

Wednesday, April 17, 14:00-15:00

Physics Department- H Block Seminar Hall (Tea & coffee at 13:45)



<https://news.cnrs.fr/articles/cosmology-in-turmoil>

## Sui generis interaction kernels: A Case Study with scale-independent EMSG

Energy momentum squared gravity (EMSG) modifies the introduction of the material source in the usual Einstein-Hilbert action (in general relativity) by adding only matter-related terms, specifically  $f(T_{\mu\nu}T^{\mu\nu})$ , to the matter Lagrangian density. In this talk, we will discuss the cosmological models in EMSG from nonminimal interaction perspective and explore the possible effects of this interaction in the dark sector. In literature this model has generally studied such that each source satisfies  $\nabla^\mu(T_{\mu\nu} + T_{\mu\nu}^{EMSG}) = 0$ . Yet, the usual and EMSG sectors may be conserved separately as well, providing a nonminimal interaction between the material fields and EMSG sectors individually. Scale-independent EMSG is chosen as a case study to demonstrate the feasibility of exploring scenarios in the simplest extension. This model is reminiscent of the cosmological model where interaction proportional to energy density  $Q(H\rho)$ , studied by Barrow and Clifton, alas the coefficients of interaction in EMSG are not arbitrary constants but species dependent. We will finalize the talk by reproducing interesting cosmologies with de-Sitter/anti de-Sitter solution in the presence of matter or radiation, or power law solutions in the presence of vacuum, which are novel in general relativity (GR).

**Keywords:** Cosmology, General relativity, Interacting dark sector models



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Bilal Bulduk obtained his B.Sc. in 2020 in Physics from Middle East Technical University. He is a graduate student in Istanbul Technical University. Besides, he is a researcher at Gebze Technical University. His research interest includes modified gravity models,  $\Lambda$ CDM cosmology, dark sector interactions, higher dimensions and symmetries in cosmology.