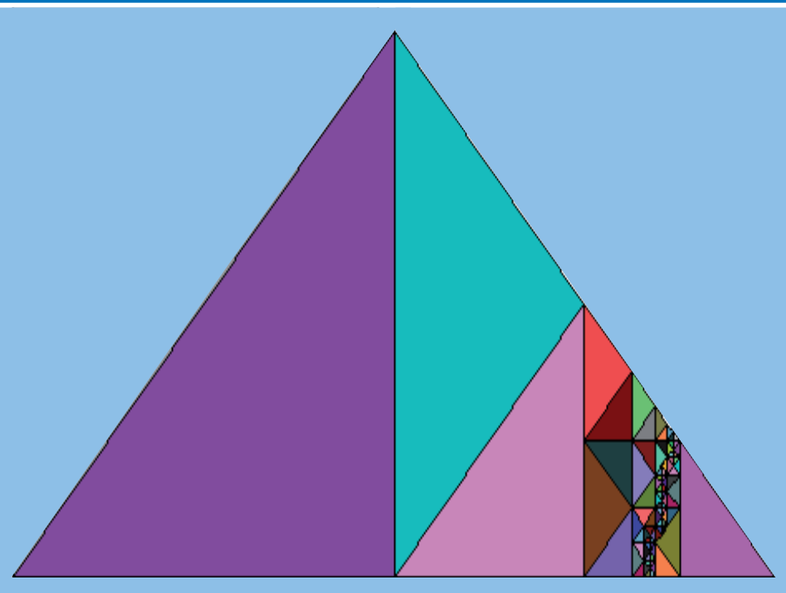
Berlin Mathematical School

BMS Friday Colloquium

Friday 5 November 2010 at 14:15

Tea before lecture begins at 13:00

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



Marie-Françoise Roy

(U Rennes)

Certificates of positivity

If a polynomial takes only positive values, is it possible to produce a certificate making it obvious?

This problem has a long story with two different approaches.

One approach, by Polya and Bernstein, is to express the polynomial in a convenient basis where the positivity of all the coefficients will imply the positivity of the polynomial. The Bernstein basis, univariate and multivariate, plays a key role there, but the degree bounds are horrendous.

Another approach suggested by Minkowski and Hilbert is to express the polynomial as a sum of squares: this is the famous 17th Hilbert problem. The proof by Artin that a positive polynomial is always a square of rational functions is beautiful, but provides no construction.

In both these approaches there are effectiveness, complexity and computational issues that Marie-Françoise Roy adressed in several recent papers or work in progress.

Her talk will report on her joint work with Fatima Boudaoud, Fabrizio Caruso, Richard Leroy, Henri Lombardi and Daniel Perrucci.

www.math-berlin.de