Why You'll Never Find Gravity in QFT

Terry Bollinger
2022-10-01.17:00 EDT Sat

Why has it proven so difficult to add gravity to Quantum Field Theory (QFT)?

It's for the same reason that it's hard to find houses inside bricks. Houses are defined by relationships *between* bricks, not inside them. The bricks provide the solid, well-defined building blocks to construct such higher-level edifices. They also define the lowest level of resolution possible when describing such edifices. Low-energy quantization of sound thus is a better model for modeling gravity than unrealistic, ether-inspired "Planck" energies.

QFT similarly defines the smallest spacetime blocks, better known as inertial frames. QFT inertial frames are not your father's inertial frames, however. QFT frames consist of finite-volume collections of matter, energy, and fields, all bound together, or at least informed of each other's presence, by the ether-like rules of quantum field theory. QFT frames are hierarchical, multi-scale, entangled, and, most interestingly, subject to the same rules of Planck uncertainty as individual particles. A photon traversing the universe thus is, by itself, an example of a relativistic inertial frame, but one whose total energy is so low that its uncollapsed location quickly grows uncertain relative to other, more massive inertial frames of the universe, from dust through supermassive black holes [1].

The merging of two QFT "ethers" is known as quantum wave collapse. While such mergers require an exchange of at least a tiny bit of momentum and energy, the energy part of this exchange grows asymptotically small as the QFT frames grow closer to each other in the coordinates of special relativity. This asymptotic limit is what we call "information," though a more precise model is a prolific and continual exchange of low-cost momentum packets, which result in mutual "observation" by the two QFT frames. We call the resulting runaway explosion of internal location information "classical matter" and observe the quantum side only by first carefully peeling away most exchanges.

So, where is gravity in all of this? It resides in the long-range mathematics of a simplified version of QFT that respects the energy-minimization nature of rest-frames views. There is still a quantization to be had there, but it is one *between* QFT frames, not within them.

---

[1] In terms of classical space locations, supermassive galactic black holes are necessarily the most precisely located entities in the universe. They serve not only as gravitational anchors for lesser frames but also as spacetime anchors to which other lesser entities can attach their relative locations. Internally, black holes differ most from ordinary objects in the dominance of a momentum space in their internal QFT coordinates.

2022-10-01.17.00 EDT Sat
PDF: https://sarxiv.org/apa.2022-10-01.1700.pdf