As an extension of Gabor signal processing, the covariant Weyl-Heisenberg integral quantization is implemented to transform functions on the eight-dimensional phase space (x,k) into Hilbertian operators. The $x=(x^\mu)$ are space-time variables and the $k=(k^\mu)$ are their conjugate wave vector-frequency variables. The procedure is first applied to the variables (x,k) and produces canonically conjugate essentially self-adjoint operators. It is next applied to the metric field $g_{\mu\nu}(x)$ of general relativity and yields regularised semi-classical phase space portraits of it. The latter give rise to modified tensor energy density. Examples are given with the uniformly accelerated reference system and the Schwarzschild metric. Interesting probabilistic aspects are discussed.

Bibibliography

• H. Bergeron and J.-P. Gazeau, Integral quantizations with two basic examples, Ann. Phys. 344 43 (2014).

• J.-P. Gazeau, From classical to quantum models: the regularising rôle of integrals, symmetry and probabilities, Found. Phys. 48 1648-1667 (2018); arXiv:1801.02604.

• J.-P. Gazeau and C. Habonimana, Signal analysis and quantum formalism: Quantizations with no Planck constant, In: Boggiatto P. et al. (eds) Landscapes of Time-Frequency Analysis. Applied and Numerical Harmonic Analysis. Birkhauser, Cham. (2020) https://doi.org/10.1007/978-3-030-56005-8_8

• G. Cohen-Tannoudji, J.-P. Gazeau, C. Habonimana, and J. Shabani, Quantum Models à la Gabor for the Space-Time Metric, Entropy 2022, 24(6), 835; https://doi.org/10.3390/e24060835