



New Maths, New Science!

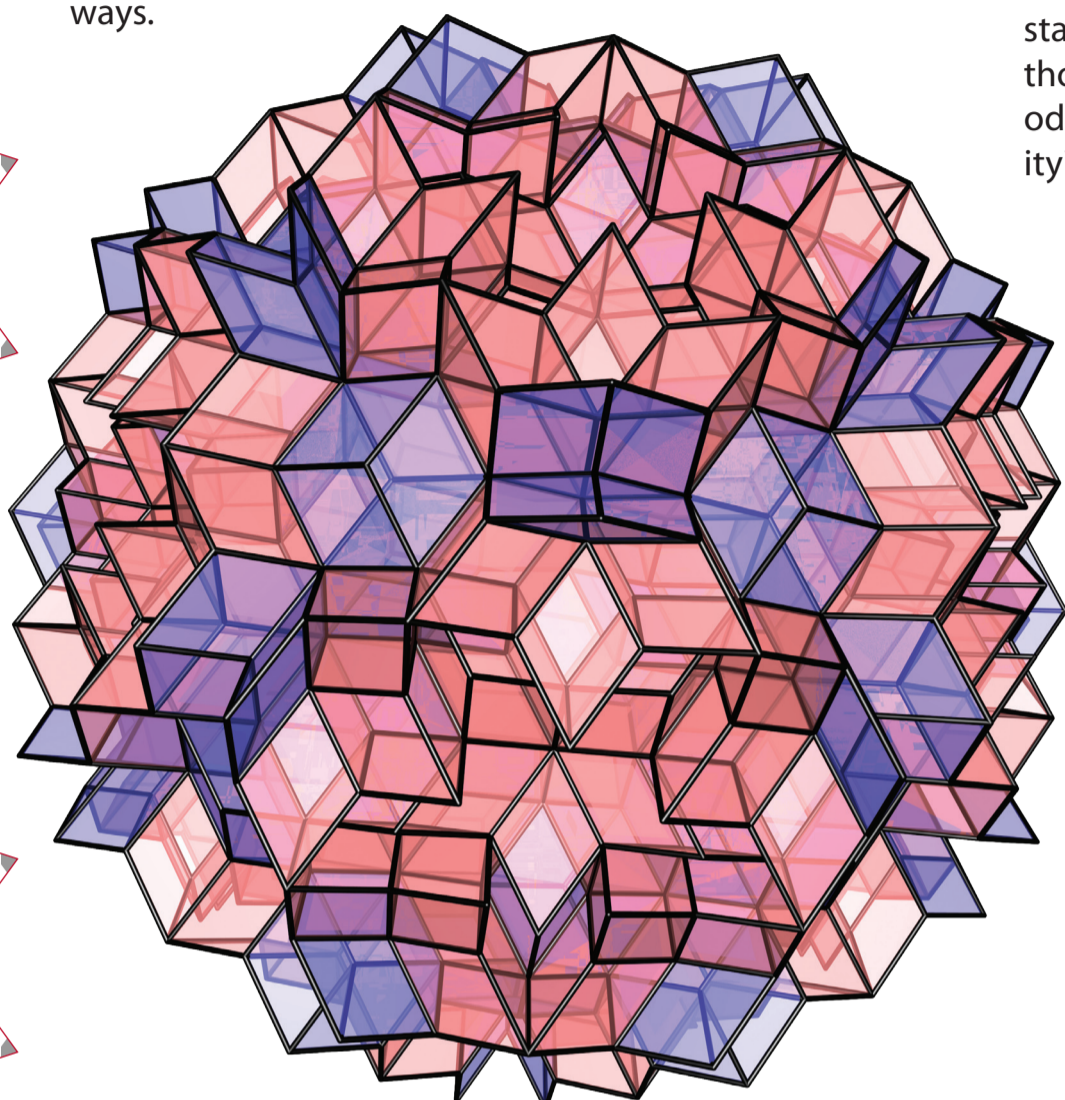
Aperiodic tilings were first discovered in the 1960's. It is now known that there are an infinite number of different examples. The study of such tilings has become a new branch of mathematics and is developing in several ways.

New Maths

Can you list all possible aperiodic tilings? Can you understand all aperiodic tilings with certain properties, such as those which are the shadows of high dimensional periodic tilings, or those which have fractal-like self similarity?

How different can aperiodic tilings be? How dependent are the patterns formed on the exact shapes of tiles used? How can we characterise an infinite, never repeating pattern?

