Keller-Segel, Fast-Diffusion and Functional Inequalities

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Abstract

We will show how the critical mass classical Keller-Segel system and the critical displacement convex fast-diffusion equation in two dimensions are related. On one hand, the critical fast diffusion entropy functional helps to show global existence around equilibrium states of the critical mass Keller-Segel system. On the other hand, the critical fast diffusion flow allows to show functional inequalities such as the Logarithmic HLS inequality in simple terms who is essential in the behavior of the subcritical mass Keller-Segel system. HLS inequalities can also be recovered in several dimensions using this procedure. It is crucial the relation to the GNS inequalities obtained by DelPino and Dolbeault. This talk corresponds to two works in collaboration with E. Carlen and A. Blanchet, and with E. Carlen and M. Loss.