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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Synopsis Seminar

Title : An Exterior Field Theory for Hawking Radiation

Speaker : Godwin Martin (ICTS-TIFR, Bengaluru)

Date : Thursday, 10 September 2026

Time : 10:00 AM – 11:30 AM (IST)

Abstract : Classically, a black hole only absorbs; anything crossing its horizon is lost forever. Quantum mechanically, Hawking showed that it also radiates at a temperature set by its mass. Fields and particles outside a black hole therefore behave like an open system in contact with a bath, i.e., they dissipate into the horizon and are stochastically kicked around by the outgoing radiation. This raises a natural question: can the interior be integrated out, leaving a field theory that lives purely outside the horizon? In this talk, I will show that for scalar and Yukawa theories on an AdS_{d+1} black brane, the answer is yes. The gravitational Schwinger-Keldysh (grSK) construction, which computes real-time correlators on a doubled geometry, collapses onto a single copy of the exterior, giving explicit Feynman rules built from causal propagators with vertices dressed by thermal occupation factors. I will describe how this picture extends to fermions and to arbitrary loop order.

Venue : Feynman Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/92020032996?pwd=8whxbes4jMcuxZf98nZXDvF7NrKOfb.1>

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