

# *Departmental Colloquium*

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2 pm in HH-3017*

*Kähler metrics via Lorentzian geometry in dimension 4*

**Abstract:**

Given a Lorentzian 4-manifold  $(M, g)$  with two distinguished vector fields satisfying properties determined by their shear, twist and various Lie bracket relations, a family of Kähler metrics  $g_K$  is constructed on  $M$ . Under certain conditions  $g$  and  $g_K$  share various properties, such as a Killing vector field or a vector field with geodesic flow. The Ricci and scalar curvatures of  $g_K$  are computed in some cases in terms of data associated to  $g$ ; in certain cases the Kähler manifold  $(M, g_K)$  will be complete and Einstein. Many classical spacetimes fit into this construction: warped products, for instance de Sitter spacetime, as well as gravitational plane waves and metrics of Petrov type  $D$ , such as Kerr and NUT metrics. This work is joint with Gideon Maschler.