

The aspect of the planetary normal form :
stable and unstable motions

Gabriella Pinzari *

pinzari@mat.uniroma3.it

The existence of a Birkhoff normal form for the planetary problem was a long outstanding question that remained open for about 50 years, after a famous work by V. I. Arnold of 1963. This normal form was found (and proved to be non degenerate) by the author during her Ph.D., by solving the problem of the degeneracy due to rotations. This led to prove, *jointly with L. Chierchia*, the existence (with constructive proof) of a large measure set of stable motions in phase space, as conjectured by Arnold himself and, moreover, of lower dimensional elliptic tori. In this talk I shall discuss other consequences of this normal form. In particular, I shall discuss how its aspect may change in presence of mean motion resonances, with particular attention to the case of the three body problem.

*Dipartimento di Matematica, Università di Roma 3, L.go S. Leonardo Murialdo, 1 00146 Roma, ITALY.