Controlled transition to complete multiparticle quantum dynamics from classical field simulations of interacting bosons[1] PIOTR DEUAR, Universite Paris-Sud — The classical field (or truncated Wigner) and the positive P methods are in use to simulate non-equilibrium quantum dynamics of large interacting bosonic systems, such as BECs, beyond the mean-field approximation. However, the classical field method is inherently an approximation that discards some processes. Although it can often be argued that the discarded evolution is relatively small, so are many quantities of interest beyond the mean-field description. Their accuracy in the simulation often remains unknown, limiting its use. The positive P method, on the other hand, while giving the complete quantum dynamics, gives useful precision only for a limited evolution time. Here, a technique is presented that allows the gradual and controlled introduction of the non-classical-field parts of the evolution, interpolating from the classical field to the complete quantum dynamics of the positive P. This allows one to assess the accuracy of the long-time classical field calculations quantitatively and provide confidence, if warranted. It can play a similar role here to the controlled addition of increasing state complexity in DMRG methods.

Piotr Deuar
Universite Paris-Sud

Electronic form version 1.4