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Positive scalar curvature on foliations. (English) Zbl 1404.53038

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Summary: We generalize classical theorems due to Lichnerowicz and Hitchin on the existence of Riemannian metrics of positive scalar curvature on spin manifolds to the case of foliated spin manifolds. As a consequence, we show that there is no foliation of positive leafwise scalar curvature on any torus, which generalizes the famous theorem of Schoen-Yau and Gromov-Lawson on the nonexistence of metrics of positive scalar curvature on torus to the case of foliations. Moreover, our method, which is partly inspired by the analytic localization techniques of Bismut-Lebeau, also applies to give a new proof of the celebrated Connes vanishing theorem without using noncommutative geometry.

MSC:

53C12 Foliations (differential geometric aspects)

Keywords:

Connes fibration; foliation; scalar curvature; sub-Dirac operator

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