

ASTRONET 2

Marie-Curie Research Training Network

- First School -

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Background

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R. I. Paez



“Licenciatura” in Astronomy, at the Facultad de Ciencias Astronómicas y Geofísicas, of the Universidad Nacional de La Plata. 22 compulsory courses and 10 electives, distributed in the areas of Mathematics (8), Physics (9), Numerical methods and programming (3), and Astronomy (10). Electives cover a general spectrum in Astronomy, with a focus on Dynamical Systems.

Previous work

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- **1** - Development of a program creating initial conditions for a simulation of a spherical stellar system with Hernquist profile (in the framework of the course *Elements of Computational Astronomy*).
- **2 - Degree thesis work: Diffusion study of a multidimensional symplectic mapping.** Numerical integration of weakly chaotic orbits in the resonance web of the 4D Coupled Rational Shifted Standard Map for a fixed choice of the phase parameter values. Study of the chaotic diffusion, including identifying the character of the diffusion (normal or not) as well as quantitative estimates of the diffusion coefficient as a function of the mapping's coupling parameters, in the so-called Nekhoroshev regime (where resonances do not overlap).

Current and Future Work

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Project within the Network: Perturbation Theory at work on AstroDynamics.

Construction and study of suitable Hamiltonian normal forms, in three different cases:

- **a KAM torus**, applied to the Sitnikov problem
- **a lower dimensional torus of hyperbolic type**, applied to travels along the resonant manifolds in the Solar System
- **a low dimensional torus of elliptic type**, applied to the Cassini states for satellites.

Project outside the Network: Stability of resonant motions in the Trojan problem.

Parametric study of the main resonances that cross the domain of stability, and their effect on the dynamical behavior of possible trojan exoplanets.