

RTG Models of Gravity – Online Colloquium	
Date:	08.12.2021
Time:	14:00 - 16:30
Location:	Zoom: https://ucl.zoom.us/j/93264781933 Meeting-ID: 932 6478 1933

Program	
14:00 – 15:00	Talk 1: Irene Tamborra Niels Bohr Institute, University of Copenhagen <i>“Messengers from the Universe”</i>
15:00 – 15:30	Break
15:30- 16:30	Talk 2: Fethi Ramazanoglu Koc University, Istanbul <i>“Unwelcome instabilities in theories of gravity”</i>

Abstracts

Talk 1: Irene Tamborra

Niels Bohr Institute, University of Copenhagen

“Messengers from the Universe”

Neutrinos are fascinating elementary particles heralding the dawn of the multi-messenger astronomy era. Neutrinos affect the stellar dynamics, drive the formation of new elements, and carry signatures of the yet mysterious physics ruling the most powerful cosmic fireworks. Recent developments on the role of neutrinos in cosmic sources will be reviewed together with the most exciting detection prospects.

Talk 2: Fethi Ramazanoglu

Koc University, Istanbul

“Unwelcome instabilities in theories of gravity”

Unwelcome instabilities in theories of gravity Weak field tests already constrain any deviation from general relativity to be small, hence, scenarios in alternative theories where major effects become relevant in the strong gravity regime are particularly interesting. A perfect example of this is the spontaneous scalarization phenomena in scalar-tensor theories where the scalar can naturally grow near compact objects due to a tachyonic instability. The tachyon is welcome, because it is eventually shut off due to nonlinear effects, and leads to stable objects of potential astrophysical relevance. There does not seem to be anything specific to scalars in the instability mechanism at a first sight, hence there have been various efforts to find analogous theories for vectors and other fields. I will summarize these efforts, and then concentrate on our recent finding that such theories are fundamentally different from scalarization. Whenever an analog of the tachyon in scalarization is introduced in a vector-tensor theory, a ghost (or gradient) instability also appears. Instability time scale of the ghost is faster than that of tachyons, hence it dominates the dynamics. Even more crucially, these ghosts also manifest divergent terms in the field equations, which poses serious questions about the mathematical meaning and physical validity of the theories they appear in. We will discuss these problems, some ideas about potential solutions and factors that hinder the solutions.

Reference: <https://arxiv.org/abs/2110.04594>