1111-83-594 **Borja Reina** and **Raül Vera*** (raul.vera@ehu.eus), Dept. Theoretical Physics and H. of Science, Faculty of Science and Technology, UPV/EHU, Apt. 644, 48080 Bilbao, Spain. *Revisiting Hartle's model using perturbed matching theory to second order: amending the change in mass.*

Hartle's model describes the equilibrium configuration of a rotating isolated compact body to second order in perturbation theory in GR. The interior is a perfect fluid with a barotropic equation of state, no convective motions and rigid rotation, which is matched across its surface to an asymptotically flat vacuum exterior. Perturbations are taken around a static and spherically symmetric background configuration. Apart from the explicit assumptions, the model is built upon some implicit premises, as the continuity of the functions describing the perturbation in terms of some radial coordinate. We have revisited the model within a recent consistent theory of perturbative matchings to second order, independent of the coordinates and gauges used in the two regions. The matching conditions are explored up to second order in full, and put on firm grounds. However we find that the second order radial function m_0 in the original work, contrary to the original assumption, presents a jump at the surface of the star proportional to the value of the energy density of the background configuration there. As a consequence, the change in mass δM needed by the perturbed configuration to keep the value of the central energy density unchanged must be amended. (Received February 09, 2015)