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A new mean curvature proof of the spacetime positive mass theorem

We describe recent joint work with Michael Eichmair, Lan-Hsuan Huang, and Dan Lee. The original Schoen/Yau mean curvature proof of the general positive mass theorem only gave directly the positivity of energy. We give a direct proof of the timelike character of the total energy momentum vector using the MOTS equation. We also improve the density theorems for initial sets satisfying the dominant energy condition.