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Proper Time Oscillator

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We show that a proper time oscillator can mimic a point mass at rest in general relativity. The spacetime outside a proper time oscillator is a Schwarzschild field. Extending the concepts, we find that a matter field with proper time oscillations is a quantized field. The particles observed are proper time oscillators. In motion, the proper time oscillation translates to oscillations in both time and space. To test the theory, we propose to study the uncertainty of a neutrino's arrival time.

References

- [1] Yau, H. Y.: Schwarzschild field of a proper time oscillator. *Symmetry* 12(2), 312 (2020)
- [2] Yau, H. Y.: Thin shell with fictitious oscillations", in *Spacetime Physics 1907 – 2017*, Chapter 6 (Minkowski Institute Press, Montreal, 2019)
- [3] Yau, H. Y.: Proper time operator and its uncertainty relation. *J. Phys, Commun.* 105001 (2021)
- [4] Yau, H. Y.: Self-adjoint time operator in a quantum field. *J. Quant. Info.* 1941016 (2020)
- [5] Yau, H. Y.: Time and space symmetry in a quantum field. *J. Phys.: Conf. Ser.* 1194, 012116 (2019)
- [6] Yau, H.Y.: Temporal vibrations in a quantized field. In: Khrennikov, A., Toni, B. (eds.) *Quantum Foundations, Probability and Information*, pp. 269. Springer-Verlag, Heidelberg (2018)