut für Physik, Technische Universität Chemnitz, 09107 Chemnitz, Germany — ²Department of Mathematics and Statistics, The Open University, Milton Keynes MK7 6AA, United Kingdom

The light propagation through a quasiperiodic stack of layers with different indices of diffraction is studied using the transfer matrix method. The layers are aligned according to metallic means sequences depending on a parameter m with an inflation rule $\mathcal{P} = \{B \rightarrow A, A \rightarrow$

$ABA^{m-1}\}$ denoting the indices of diffraction n_A and n_B , respectively. We focus on the dependence of the light transmission on the underlying construction rule and obtain that additional transmission bands occur for frequencies corresponding to the photonic band gap of the periodic system. Further, we obtain almost complete transmission for the quasiperiodic systems for a wide range of ratios of diffractive indices n_A/n_B in contrast to systems with periodically stacked layers. In addition, our numerical results indicate that the transmission coefficient becomes either 1 or 0 for very large systems while usually for smaller approximants of the quasiperiodic systems also intermediate values of the transmission coefficient T occur. This corresponds to either complete reflection or transmission of the light for an infinite stack.

MM 23.3 Tue 12:15 H5

Binary Tilings with n -fold Symmetry — •JOHANNES ROTH — ITAP, Universität Stuttgart

In the field of quasicrystals, binary tilings are rhombus tilings with vertices decorated alternatively with large and small atoms. Binary tilings have played an important role in computer simulations of decagonal quasicrystals, for example in the study of the properties of random tilings, dislocations, cracks and so on.

In this contribution we study the possibility to generalize the decagonal case to arbitrary rotational symmetries. Basically it is easy to show that a generalization is possible in many cases, but our purpose is to find tilings with nice properties, especially for example Bragg reflection.