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# I N V I T A T I O N

**as part of the Gravitational Physics Literature Seminar**

to the talk by

## Mahdi HAGHSHENAS

(Imperial College London)

on

## *"Boundedness and Decay of Waves on Decelerated FLRW Spacetimes"*

**Abstract:**
The standard cosmological models of a homogeneous and isotropic universe in general relativity are described by the Friedmann--Lemaître--Robertson--Walker (FLRW) spacetimes. A natural step toward understanding the dynamics of wave-type equations---including the Einstein equations---near these backgrounds is to study the scalar wave equation on FLRW spacetimes and establish robust energy estimates.

In this talk, after outlining the stability problem for FLRW spacetimes, we consider the wave equation---as a proxy for the Einstein equations---on decelerated FLRW spacetimes with R^3 spatial sections. We demonstrate how dispersion and expansion affect the long-time behaviour of waves. In particular, we present uniform energy bounds and integrated local energy decay estimates across the full decelerated expansion range. Moreover, we describe a hierarchy of r^p-weighted energy estimates, in the spirit of the Dafermos--Rodnianski r^p-method, which lead to energy decay estimates.

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**Time:** **Wednesday, 17 September 2025, 2:15 p.m.**

**Location:** **VERA Seminar Room (Viktor-Franz-Hess Lecture Hall), Währinger Straße 17, 1090 Vienna, Hoftrakt, 1st floor**

sgd.: D. Fajman