WORKSHOP on
Orthogonal polynomials and Special functions
13 – 15 July, 2016

PROGRAM

13 July 2016, 17:00 - 18:00, KGA-103, Mathematisches Kolloquium
David Gomez-Ullate
Title: An overview of exceptional polynomials
Abstract: Since the pioneering work of Solomon Bochner and Peter Lesky, the community working on orthogonal polynomials and special functions had the belief that the only orthogonal polynomial systems that arise as eigenfunctions of a Sturm-Liouville problem are the classical systems of Hermite, Laguerre and Jacobi. In 2009 we introduced a new class of orthogonal polynomial systems that enlarged this class: the exceptional orthogonal polynomials. In this talk we will review the recent history of these new functions, emphasizing their similarities and differences with respect to the well known classical families.

14 July 2016, 9:30 – 11:00, KGA-204
Stefan Hilger
Title: Orthogonal polynomials and special functions appearing in ladders
Abstract: We will introduce basics of ladder theory and the Weyl algebra, h- and q-deformed Weyl algebra, the algebra U_q. Then we will show how classical orthogonal polynomials and special functions appear as intrinsic eigenfunctions of ladders.

14 July 2016, 11:30 - 13:00, KGA-204
Galina Filipuk
Title: The recurrence coefficients of semi-classical orthogonal polynomials and the Painlevé equations
Abstract: In this talk we shall review how the recurrence coefficients of semi-classical orthogonal polynomials are related to solutions of the Painlevé equations.

14 July 2016, 14:30 - 16:00, KGA-204
David Gomez-Ullate
Title: Recurrence relations for exceptional Hermite polynomials
Abstract: We will explain how to use the bispectral anti-isomorphism to produce explicit formulas for all difference operators having the Hermite exceptional orthogonal polynomials as eigenfunctions, with eigenvalues that are polynomials in x. This procedure gives an algorithmic way to derive explicit recurrence relations similar to the usual ones, whose order is $3 + 2m$, where m is the codimension of the exceptional family.

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14 July 2016, 16:30 - 18:00, KGA-204
Edmundo Huertas
Title: Electrostatic Interpretation of Zeros of Canonical Perturbed Orthogonal Polynomials
Abstract: In the last years some attention has been paid to the so called canonical spectral transformations of measures. This talk is focused on the zeros of monic orthogonal polynomial sequences associated with the so called Geronimus canonical transformation, which consist of a linear rational modification together with a mass point N of a given positive Borel measure. We provide a complete electrostatic model of the zero distribution as equilibrium points in a logarithmic potential interaction under the action of an external field. We analyze such an equilibrium problem when the mass point/points is/are located on the exterior of the support of the initial measure.

15 July 2016, 10:00 - 11:00, KGA-204, Mathematisches Kolloquium
Edmundo Huertas
Title: Computational Approach to the Asymptotic Behavior of Ratios of Laguerre Orthogonal Polynomials
Abstract: We consider the strong asymptotic behavior of Laguerre polynomials in the complex plane. The leading behavior is well known from Perron and Mehler-Heine formulas, but higher order coefficients, which are important in the context of Krall-Laguerre, and Laguerre-Sobolev type orthogonal polynomials, are notoriously difficult to compute. Here, we propose the use of an alternative expansion, due to Buchholz, in terms of Bessel functions of the first kind. The coefficients in this expansion can be obtained in a straightforward way using symbolic computation (Wolfram Mathematica, MAPLE, etc).

PARTICIPANTS

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