



universität
wien

Fakultät für Mathematik

EINLADUNG
**Mathematisches Kolloquium
und
Junior Kolloquium**

Mihai Putinar (*University of Santa Barbara*)
Mittwoch, 29. Juni 2016

15.00 Uhr – Junior Kolloquium:

**“The geometry of critical points of complex
polynomials”**

15.45 Uhr – Kaffeepause

16.15 Uhr – Vortrag:

“Matrix positivity preservers in fixed dimension”

Alternativer Ort: Fakultät für Mathematik, Oskar Morgenstern-
Platz 1, HS 15, 2. OG

**“The geometry of critical points of complex
polynomials”**

Rolle Theorem asserts that between two real roots of a real polynomial, there is a root of its derivative, also called critical point. Is there an analogue of Rolle Theorem for complex polynomials? I will present several classical contributions in this direction, touching two tantalizing conjectures: one due to Maxwell and the other to Sendov.

Vortrag:

“Matrix positivity preservers in fixed dimension”

Abstract:

A basic observation of Schoenberg, dated 1942, provides a description of all functions which preserve matrix positivity when applied entry-wise (the so-called Schur-Hadamard calculus). Under the guidance of Lowner, the young doctoral candidate Roger Horn refined in the mid 60-ies Schoenberg's result to a necessary condition for positivity preservers applied to matrices of a prescribed size. Using techniques of representation theory (Schur polynomials) one can complete Horn's theorem by characterizing classes of functions with the same property. The motivation for this new step comes from the statistics of large data. Applications to global optimization will also be touched. On the geometric side, a novel stratification of matrix spaces, à la Schubert cells, will be discussed and related to the main topic of the lecture.

Based on joint work with Alex Belton, Dominique Guillot and Apoorva Khare.

Karlheinz Gröchenig
Maria Charina
Harald Rindler