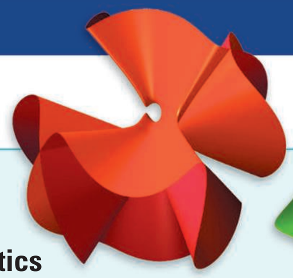
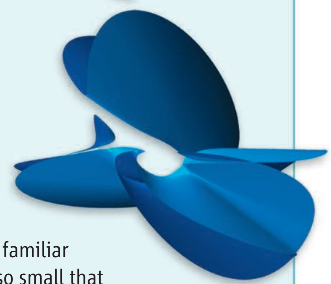
Random Sample

Elementary Mathematics





An international group of mathematicians hopes to do for math what Dmitri Mendeleev's periodic table did for chemistry by identifying the shapes in three, four, and five dimensions that cannot be divided into other shapes—the elemental "atoms" of geometry. Borrowing techniques from theoretical physics, they plan to sift through some 470 million 4D shapes in search of a few thousand fundamental building blocks. "We're using physics as a lens to view the mathematics," says team leader Alessio Corti of Imperial College London (ICL).

Mathematicians have already identified all the 2D and 3D basic shapes—called Fano varieties—but need new methods for higher dimensions. So the researchers turned to string theory, a branch of physics which posits that, in addition to the familiar dimensions, the universe contains other dimensions curled up so small that their effects are hard to detect. Tools developed by string theorists to study such curled-up dimensions can tell the team whether higher-dimensional shapes, slices of which are shown here, are Fano varieties.

The researchers—who are from the United Kingdom, Russia, Japan, and Australia—communicate via a blog (http://scim.ag/fano-v) and Twitter, so anyone can see how they're getting on. Knowing the basic building blocks of geometry, they hope, will be useful for mathematicians, string theorists, and engineers. Team member Tom Coates of ICL says it should take roughly 3 years to work through the 4D shapes. And the 5D ones? "We simply don't know."

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