The researchers who put on this exhibit, their collaborators from all around the world and other mathematicians, have developed ways of answering such questions, but many puzzles still remain unsolved. Mathematics always needs new minds and new ideas. Mathematics needs you!



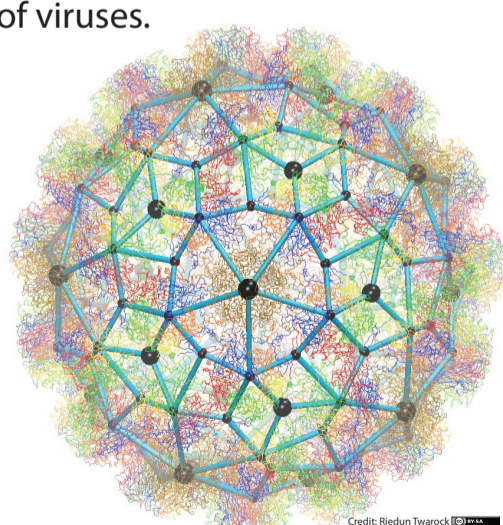
Icosahedral Tiling

A 3d version of the Penrose Tiling

New Science

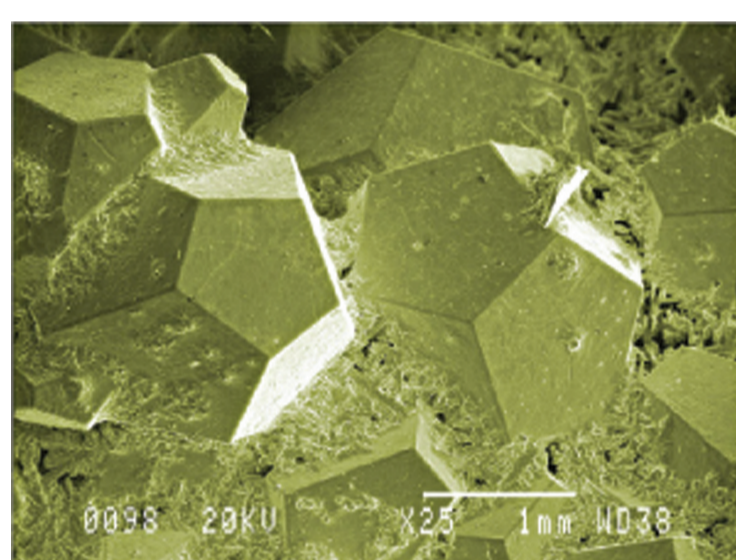
It is often the case that scientific discoveries have to wait until mathematics has provided the ideas and language needed to recognise them. Several years after their discovery, aperiodic tilings were found in nature, marking the positions of atoms in quasicrystals. More recently they are also being used to understand and predict the behaviour of viruses.

The atomic structure of solids such as quasicrystals is detected by diffraction experiments. Research carried out by members of the exhibiting team is addressing questions such as: What diffraction patterns do aperiodically ordered materials have? Can one actually distinguish order from disorder?



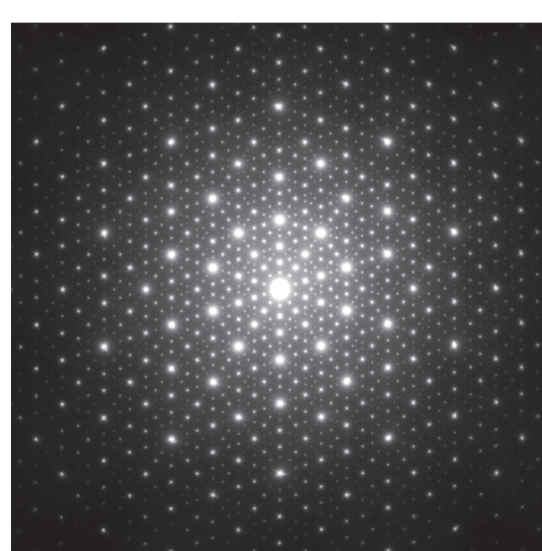
Virus Structure

Icosahedral structure used to analyse the proteins in a virus



Quasicrystal

Electron microscope image of the surface of a collection of quasicrystals



Diffraction

Diffraction Pattern for a quasicrystal. Note the five fold rotational symmetry that cannot occur for a periodic crystal.

SELECTED 2009 THE ROYAL SOCIETY SUMMER SCIENCE EXHIBITION

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zometool POLYDRON Edmund Harriss, Uwe Grimm, Richard Henry John Hunton, Vinay Kathotia, Jeroen Lamb