A short history of aperiodic order - from crystals to quasicrystals

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Abstract

Much of classical mathematics focuses on studying well-behaved objects that are easy to define fully, such as smooth curves or regular polygons. Modern mathematical research is, however, increasingly interested in irregular and asymmetric objects, often motivated by our increasing understanding of the physical world around us.

In this talk we start with periodic tilings - an example of which would be the tiling of a kitchen floor by square tiles - and go on to define and investigate aperiodicity: How to recognise it? How to create aperiodic patterns with rich order structure? We review the history of the study of aperiodic tilings, highlighting how the mathematical theory has grown out of and been directed by physical discoveries. We finish with a discussion on how much we can by now understand of aperiodic order, and what kind of central questions remain.