Berlin Mathematical School

BMS Friday Colloquium

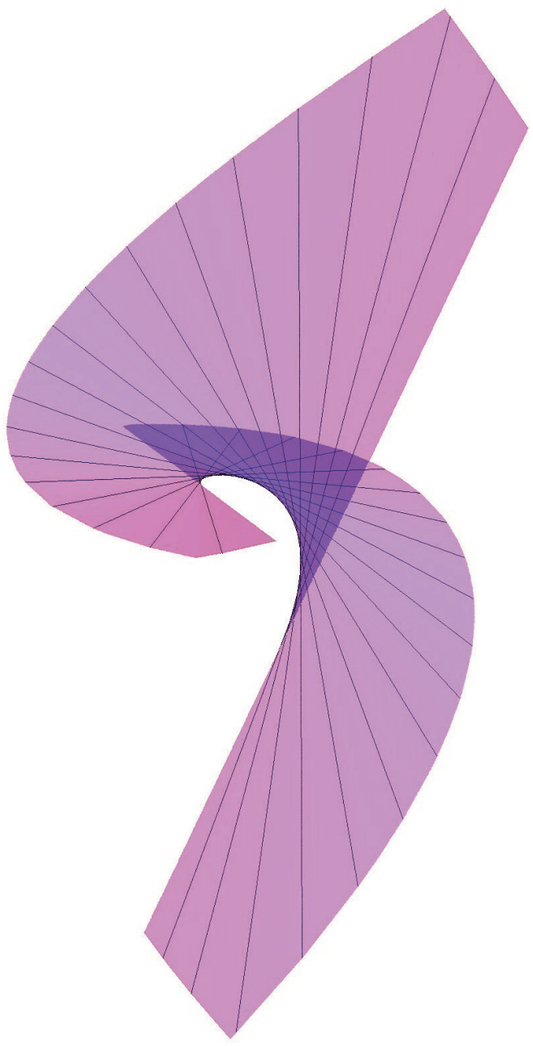
Friday 6 February 2015 at 14:15

Tea & Cookies starting at 13:00

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

Joseph M. Landsberg

(Texas A&M University)



© Jesko Hüttenhain

What can geometry tell us about computer science?

Algebraic complexity theory attempts to determine both fast algorithms for basic tasks such as multiplying matrices, as well as bounds for just how fast an algorithm for a given task can be. In his talk, Landsberg will discuss how the areas of algebraic geometry, differential geometry, and representation theory are used to address these basic questions. He will focus on two central problems: Valiant's algebraic variant of the famous P v. NP conjecture (and its „Geometric Complexity Theory" version due to Mulmuley and Sohoni) and the complexity of matrix multiplication.

The P v. NP conjecture asserts that there is essentially no solution to, e.g., the Traveling Salesman problem, more efficient than a brute force search. Valiant's variant deals with algorithms for evaluating polynomials (e.g., the determinant and permanant).

The study of the complexity of matrix multiplication began with Strassen's shocking 1969 discovery that the standard algorithm for matrix multiplication that everyone uses is not the best one. This discovery eventually led to the astounding conjecture in computer science that asymptotically it is almost as easy to multiply matrices as it is to add them.

Joseph M. Landsberg is a professor of mathematics at Texas A&M University. He has broad research interests, most recently applying geometry and representation theory to questions in theoretical computer science. Landsberg completed his PhD at Duke University in 1990. In the fall of 2014, Landsberg served as Chancellor's Professor at the Simons Institute for the Theory of Computing, UC Berkeley.

www.math-berlin.de