Marcony S Cunha et al., J Astrophys Aerospace Technol 2017, 5:3 (Suppl)
DOI: 10.4172/2329-6542-C1-011

About the dependence of the black-body force on space-time geometry and topology

Marcony S Cunha, C.R. Muniz, G. Alencar, R.R. Landim and **R.N. Costa Filho**
Ceará State University, Brazil

The recently discovered attractive force on neutral atoms caused by the thermal radiation emitted from black bodies is investigated in gravitational systems with spherical and cylindrical symmetries. We show that corrections to the potential and then we calculate the so-called black-body force (BBF) due to space-time geometry and topology. For some astrophysical objects we find that the corrected black-body potential is greater than that given in the flat case, showing that this kind of correction can be quite relevant when curved spaces are considered. For the spherically symmetric case of a massive body, we find that two corrections appear: One due to the gravitational modification of the temperature and the other due to the modification of the solid angle subtended by the atom. We find that the BBF depends on the topology of the space-time through the modification of the azimuthal angle and therefore of the solid angle. For the global monopole, the modification in the potential is due to its topological space-time nature which produces a solid angle deficit which is intrinsic to that object. In the cylindrical case, which generates a locally flat space, no gravitational correction to the temperature exists, neither in the global monopole case. For the static cosmic string we find that the force is null for the zero thickness case. In conclusion, we believe that massive objects which can warp the space-time can also magnify the black-body force effect on neutral atoms around them and that the phenomena can contribute to the understanding the formation of stars and planets, and other cosmological objects.

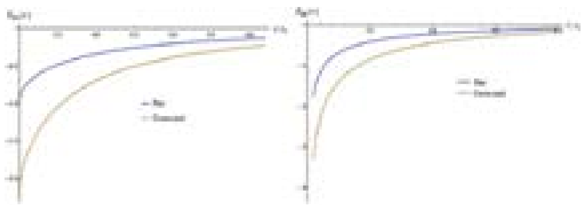

Figure 1. The temperature-independent part of the black-body potential V_{bb} and force F_{bb}, gravitationally corrected and flat, both as functions of the ratio r/r_s, due to a massive spherical body with $R = 2r_s$.

Biography

Marcony Silva Cunha has his experience in Physics focusing on general theory of particles and fields, classical and alternative theories of gravitation, and quantum mechanics. He is professor at Ceará State University, Brazil.

marcony.cunha@uece.br

Notes: