

## Departamento de Matemáticas

# *Coercive polynomials and their Newton polytopes*

**Abstract:** Many interesting properties of polynomials are closely related to the geometry of their Newton polytopes. In this talk we analyze the coercivity on  $\mathbb{R}^n$  of multivariate polynomials  $f$  in  $\mathbb{R}[x]$  in terms of their so-called Newton polytopes at infinity. In fact, we introduce the broad class of so-called gem regular polynomials and characterize their coercivity via conditions solely containing information about the geometry of the vertex set of the Newton polytope at infinity, as well as sign conditions on the corresponding polynomial coefficients. For gem irregular polynomials, we introduce sufficient and, in some cases, also necessary conditions for coercivity based on so-called circuit numbers.

While this analysis originally was meant to provide the existence of optimal points in polynomial optimization problems, surprisingly it also allows a new insight into the real Jacobian conjecture on global invertibility of polynomial systems of equations.

This is joint work with Dr. Tomas Bajbar.

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Lugar: Aulario, Aula 1-59M.

### Información sobre el conferenciante

Graduado (1993) y doctor (1997) por la University of Trier, Oliver Stein realizó estancias postdoctorales en Virginia Tech. (EEUU) y en Alexander von Humboldt-Stiftung. Defendió su tesis de habilitación en la RWTH Aachen University, ocupando sucesivamente plazas de profesor en las mencionadas universidades de Trier y Aachen, y de catedrático en Chemnitz University of Technology, en University of Duisburg-Essen y, desde 2006, en Karlsruhe Institute of Technology.

MathScinet reseña 72 trabajos suyos, que han recibido un total de 622 citas. Su libro “Bi-level strategies in semi-infinite programming” (Kluwer, 2003) ha recibido 80 citas. Oliver Stein es actualmente Editor en Jefe de la revista Mathematical Methods of Operations Research publicada por Springer.