34th Chris Engelbrecht Summer School & 8th Mandelstam Theoretical Physics (MITP) School and Workshop on 'Large N and the Emergence of Holography'

Thursday 8 January 2026 - Wednesday 14 January 2026

NITheCS, Merensky Building,Stellenbosch University

Scientific Programme

Lorenzo Di Pietro (Trieste University, Italy)
Pedagogical Lecture 1 Title: QFT in AdS: Kinematics
Abstract: AdS geometry: bulk and boundary; Isometry constraints on correlation functions; Bulk state / Boundary operator correspondence; Boundary operator product expansion

Lorenzo Di Pietro (Trieste University, Italy)
Pedagogical Lecture 2 Title: QFT in AdS: Dynamics
Abstract: OPE decomposition of bulk 2 pt functions and boundary 4pt functions; Example of the free scalar; Example of the O(N) model: various phases and their boundary interpretation.

Lorenzo Di Pietro (Trieste University, Italy)
Research Seminar Title: The AdS perspective on Confinement
Abstract: I will discuss four dimensional non-abelian gauge theories in the background of Anti-de Sitter space. I will review how, imposing a Dirichlet boundary condition at small radius, there is a deconfinement/confinement transition as the radius is increased, while imposing a Neumann boundary condition a continuous extrapolation to the flat space limit is expected. I will then review recent investigations of this setup using both perturbation theory and nonperturbative methods.

Seok Kim (Seoul National University, China)
Pedagogical Lecture 1 Title: Hairy black holes in AdS
Abstract: I will talk about the black hole instabilities in AdS and the new hairy black hole configurations which we suggest to be the endpoints. Based on these findings, I will suggest better pictures on the spectral/entropic structures of the AdS quantum gravity.

Seok Kim (Seoul National University, China)
Pedagogical Lecture 2 Title: Black hole microstates from cohomologies and their applications
Abstract: I will explain the cohomology program for the BPS black hole states in AdS/CFT. After explaining its general structures and examples, I will explain how to better understand the hairy BPS black hole states in this setup.

Seok Kim (Seoul National University, China)
Research Seminar Title: BPS phases and fortuity in ABJ higher spin holography
Abstract: I will explain the large N BPS phases of the ABJ vector Chern-Simons model dual to a higher spin gravity, from the saddle points of its index. Their physical aspects are discussed from the viewpoint of trace relations and fortuitous operators. I will compare them with the AdS string theory and its black holes.

Costis Papageorgakis (Queen Mary University London, UK)
Pedagogical Lecture 1 Title: TBA
Abstract: TBA

Costis Papageorgakis (Queen Mary University London, UK)
Pedagogical Lecture 2 Title: TBA
Abstract: TBA

Costis Papageorgakis (Queen Mary University London, UK)
Research Seminar Title: Deep Finite Temperature Bootstrap
Abstract: We introduce a novel method to bootstrap crossing equations in Conformal Field Theory and apply it to finite temperature theories on S1×Rd−1. Traditional bootstrap approaches relying on

positivity constraints or truncation schemes are not applicable to this problem. Instead, we capture infinite towers of operators using suitable tail functions, which are bootstrapped numerically together with explicit CFT data. Our method employs three key ingredients: the Kubo-Martin-Schwinger (KMS) condition, thermal dispersion relations, and Neural Networks that model spin-dependent tail functions. We test the method on Generalized Free Fields and apply it to bootstrap double-twist thermal data in holographic CFTs.

Xinan Zhou (Shanghai Technical University, KITP - UCAS, China)
Pedagogical Lecture 1 Title: Holography, bootstrap and defects
Abstract: In this series of lectures (and seminar) I will cover the following. I will discuss the basics of perturbation theory in AdS and how bootstrap ideas can be used to efficiently compute holographic correlators. The example of 4d N=4 SYM in the dual supergravity limit will be analyzed in detail. I will also discuss how the bootstrap approach can be extended to include holographic defects. In particular, I will present the recent progress on giant graviton correlators.

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Tarek Anous (Queen Mary University London, UK)
Pedagogical Lecture 1 Title: QFT in dS: The basics
Abstract: In this lecture we will introduce basic facts about QFT in de Sitter, highlighting the main differences with its flat-space counterpart. We will start by discussing the geometry of dS, its isometries, and the admissible particle representations. We will also discuss the maximally analytic vacuum of any interacting QFT: the Bunch Davies state.

Tarek Anous (Queen Mary University London, UK)
Pedagogical Lecture 2 Title: QFT in dS: The Issues
Abstract: The focus of this lecture will be on the various issues that arise when working with interacting QFTs on de Sitter using perturbation theory. Time permitting, we will also discuss the Euclidean approach to de Sitter QFT.

Tarek Anous (Queen Mary University London, UK)
Research Seminar Title: The case for integrability in dS
Abstract: In this lecture we will present what can be learned from exactly solvable models on de Sitter, working through examples.

Programme