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Many-particle Hardy inequality and singular diffusions

I will talk about an improved upper bound on the best possible constant in the many-particle Hardy inequality. Specifically, our result improves the previously known factorial dependence on the dimension to a polynomial dependence. The bound is obtained as an application of our recent work on singular stochastic differential equations, along with classical results on Bessel processes.

To our knowledge, this is the first instance where a probabilistic argument is employed in the analysis of the constant in a Hardy inequality. Our estimate also shows that the lower bound established earlier by Hoffmann-Ostenhof, Hoffmann-Ostenhof, Laptev, and Tidblom is in fact close to optimal.

Joint work with Reihaneh Vafadar.