

School of Physical Sciences Seminar

Location: SA217 and on Zoom

Speaker: Julio Arrechea (Instituto de Astrofísica de Andalucía, Granada)

Topic: Semiclassical relativistic stars.

Abstract: The phenomenon of quantum vacuum polarization violates general relativistic energy conditions in the spacetime external to an ultracompact star. As this object is made to approach the black hole limit, semiclassical corrections become potentially capable of producing new end-states in stellar evolution. We investigate this effect in a simplified setting i.e. modeling the semiclassical contribution by a massless quantum scalar field in the Boulware vacuum state. The renormalized stress-energy tensor is firstly approached by an analytic Polyakov approximation. This already reveals a crucial difference with respect to classical stars: we find families of solutions that exhibit bounded pressures and compactness up to a central core of Planckian radius. A minimal deformation of the Polyakov approximation inside this central core suffices to produce regular ultracompact configurations surpassing the Buchdahl compactness limit by far. Finally, we review the main features of these semiclassical relativistic stars.

Everyone welcome!

If you cannot join in-person, please use the Zoom link:

<https://dcu-ie.zoom.us/j/99145308425?pwd=WjdLUE5xSDBLS3p5Q216UFd3WHkyUT09>

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