Thursday, **July 3, 2014**, Oberseminar Algorithmische Mathematik und Komplexitätstheorie, **10-12 o'clock in room MA 313/314**, Technische Universität Berlin

Lecture – Pierre Lairez – École Polytechnique Palaiseau

Title: Complexity and efficiency of the integration of rational function

Abstract:

The question of integrating rational functions may arise, for example, from algebraic geometry, combinatorics or number theory. It is about computing a linear differential equation, with polynomial coefficients, satisfied by the multiple parametrized integral of a rational function over a cycle. If D is the degree of the rational function being integrated and n the number of variables, then the differential equation has a size O(D^n) while algorithms that compute it perform \Omega(D^{n^2}) operations over the rational numbers. Is this exponential blowup necessary when n increases? With Alin Bostan and Bruno Salvy, we gave an algorithm which performs only O(e^{3n} D^{8n}) operations.
The practical efficiency of this algorithm is however disappointing. I gave a second algorithm which improves greatly the running time. It can compute integrals that were out of reach.