

Semiclassical gravity in the far field of stars and black holes

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In semiclassical gravity, the expectation value of the stress-energy operator $\langle T_{\mu\nu} \rangle$ is an infinite quantity. To avoid having to renormalize it, one can calculate the difference in $\langle T_{\mu\nu} \rangle$ between a pair of quantum states in such a manner that the divergent parts cancel. However, another technique explored more recently is to take the difference in $\langle T_{\mu\nu} \rangle$ between two different spacetimes, while in the same quantum state. I will summarize prior work on this method and detail how we have applied it to calculate the difference $\Delta \langle T_{\mu\nu} \rangle$ between the spacetimes of a non-Newtonian star and a Schwarzschild black hole.

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