

Quasiperiodic packings of icosahedral clusters obtained by projection

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An icosahedral quasicrystal can be regarded as a quasiperiodic packing of interpenetrating copies of a well-defined icosahedral atomic cluster, most of them only partially occupied. A remarkable mathematical model has been obtained by Katz and Duneau [1] and independently by Elser [2] shortly after the discovery of quasicrystals. It concerns the case of a single-shell cluster formed by the twelve vertices of a regular icosahedron.

From a mathematical point of view, an icosahedral cluster \mathcal{C} can be defined as a finite union of orbits of a three-dimensional representation of the group of all the rotations leaving a regular icosahedron invariant. By using Schur's lemma and some methods from the theory of representations of finite groups we have obtained a more general version of Katz-Duneau-Elser model [3,4]. For any finite group G and for any G -cluster \mathcal{C} our algorithm leads directly to a pattern \mathcal{Q} which can be regarded as a union of interpenetrating partially occupied translations of \mathcal{C} .

Our aim is to present new mathematical results [5,6] concerning this model.

References

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