DYNAMICS OF THE MARS 1:2 RESONANT POPULATION. T. Gallardo, Departamento de Astronomia, Facultad de Ciencias, Igua 4225, 11400 Montevideo, Uruguay, gallardo@fisica.edu.uy.

Abstract: There is a population of about a thousand asteroids evolving in the exterior 1:2 resonance with Mars [1]. We have found approximately 400 asteroids performing librations around the asymmetric libration centers and about 700 in horseshoe trajectories. Perturbations generated by Jupiter and the time evolution of Mars' eccentricity generate a complex dynamical behavior.

The Population: Looking at the distribution of the asteroid's semimajor axes it is possible to distinguish a concentration at a=2.419 AU. It was probed recently the concentration is generated by a numerous population of asteroids in the resonance 1:2 with Mars [1] and the analysis of the critical angle shows librations with a libration center depending on asteroid´s eccentricity as expected for an exterior resonance of the type 1:N [2]. This is the first numerous population of asteroids dynamically linked to a terrestrial planet.

The Dynamics: A numerical integration for 10.000 years allow us to define the present status of the population as presented in the figure below. The long term evolution of this population is generated by a complex mechanism due to a secular perturbation by Jupiter and a variable second forced mode generated by the time-depending eccentricity of Mars. Due to this mechanism is frequent the transformation of librations in horseshoes and conversely but in the long term evolution the number of asteroids performing librations is linked to the eccentricity of Mars. At timescales of some hundred million years it is possible to appreciate a decay in the number of asteroids evolving in the resonance.

Mean lifetime: Numerical integrations show that the asteroids remain linked to the resonance over 10^8 to 10^9 years.

The Origin: We do not have an answer yet but it is possible that some mechanism like Yarkovsky [3] effect could have some relevance.

References: [1] Gallardo T. (2007) *Icarus, 190,* 280–282. [2] Beaugé C. (1994) *CMDA, 60,* 225-248. [3] Bottke W. F. et al. (2000*) Icarus, 145,* 301-331.