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Energetics of a self-gravitating quantum system of charged particles

The General Theory of Relativity(GTR), Quantum Field Theory(QFT) and Newtonian Quantum Gravity(NQG) are three alternative approaches to study Full Quantum Gravity(FQG). We investigate a system of self-gravtitating fermionic particles with small but significant charges using the NQG model. We derive the equation for ground state energy by adding the energy resulting from charges to the total energy and using uncertainty relation. Then incorporating special relativistic effects, we derive the radius of a non-singular charged compact object. We show an intriguing comparison between our result and the Reissner-Nordstorm black hole obtained from GTR. We also explore the additional results like Hawking temperature and Buchdahl limit.

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