Time-dependent focusing Mean Field Games with strong aggregation

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Mean Field Games (MFG) theory models the behavior of an infinite number of indistinguishable rational agents aiming at minimising a common cost. A large part of MFG literature is devoted to the study of MFG systems with increasing coupling (”non focusing” case). Heuristically, this assumption means that agents prefer sparsely populated areas (indeed concentration costs), and it is well-suited to model competitive cases. Moreover, the increasing monotonicity of the coupling ensures existence and regularity of solutions in many circumstances. We are interested in the ”focusing” case, that is, where the coupling is monotone decreasing and it is a local function of the distribution, so that no regularising effect can be expected. These systems describe Nash equilibria of games with a large number of agents aiming at aggregation. In this talk, we will introduce the model in the focusing case and we will show that there is a threshold for the growth of the coupling, after which the solutions to the MFG system may not exist. This is coherent with the focusing character of the MFG, which induces solutions to concentrate and develop singularities.