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Fuzzy Geometries with an Internal Space

The product of a non-commutative matrix spectral triple with a simple two-dimensional internal space is considered. The inner fluctuations of a vacuum Dirac operator are calculated, using the standard technique of Connes' one-forms. This results in the non-commutative analogue of a gauge field, as expected, and also fluctuations of the spacetime geometry. In addition, the fluctuations include a derivative operator that depends on the particle charge.