

## **Applications of normal form theory in celestial mechanics**

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Normal form theory goes back to N. Nekhoroshev. It states that, under some generic assumption, a close-to-be-integral Hamiltonian system is close to an integrable one and hence possesses approximate first integrals. Letting the order of normalization to infinity, one obtains the best result, which is integrability on Cantor sets, mostly known as "KAM theory" (Kolmogorov, Arnold and Moser, 1960s). However, also keeping the order of normalization finite, one obtains noticeable results, like, for examples, the stability of semi-major axes of the solar system for very long time (N. Nekhoroshev, 1970s). I shall discuss extensions of the normal form theory which allow to prove new results in celestial mechanics, like, for example, the existence of librations for the perihelia for a model of the three-body problem.