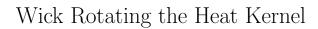# Wick Rotating the Heat Kernel

Rudrajit Banerjee

OIST

While the heat semigroup and kernel on L^2 spaces associated to the Dirichlet Laplacian on Riemannian manifolds is a central object in many areas of mathematics, much less is known about a suitable analogue for Lorentzian signature pseudo-Riemannian manifolds. Aiming at such a construction, I will introduce a family of real manifolds, each with a complexified metric tensor, that interpolates between a foliated globally hyperbolic Lorentzian signature manifold and a foliated Riemannian manifold (a variant of the "Wick rotation" from theoretical physics). I will report on the construction and properties of a generalized diffusion/heat semigroup and kernel on this family of manifolds, which indeed generalizes many of the well-known aspects of the familiar heat operator, including its smoothening property, to this broader setting. Time permitting, I will comment on the strict Lorentzian signature limit.