New Developments in Theoretical Cosmology

Report of Contributions

Contribution ID: **1** Type: **not specified**

Cosmological Dressing Rules

Wednesday 12 February 2025 15:30 (45 minutes)

The basic observables in cosmology are known as in-in correlators. Recent calculations have revealed that in-in correlators in de Sitter space exhibit hidden simplicity stemming from a close relation to scattering amplitudes in flat space. In this talk, I will explain how to make this property manifest by dressing flat space Feynman diagrams with certain auxiliary propagators. Such dressing rules can be derived for a broad range of scalar theories, including those with IR divergences. If time permits, I will sketch how to extend this to spinning fields and formulate the double copy for in-in correlators.

Presenter: LIPSTEIN, Arthur (University of Durham)

Session Classification: Afternoon session 2

Contribution ID: 4   Type: **not specified**

Holography in the static patch

Wednesday 12 February 2025 10:00 (45 minutes)

In this talk I will review recent progress towards formulating a holographic theory for the de Sitter static patch, from the point of view of an inertial observer. One of the main obstructions to achieve this is the lack of an asymptotic timelike boundary. I will discuss two ways of, at least partially, overcoming this issue. One way is to consider gravity in the presence of a finite boundary. The other one is to study the analogue problem in lower dimensional theories of gravity.

Presenter: GALANTE, Damian (KCL)

Session Classification: Morning session 1

Contribution ID: **5**   Type: **not specified**

From Strings to Stars: Unlocking the Universe's Acceleration

Wednesday 12 February 2025 13:00 (45 minutes)

Recent cosmological observations suggest that dark energy, the driver of the universe's accelerated expansion, may be evolving over time. This challenges the conventional idea of a static cosmological constant within the standard model of cosmology. In this talk, I will explore recent theoretical developments in understanding the nature of dark energy from the perspective of string theory. Additionally, I will discuss how these insights can be tested through simple, string-motivated models in light of the latest observational data.

Presenter: ZAVALA, Ivonne (University of Swansea)

Session Classification: Afternoon session 1

Contribution ID: **6**   Type: **not specified**

Exact results for de Sitter QFTs

Wednesday 12 February 2025 16:15 (30 minutes)

In this talk I will discuss some recent developments in the study of quantum fields on a fixed de Sitter background. I will discuss the two-dimensional Schwinger model of a massless charged fermion coupled to an Abelian gauge field. The theory admits an exact solution that can be analyzed efficiently using Euclidean methods. I will discuss the fully non-perturbative, all loop correlation function of the electric field as well as the fermion field and demonstrate many features endemic of quantum field theory in de Sitter space, including the appearance of late-time logarithm, their resummation and the role of non-perturbative phenomena.

Presenter: RIOS FUKELMAN, Alan (KCL)

Session Classification: Afternoon session 2

Contribution ID: **7** Type: **not specified**

Lessons from the self-dual sector

Wednesday 12 February 2025 16:45 (45 minutes)

In this talk, I will explore how the self-dual sector of gravity and Yang-Mills theory provides a natural framework for formulating an elegant version of the double copy in curved spacetimes. Additionally, I will discuss how this perspective sheds light on the soft limits of these theories, offering a deeper understanding of their asymptotic behaviour.

Presenter: NAGY, Silvia (University of Durham)

Session Classification: Afternoon session 2

Contribution ID: **8**   Type: **not specified**

An Open Effective Field Theory for light in a medium

Wednesday 12 February 2025 13:45 (30 minutes)

Open effective field theories seek to incorporate dissipation and noise into our theoretical toolbox. These effects arise from the incomplete modelling of unknown components, which can significantly alter the dynamics of observable degrees of freedom. In this talk, I will introduce open electromagnetism, a sandbox for exploring gauge symmetries in open systems, which describes light in dielectric media. I will highlight how symmetries, locality, and UV unitarity impose constraints on dissipation and noise. Finally, I will outline a roadmap toward a description of open gravity in cosmology.

Presenter: COLAS, Thomas (University of Cambridge)

Session Classification: Afternoon session 1

Contribution ID: **9**   Type: **not specified**

Cosmological Correlators Through the Looking Glass

Wednesday 12 February 2025 11:15 (45 minutes)

I will discuss parity violation in the early universe. I'll outline a no-go theorem that states that vanilla inflation cannot produce parity-violating inflationary correlators, then show how including additional massive states in the early universe can yield non-zero signals that take an intriguing factorised form. For example, the parity odd four-point function of scalar perturbations can be written in terms of bispectra and power spectra. Such a correlator-to-correlator factorisation formula holds for general kinematics and is in principle a testable relation that can be used to determine some fundamental properties about inflation.

Presenter: STEFANYSZYN, David (University of Nottingham)

Session Classification: Morning session 1

Contribution ID: **10**   Type: **not specified**

From Holographic Correlators in the Sky to Euclidean AdS

Wednesday 12 February 2025 14:15 (45 minutes)

Presenter: SLEIGHT, Charlotte (University of Naples)

Session Classification: Afternoon session 1