Berlin Mathematical School

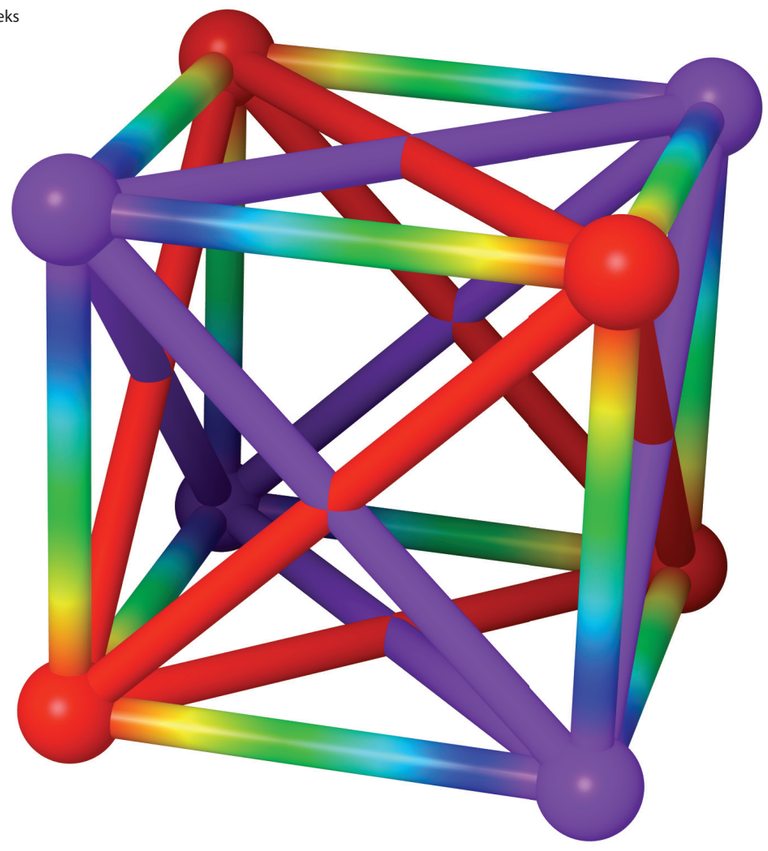
BMS Friday Colloquium

Friday 17 January 2014 at 14:15

Tea & Cookies starting at 13:00

BMS Loft, Urania, An der Urania 17, 10787 Berlin

Jeff Weeks



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Visualizing Four Dimensions

Since the early 19th century, people have been thinking about 4-dimensional space. While a purely algebraic description of 4D space is straightforward – it is the set of all points (*x*, *y*, *z*, *w*) – our human curiosity also demands a visual geometric understanding. Various authors have used various techniques to convey geometric understanding. Edwin Abbott's classic 1884 novella *Flatland* presents 4D space by analogy, comparing a 2D creature's struggle to understand 3D to our own struggle to understand 4D. Others have presented 4D objects by showing their cross-sections, or the shadows they project onto 3D space.

In his talk, Weeks will eschew all those techniques in favor of direct visualization. That is, in the first three-quarters of his talk, Weeks will provide an introductory lesson on how to learn to "see" 4D space directly. In the final quarter of the talk, he will move from four purely spatial dimensions to the related concept of 4D spacetime, which models the geometry of the real world. This spacetime model of reality leads to a surprising conclusion about the nature of time.

Jeff Weeks is an American geometer, topologist and cosmologist. He received his PhD in mathematics from Princeton University in 1985. After a decade of work on hyperbolic 3-manifolds, he began collaborating with cosmologists seeking clues to the topology of the real universe. Weeks became a MacArthur Fellow in 1999. He currently develops software that brings the simplest and most beautiful ideas of topology and geometry to students and non-specialist adults.

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