

2022 Jacques Solvay International Chair in Physics



Professor Juna Kollmeier

Canadian Institute for Theoretical Astrophysics, Toronto

Inaugural Lecture on Tuesday 28 June at 4:00 P.M.

Mapping Our Universe: The Sloan Digital Sky Survey

For millennia, humans, limited by the optics of their eyes and the reach of their feet evolved beautifully to probe the Earth and its contents. This changed only recently, but dramatically, when humanity mastered optics, gravity, and quantum mechanics. Today, we survey the skies at all wavelengths and in all directions. This great capacity to map the heavens, has brought new challenges. What are we learning about the universe, its fundamental structure, and our place within it? I will present what we have learned from the Sloan Digital Sky Survey --- the largest map of the cosmos to date. I will describe its fifth phase, mapping of over six million objects, from stars, to black holes, to Galaxies. SDSS is designed to decode the history of the Universe and the galaxies within it, trace the emergence of the chemical elements, reveal the inner workings of stars, and investigate the origin of planets. I will explain why we do this and how taking on this massive, complex, and seemingly esoteric undertaking, humanity ultimately benefits. While our place in the cosmos is not special, it is precious and this inaugural lecture will explore the underpinnings of how we understand physical reality and why it is so critically important at this point in the evolution of our species.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M. AND DRINKS AT 5:00 P.M IN FRONT OF THE SOLVAY ROOM

Lecture 1 on Monday 27 June at 11:00 A.M.

Astrophysical Foundations I: Stellar Astrophysics and Supermassive Black Holes

Stellar and black hole astrophysics are both currently in a wonderful period of scientific explosion. Stars and black holes, in many ways, form the bedrock of our astrophysical knowledge base. And yet, we still have critical uncertainty about how stars and black holes form and critical uncertainty about their evolution during different phases. I will discuss these puzzles where I believe there is the opportunity for transformative change over the next 5 years.

Lecture 2 on Wednesday 29 June at 11:00 A.M.

Astrophysical Foundations II: Galaxies and Cosmology

In this lecture, I will move to the larger scales of galaxies and cosmology. I will discuss the state-of-the-art in these areas and my work related to each. I will describe what the era of precision cosmology has told us about our universe, and what it has not yet revealed. I will highlight the puzzle of why galaxies are so dark and go over possible changes to the cosmic picture that could be probed within the next 15 years. I will challenge the audience to "think big" while also thinking deeply about these puzzles.

**SOLVAY ROOM - UNIVERSITÉ LIBRE DE BRUXELLES - CAMPUS PLAINE - BOULEVARD DE LA PLAINE
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