Some multi-species mean field equations arising in 2D turbulence

We compare some mean field equations with exponential nonlinearity describing turbulent Euler flows in equilibrium according to Onsager's theory. We consider the multi-species case where the variable vorticities are subject either to a deterministic distribution or to a stochastic distribution. We show that such models lead to different critical temperatures (corresponding to optimal Moser-Trudinger inequalities). Although the stochastic model is in general more similar to the single vorticity case (standard mean field equation) than the deterministic model, we will show some situations where such a situation is reversed.