Janssen, T.

Aperiodic Schrödinger operators. Electrons and phonons in aperiodic crystals. (English)
Zbl 0883.47087
Moody, Robert V. (ed.), The mathematics of long-range aperiodic order. Proceedings of the NATO Advanced Study Institute, Waterloo, Ontario, Canada, August 21–September 1, 1995. Dordrecht: Kluwer Academic Publishers. NATO ASI Ser., Ser. C, Math. Phys. Sci. 489, 269-306 (1997).

The article can be used to get a recent overview on results for several aspects in the theory of aperiodic Schrödinger operators. The following list summaries the content: structure of quasicrystals, incommensurate crystal phases, atomic surfaces, superspace symmetry, scale invariance; characterization of phonons and electrons, modulated spring model, Harper's equation, Kronig-Penney model; discrete Schrödinger operators, integrated density of states, gap labelling, multifractal analysis, transfer matrices; one-dimensional models, trace maps; numerical computations, rigorous results; experimental verification.

The results are mainly described. For an interested reader, the author gives a long list of references.

For the entire collection see [Zbl 0861.00015].

Reviewer: M.Demuth (Clausthal)

MSC:

47N50 Applications of operator theory in the physical sciences
81Q10 Selfadjoint operator theory in quantum theory, including spectral analysis
81Q05 Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics

Keywords:

aperiodic Schrödinger operators; quasicrystals; incommensurate crystal phases; atomic surfaces; superspace symmetry; scale invariance; characterization of phonons and electrons; modulated spring model; Harper's equation; Kronig-Penney model; discrete Schrödinger operators; integrated density of states; gap labelling; multifractal analysis; transfer matrices; one-dimensional models; trace maps; numerical computations; rigorous results; experimental verification