

"Optimal Metrics, 4-Manifolds, and Complex Singular Spaces"

(Preliminary title)

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A Riemannian metric on a smooth compact 4-manifold is called OPTIMAL if it is "as flat as possible", in the sense of minimizing the L^2 norm of the curvature tensor. I will present some new constructions of such metrics via twistor correspondences and deformations of singular varieties. One consequence is a complete topological classification of those simply connected 4-manifolds which admit a special class of optimal metrics called scalar-flat anti-self-dual metrics. However, the same circle of ideas also shows that vast numbers of smooth compact 4-manifolds simply do not admit optimal metrics at all.