

Quantum matter and Buchdahl's theorem.

Very compact stars seem to be forbidden in General Relativity. While Buchdahl's theorem sets an upper bound on compactness, further no-go results rely on the existence of two light rings, the inner of which is associated to gravitational instabilities. However, little is known about the role of QFT in these strong gravity regimes. We show that the renormalized stress tensor for CFTs diverges faster than the classical source as the star's surface approaches the Buchdahl radius rather than the Schwarzschild radius. The backreaction of quantum fields in this regime therefore cannot be ignored.

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