

Riemannian Yang-Mills connections on four-manifolds

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We describe a step towards classifying compact four-dimensional Riemannian manifolds in which the curvature tensor R has $\operatorname{div} R = 0$ (so that it is harmonic as a 2-form valued in 2-forms) or - equivalently - the Ricci tensor satisfies the Codazzi equation. Known examples form five (non-disjoint) classes, in which the metric is, respectively, Einstein; conformally flat with constant scalar curvature, locally reducible (of types 1+3 or 2+2); and a 2+2 warped product. The talk presents work in progress, joint with Paolo Piccione, showing how the classification question for such manifolds that lie outside of these five classes is reduced to a problem in real algebraic geometry.