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Mathematical Colloquia

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17:15 h, Lecture Room 119

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Semigroups of holomorphic self-maps of the unit disc: from dynamics to hyperbolic geometry

Abstract:

Continuous one-parameter semigroups of holomorphic self-maps of the unit disc in the complex plane have been a subject of study since early 1900s, both for their intrinsic interest in complex analysis and for applications (Galton-Watson processes, growth of plants,..). In recent years, there has been a lively development of the theory, and deep achievements about boundary behavior and dynamical aspects have been obtained. A (continuous) semigroup of holomorphic self-maps of the unit disc, or just a semigroup for short, is a continuous semigroup homomorphism between the additive semigroup of non-negative real numbers endowed with the Euclidean topology and the semigroup with respect of composition of holomorphic self-maps of the unit disc endowed with the topology of uniform convergence on compacta. To every semigroup there is associated a unique semi-complete vector field and an essentially unique univalent (i.e. holomorphic and injective) linearization function, the so-called Koenigs's function. There is a natural and interesting relation among dynamical properties of semigroups, analytic properties of the associated holomorphic vector field and geometrical properties of the image of Koenigs' functions.
In this introductory talk I will give a quick overview of the theory and concentrate on the relations between dynamics of semigroups and (hyperbolic) geometry of the image of Koenigs' functions, discussing some recent results.