On the Limits of General Relativity for UAP Metric Engineering

Jack Sarfatti. June 12, 2026

Doctor of Philosophy (Ph.D.) at University of California CEO Internet Science Education Project (Foundation)

The classical energy and singularity theorems in 1915 General Relativity (GR) — the local gauge theory of the Lorentz group SO(1,3) — have a well-defined but limited domain of validity.

Domain of Validity in Standard GR (SO(1,3))

GR, as formulated by Einstein in 1915, is a classical field theory where gravity emerges from the curvature of spacetime via the Einstein field equations, with the Levi-Civita connection (torsion-free). It is the local gauge theory associated with the 6-parameter Lorentz group SO(1,3) (rotations and boosts), acting on the tangent spaces.

Key theorems include:

- **Singularity Theorems (Penrose 1965, Hawking, Geroch, etc.)**: These prove geodesic incompleteness (singularities) under certain conditions. For example, Penrose's theorem shows that a trapped surface (where outgoing light rays converge) plus the **weak energy condition** (WEC: energy density ≥ 0 for all observers, ensuring gravity is attractive) implies future-directed null geodesics are incomplete. The Hawking-Penrose theorems extend this to cosmological and collapse scenarios using the **strong energy condition** (SEC) or similar, plus generic conditions and causal structure assumptions (e.g., no closed timelike curves).130
- **Energy Theorems/Positive Energy Theorems**: These establish that the total energy (ADM mass or similar) of an asymptotically flat spacetime is non-negative, and zero only for flat Minkowski space (under dominant energy condition or similar). Proofs by Schoen-Yau and Witten rely on the geometry and energy conditions.46

Domain of validity:

- **Classical regime**: Macroscopic scales, weak-to-moderate curvatures (away from Planck scale), where quantum gravity effects are negligible.
- **Energy conditions**: WEC, SEC, null energy condition (NEC), etc., which encode “reasonable” matter (no exotic negative energies dominating).
- **Global causal structure**: Global hyperbolicity, no CTCs, appropriate topology/asymptotics.
- **Torsion-free metric connection**: Pure curvature from mass-energy via Einstein equations.
- **Limitations**: These theorems assume the Einstein equations hold exactly with the standard stress-energy tensor. They break down near singularities (where curvature → ∞, GR itself fails), in quantum regimes (e.g., black hole evaporation via Hawking radiation), with violations of energy conditions (e.g., for wormholes or warp drives), or if torsion/non-metricity is present. They are “generic” results but not universal; exact solutions like Schwarzschild have singularities, but the theorems highlight their inevitability under broad assumptions.15

They demonstrate that singularities (e.g., in black holes or the Big Bang) are robust predictions of classical GR, not artifacts of symmetry.

In Jack Sarfatti’s Larger SO(2,4) Local Gauge Theory

Sarfatti extends GR by promoting it to a **local gauge theory of the full 15-parameter conformal group SO(2,4) ≅ SU(2,2)**(or related structures like the Penrose twistor conformal group). This includes the Poincaré subgroup (translations + Lorentz SO(1,3)) plus dilations and special conformal transformations. It incorporates **propagating torsion** (from local gauging of translations, as “dislocation defects” sourced by spin densities, e.g., in metamaterials) alongside curvature (“disclination defects”).3540

This framework aims at **UAP metric engineering** (low-power warp drives, stargates, gravity control) via enhanced couplings (e.g., G* >> G in certain sectors), non-equilibrium phases in materials, and modifications to the field equations (e.g., involving spin-squared terms or conformal factors). It draws on Noether’s theorems for global/local symmetries and conservation laws.57

Classically:

- The larger symmetry group and additional fields (torsion, conformal factors, possible non-metricity) provide extra “degrees of freedom” or mechanisms to evade or resolve the incompleteness that defines singularities in SO(1,3) GR.
- Energy conditions can be effectively violated or modified locally (e.g., via metamaterial-induced torsion or amplified couplings), allowing exotic metrics (warp bubbles, traversable wormholes) with lower or positive energy requirements.
- Singularity theorems like Hawking-Penrose do **not hold in their strong generic form** as fundamental statements; they are seen as artifacts of the truncated

SO(1,3) theory. Conformal freedom, torsion, and modified dynamics can prevent geodesic incompleteness or "resolve" singularities (e.g., via bounce-like behavior or finite curvature). Positive energy results may also be altered due to new contributions to the effective stress-energy.5657

- Metric engineering becomes feasible: Control curvature + torsion with practical energy inputs (e.g., via spin-torsion coupling in condensed matter), enabling UAP-like maneuvers without Jupiter-mass negative energies.

Quantum Mechanically:

- The theory aligns with post-quantum or emergent gravity ideas, incorporating quantum spin sources for torsion, macro-quantum coherence (e.g., Frohlich condensates), and possible retrocausality or holographic principles.
- Singularities are expected to be resolved by quantum effects (as in standard quantum gravity expectations), but here the classical extension already mitigates them, with quantum corrections (e.g., Hawking radiation analogs, vacuum coherence) further smoothing or engineering the geometry.
- It unifies aspects with the Standard Model (e.g., parity violation via SO(2,4) subgroups) and allows low-energy control of gravity-like effects, potentially explaining UAP observations through engineered spacetime metamaterials.26

In summary, Sarfatti's SO(2,4) framework treats standard GR theorems as valid approximations within their narrow domain (torsion-free, energy-condition-satisfying classical solutions) but incomplete for a fuller theory. The extended gauge structure and dynamics generically allow evasion of singularities and exotic engineering, both classically (via new fields/symmetries) and quantum mechanically (via spin/coherence effects). This remains a speculative but coherent research program aimed at bridging GR, quantum theory, and advanced propulsion. For precise mathematical details, consult Sarfatti's papers on Academia.edu.