MANIFOLDS OF SIGNATURE (3,2) WITH TWISTOR SPINORS - HOLONOMY AND INDUCED 2-DISTRIBUTIONS

MAX FRANKS

Let S^g be the spin bundle of a semi-Riemannian manifold (M^n, g). Twistor spinors are defined as those spinor fields $\varphi \in \Gamma(S^g)$ that are contained in the kernel of the twistor operator $\mathcal{P}^g$. Equivalently, they are defined by the twistor equation

$$\nabla_X \varphi + \frac{1}{n} X \cdot \mathcal{D}^g \varphi = 0 \quad \forall\, X \in TM.$$

Twistor spinors are objects of conformal spin geometry, often they are referred to as conformal Killing spinors: If $\varphi \in \Gamma(S^g)$ is a twistor spinor with respect to a certain metric g, then $\lambda^{\frac{1}{2}}\varphi$ is a twistor spinor with respect to the conformally equivalent metric $\lambda^2 g$.

Manifolds admitting a twistor spinor have already been classified in the Riemannian, the Lorentzian and the signature (2,2) case. In this talk, we will examine the signature (3,2) case. Recently, it has been shown by Katja Sagerschnig and Matthias Hammerl that in the case of the existance of a twistor spinor satisfying an additional but relatively weak condition, i.e. *genericity*, the underlying geometry is already determined.

The only class of manifolds in signature $(3, 2)$ admitting such a twistor spinor are the so-called Fefferman type constructions in the sense of A. Cap. In this talk we will characterize signature $(3, 2)$ manifolds carrying a generic twistor spinor by their conformal holonomy and show how such a twistor spinor induces a generic 2-distribution - an object of great relevance for the above mentioned Fefferman type constructions.