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Degenerate Kerr vacuum and a D-brane correction

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We revisit an effective curvature formalism underlying a two form in a $U(1)$ gauge theory on a D4-brane in presence of a background black hole metric. Alternately the scenario may be analysed in presence of an extra fifth dimension transverse to a vacuum created gravitational pair of 3-brane and anti 3-brane by the Kalb-Ramond quanta. Interestingly an electric (non-linear) charge independence of an event horizon in a “Kerr-Newman” brane universe is shown to describe a degenerate brane vacuum. In a low energy limit the electric charge regains significance at the expense of the degeneracy. In the limit the brane universe is shown to reduce to a typical 4D Kerr-Newman black hole in presence of an extra fifth hidden dimension. It is argued that a D-brane correction, underlying a propagating torsion, becomes insignificant in a low energy limit. Our analysis reveals that a degenerate “Kerr brane” may be viewed as a low energy perturbative string vacuum in presence of a non-perturbative correction.

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