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Mass, gauge conditions and spectral properties of the Sen-Witten operator in closed universes

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A non-negative expression, built from the norm of the 3-surface twistor operator and the energy-momentum tensor of the matter fields on a spacelike hypersurface, is found which in the asymptotically flat/hyperboloidal case povides a lower bound for the ADM/Bondi-Sachs mass, while on closed hypersurfaces gives the first eigenvalue of the Sen-Witten operator. Also in the closed case, its vanishing is equivalent to the existence of non-trivial solutions of Witten's gauge condition. Moreover, it is vanishing if and only if the closed data set is in a flat spacetime with spatial topology $S^1\times S^1\times S^1$. Thus, it provides a positive definite measure of the strength of the gravitational field (with physical dimension mass) on closed hypersurfaces, i.e. some sort of the total mass of closed universes. Reference: Class. Quantum Grav. 29 (2012) 095001, or arXiv:1112.2966v2[gr-qc]