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UC|UP MATH PhD Program

Research Seminar Program
UC|UP Joint PhD Program in Mathematics

Date: December 13th, 2019

Place: Room 0.29, Department of Mathematics, FCUP, University of Porto

Program

11h00 - Reception

11h15 - João Santos[1]: *Keys and Demazure crystals in type C*

Abstract: We compute, mimicking the Lascoux-Schützenberger type A combinatorial procedure, left and right keys for a Kashiwara-Nakashima tableau in type C. These symplectic keys have a similar role as the keys for semistandard Young tableaux. More precisely, our symplectic key gives a tableau criterion for the Bruhat order of the hyperoctahedral group and describes the type C Demazure atoms and characters. The right and the left symplectic keys are related through the Lusztig involution.

12h00 - Diego Daltro[2]: *Mixing property in Dynamical Systems*

Abstract: The purpose of this talk is to give an informal presentation of mixing property in the context of dynamical systems. Let $T : X \to X$ be a measurable transformation defined in a measurable space $(X, \mathcal{A}, \mu)$. Given two physical quantities $\varphi, \psi : X \to \mathbb{R}$ (e.g. pressure, temperature, energy), we want to study the behaviour of the following quantity, $C_n(\varphi, \psi) := \int (\varphi \circ T^n) \psi d\mu - \int \varphi d\mu \int \psi d\mu$ as n goes to infinity. In other words, we would like to know how much the first quantity at time n does influence (by the system T) the second quantity at time zero. Besides, we will compare the previous definition with other independence properties.

Lunch Break

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[1]João Santos is a PhD student of the Joint PhD Program UC|UP, working at the University of Coimbra, in Combinatorics, under the supervision of Professor Olga Azenhas.

[2]Diego Daltro is a PhD student at Universidade Federal da Bahia (Brazil), working as a visiting student at the University of Porto, in Dynamical Systems, under the supervision of Professor Paulo Varandas.

14h15 - Rui Prezado[3]: *Representation theory of parabolic bundles*
        (joint talk with the **CMUP Informal PhD Seminar**)

Abstract: We explain how deformations of a parabolic bundle ξ are given by the vector space $\mathrm{Ext}^1(\xi,\xi)$; moreover, for ξ stable, this is the tangent space at ξ for a certain moduli space of parabolic bundles. We show a possible way to approach these ideas from a representation theory point of view.

15h00 - Ali Moghanni[4]: *The rough interval shortest path problem*

Abstract: Optimization problems have the potential to model a variety of real situations, in areas as diverse as transportation, network design or telecommunications. Very often vagueness, imprecise or uncertainty are encountered when defining such models, due to the fluctuation of the real problem parameters, like the traffic, the payload or even the weather. The rough set theory was introduced by Pawlak, by the end of the XX century, as a way to overcome this kind of issues and has raised increasing interest for its ability to represent complex or large data sets in a simplified manner.

In this talk we address the use of rough set theory when applied to network optimization. The approach is based on the use of rough intervals to characterize each parameter and the well-known shortest path problem is the considered problem. Basic concepts, like order relations and operations involved in this problem, are adjusted to a rough set paradigm and a labeling-like algorithm is presented to find a set of rough interval shortest paths between a pair of vertices in a network.

15h30 - Coffee break / **Christmas meeting**

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[3]Rui Prezado is a first year PhD student of the Joint PhD Program UC|UP.

[4]Ali Moghanni is a PhD student of the Joint PhD Program UC|UP, working at the University of Coimbra, in Optimization, under the supervision of Professor Marta Pascoal.