FACULTAD DE CIENCIAS FÍSICAS Y MATEMÁTICAS UNIVERSIDAD DE CHILE

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**Optimization and Equilibrium Seminar**

**Speaker:** Professor Michel de Lara, Ecole des Ponts ParisTech, France.

**Title:** Constant Along Primal Rays Conjugacies and the l0 Pseudonorm.

**Abstract:** he so-called l0 pseudonorm counts the number of nonzero components of a vector. It is standard in sparse optimization problems. However, as it is a discontinuous and nonconvex function, the l0 pseudonorm cannot be satisfactorily handled with the Fenchel conjugacy. In this talk, we present the Euclidean Capra-conjugacy, which is suitable for the l0 pseudonorm, as this latter is "convex" in the sense of generalized convexity (equal to its biconjugate). We immediately derive a convex factorization property (the l0 pseudonorm coincides, on the unit sphere, with a convex lsc function) and variational formulations for the l0 pseudonorm. In a second part, we provide different extensions: the above properties hold true for a class of conjugacies depending on strictly-orthant monotonic norms (including the Euclidean norm); they hold true for nondecreasing functions of the support (including the l0 pseudonorm); more generally, we will show how Capra-conjugacies are suitable to provide convex lower bounds for zero-homogeneous functions; we will also point out how to tackle the rank matrix function. Finally, we present mathematical expressions of the Capra-subdifferential of the l0 pseudonorm, and graphical representations. This opens the way for posible suitable algorithms that we discuss.

**Date: Wednesday, October 13, 2021 at 10:00 am (Chilean time)**

link: https://meet.google.com/jhs-kymj-gwa

Major information on the this, previous and coming seminars may be found at:

https://eventos.cmm.uchile.cl/optimseminar/seminars

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