Berlin Mathematical School

BMS Friday Colloquium

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Friday 2 December 2016 at 14:15

Tea & Cookies starting at 13:00

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

Peter Teichner

(MPIM Bonn and UC Berkeley)

Four-dimensional Manifolds revisited

This talk will be a leisurely introduction to the classification problem for manifolds of dimension two (e.g. the surface of the earth), dimension three (e.g. the space around us) and dimension four (e.g. our space-time universe). Manifolds are extremely easy to define, they are just Hausdorff spaces that are locally isomorphic to Euclidean space.

However, manifolds also abound in nature: by the implicit function theorem, any finite dimensional configuration space with generic parameters is a manifold. Moreover, low-dimensional topology can say a lot about the classification of manifolds up to homeomorphism or diffeomorphism, as Teichner shall explain in this lecture.

The ultimate goal will be a discussion of open problems in dimension four and where they come from: the failure of the Whitney trick. In his talk, Teichner will survey joint work with Jim Conant and Rob Schneiderman on their theory of Whitney towers and how it is related to the 4-dimensional classification problem.

Peter Teichner completed his PhD at the University of Mainz in 1992. For the following three years, the Bratislava-born mathematician was a Feodor-Lynen Fellow (Humboldt Stiftung) at the University of California in San Diego. From 1996 to 1997, he was a Miller Research Fellow at MSRI in Berkeley. After full professorships at UC San Diego and UC Berkeley, Teichner took up his current position of Scientific Member and Director of MPI for Mathematics in Bonn in 2008, while still retaining his professorship at Berkeley to date. His main research area is topology, in particular the study of 4-dimensional manifolds and relations to quantum field theory.

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