

The mean field limit for large stochastic systems with singular
attractive interactions

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Abstract : We propose a modulated free energy which combines of the method previously developed by the speaker together with the modulated energy introduced by S. Serfaty. This modulated free energy may be understood as introducing appropriate weights in the relative entropy to cancel the more singular terms involving the divergence of the flow. This modulated free energy allows to treat singular interactions of gradient-flow type and allows potentials with large smooth part, small attractive singular part and large repulsive singular part. As an example, a full rigorous derivation (with quantitative estimates) of some chemotaxis models, such as Patlak-Keller-Segel system in the subcritical regimes, is obtained. This is joint work with D. Bresch and Z. Wang.