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Heat kernels of finite particles with critical attracting interactions

In this talk, I will present heat kernel bounds for some particle systems with strong attracting interactions, including celebrated Keller-Segel finite particles. In dimensions $d \geq 3$ we use Nash's method but with respect to suitable "desingularizing" weights. In dimension $d = 2$, which poses additional challenges, we adapt Nash's ideas to a non-local setting – despite the fact that the object under study is local – in order to effectively handle the singularity of the interaction kernel. Joint work with Sallah Eddine Boutiah.