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Metrics of positive Ricci curvature on connected sums

Given a collection of Riemannian manifolds (M_i^n, g_i) with positive Ricci curvature, one would like to know when the connected sum of these manifolds also admits a metric of positive Ricci curvature. Using a gluing construction for Ricci-positive manifolds with boundary and a technical construction of a particular metric on S^n (for $n \geq 4$), Perelman showed that in order to construct a Ricci-positive metric on the connected sum it suffices to construct a Ricci-positive metric on $M_i^n \setminus D^n$ with round, convex boundary. For a given manifold, the existence of such a metric is far from obvious, and the only manifolds previously known to admit such metrics are spheres and projective spaces. In this talk, we will show that the class of manifolds that admit such metrics is closed under linear sphere bundles (with fiber dimensions 3 or more). In particular this shows that there are Ricci-positive metrics on the connected sum of any products of spheres (provided the dimensions are 3 or more) and also gives some new examples of exotic smooth structures supporting metrics of positive Ricci curvature. This construction requires a generalization of Perelman's gluing theorem for Ricci-positive manifolds with corners as well as an isotopy-implies-concordance result for positive Ricci curvature.