

On transport twistor spaces

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Abstract: For 2-dimensional Riemannian manifolds there is a rich interplay between the geodesic transport equation on the unit tangent bundle and Fourier analysis in the vertical fibres. This interplay has shaped the understanding of many geometric inverse problems and rigidity questions since the late 1970s. The transport twistor space is a (degenerate) complex 2-dimensional manifold Z which encodes this interplay and sheds new light on numerous aspects of the transport equation by translating them into a complex geometric language. The focus of the talk will lie on these novel twistor correspondences, as well as two theorems regarding the algebra of holomorphic functions on Z in the case of closed surfaces and the (lack of) holomorphic vector bundles on Z in the case of simple surfaces, both of which solve an open problem for the transport equation. This is based on joint work with Thibault Lefeuvre and Gabriel Paternain.