

ICTS MONTHLY COLLOQUIUM

Deriving Gauge-String Duality

Gauge (or Yang-Mills) theories are the building blocks of our current physical understanding of the universe. In parallel, string theory is a framework for a consistent quantum description of gravity. Gauge-String duality a.k.a. the AdS/CFT correspondence proposes a remarkable connection between these two very different classes of theories. I will begin by discussing why it is important to arrive at a first principles understanding of the underlying mechanism of this duality relating quantum field theories and string theories (or other theories of gravity). I will then proceed to discuss a very general approach which aims to relate large N QFTs and string theories, starting from free field theories. This corresponds to a tensionless limit of the dual string theory on AdS spacetime. Finally, I will discuss specific cases of this limit for 3d AdS (dual to 2d CFT) and 5d AdS (dual to 4d Super Yang-Mills theory), where one has begun to carry this program through to fruition, going from the string theory to the field theory and vice versa.



Rajesh Gopakumar

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Rajesh Gopakumar's interests are in theoretical physics, primarily at the intersection of quantum field theory and string theory. His research aims to understand why string theory is a natural framework for describing a variety of phenomena. A large part of his recent research has focused on deciphering the AdS/CFT correspondence. He is particularly known for proposing the Gopakumar–Vafa duality and Gopakumar–Vafa invariants.

Rajesh Gopakumar did his Phd at Princeton University under the supervision of David Gross. After being a research associate at Harvard University, he moved to Harish-Chandra Research Institute in 2001 as an Associate Professor and then Professor. He is recipient of several awards, including the ICTP Prize - in honour of G. C. Wick (2006), the S.S. Bhatnagar Award (2009), the Swarnajayanthi Fellowship (2006), the J. C. Bose Fellowship (2015), the G. D. Birla Prize (2013) and the TWAS Prize in the Physical Sciences (2013).

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 Zoom link: <https://rb.gy/mwfiff>

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