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Room: UB iA (Universitat de Barcelona)

Mean-field games and the tragedy of the commons

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The core of this talk is the development and the study of specific mean-field games related to harvesting problems. Mean-field games are a PDE framework to describe Nash equilibria in systems with a very large number of indistinguishable, rational agents.

The first part of the talk will be devoted to introducing mean-field games and the specific harvesting mean-field games that will be treated. We will assume a population of infinitely many selfish agents that harvest a resource — modelled through a reaction-diffusion equation— and derive the Nash equilibrium associated equations, the mean-field game.

We will later study two problems: first the existence of "reversing" travelling waves for the mean field game: in the presence of selfish harvesters travelling waves can go on the opposite direction than the sense they would take if the players are not present. In contrast, there are strategies for which each player has higher return than the solution associated with the Nash equilibrium without extinguishing the resource. This is an instance of the tragedy of the commons. Unfortunately, the full theory for this regime is still incomplete.

On the other part we will explore more the wellposedness of the PDE system derived under certain smallness conditions (mass of players being small) and derive as well a long-time behaviour for certain nonlinearities in the reaction diffusion equation.

These are joint works with Ziad Kobeissi (INRIA) and Idriss Mazari (CEREMADE).