

Local Symmetries And Perfect Transmission In 1-D Aperiodic Quantum And Photonic Multilayers

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We use the recently introduced concept of local parity to analyse the transmission properties of optical devices with quasi-periodic and aperiodic multilayer structure. We focus on potentials which can be decomposed in local parity symmetric domains and specify the conditions which should be fulfilled for a perfect transmission resonance (PTR) to occur. We show the existence of invariant quantities emerging from the symmetry properties of the potential which allow for a geometric interpretation and classification of PTRs. Using the local parity formalism we give valid interpretations to several PTR examples discussed in the literature which are not adequately clarified up to now. Finally, we demonstrate how a local symmetry based construction principle can be applied for the design of optical devices with perfect transmission at prescribed energies.

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