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**Igor Prokhorenkov\*** ([i.prokhorenkov@tcu.edu](mailto:i.prokhorenkov@tcu.edu)), Department of Mathematics, TCU Box 298900, Fort Worth, TX 76129, and **Ken Richardson** ([k.richardson@tcu.edu](mailto:k.richardson@tcu.edu)), Department of Mathematics, TCU Box 298900, Fort Worth, TX 76129. *Witten deformation of transversal Dirac operators*. Preliminary report.

We classify Witten deformations of transversal Dirac operators on Riemannian foliations. We apply results to obtain information about the index of basic Dirac operators in terms of geometric invariants of the foliation. (Received July 14, 2012)