Abstract

In this talk, we shall consider the finiteness of central configurations of the N-body problem with $-\alpha$-homogeneous potentials. To the four-body problem, we prove that there are finitely many central configurations for generic choices on masses provided the exponent is rational, in the sense that they are in the complement of co-dimension 1 or higher algebraic surfaces. There are indeed finitely many central configurations for positive masses if $\alpha \neq 3k+1$ is an integer. On the other hand, the finiteness of non-degenerate central configurations is proved for real $\alpha>0$, as well as and a uniform upper bound is obtained.

Our consideration is based on the fewnomial theory, the singular sequences approach proposed by Albouy-Kaloshin and basic algebraic number theory. The talk is based on joint works with Julius Natrup and Qun Wang.