

Siegfried Beckus - „Wannier transformation for Schrödinger operators with aperiodic potential“

The intention to study aperiodic ordered potentials has risen since Dan Shechtman has discovered quasicrystals in the year 1982 (SBGC). In 2011, he has been awarded the Nobel price in chemistry for his observation. In general, one is interested to study the long-time behaviour of a particle in a corresponding quantum mechanical system. From the mathematical point of view, it is important to understand the analysis of the spectrum corresponding to the related Schrödinger operators. The spectral theory of those operators with periodic potentials is well-known as the Floquet-Bloch theory. Instead of that, the examination of operators with aperiodic potential is, in general, an open question in mathematics.

From the perspective of the Floquet-Bloch theory, the so-called Wannier transformation provides a representation of operators as a projection of a decomposable operator. The projection encodes the aperiodicity of the underlying system. In this case, the examination of the spectrum on the fibres without the projections is well-known and leads to absolutely continuous spectrum. We will discuss the construction of the Wannier transformation, as well as the representation of the operators. Finally, we will focus on some future projects.

SBGC D. Shechtman, I. Blech, D. Gratias, J.W. Cahn, *Metallic Phase with Long-Range Orientational*, The American Physical Society, 1984.