Title: Dynamical study of Hilda asteroids through quasi-periodic solutions. **Authors:** A. Jorba, <u>B. Nicolás</u> and Ó. Rodríguez

The Hilda family of asteroids is a group of more than 5000 asteroids located beyond the main asteroid belt of our Solar System, but within Jupiter's orbit. They are known to have mean motion in a 3:2 orbital resonance with Jupiter and to describe orbits that seem to successively approach three Lagrangian Points, L3, L4 and L5, of the Sun-Jupiter system.

Our aim in this work is to analyse Hilda's behaviour from a dynamical systems approach, by studying their orbits within Sun-Jupiter Circular Restricted Three Body Problem (CRTBP) and Elliptical Restricted Three Body Problem (ERTBP), both in the planar case. The reason for studying both models is to analyse the level of importance of Jupiter eccentricity in this particular application.

Our analysis starts by selecting those asteroids in the JPL database with orbital elements of the Hilda category, although focusing on those with low inclination. The database provides the coordinates of the asteroids in an inertial ecliptical reference frame, with the origin set at the solar system center of mass. Then, a change of coordinates for the ephemeris of these asteroids is needed in order to have them in the CRTBP or ERTBP Sun-Jupiter systems. This (non trivial) change of coordinates is defined through the instantaneous orbital elements of the Sun and Jupiter and it will be detailed in the presentation.

Once we have the coordinates of the Hilda asteroids in our mathematical models, we are in position of computing numerically the periodic and quasiperiodic orbits that are assumed to be responsible of their motion. In order to compute these quasi-periodic orbits (also known as invariant tori), we make use of temporal or spatial Poincarè sections. Some comparisons have been performed to identify the most convenient and effective strategy when analysing these invariant objects and their stability.

Some results will be presented for both the circular and the elliptical restricted three body problems.