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A geometric Weyl quantization and asymptotics of natural operators on pseudo-Riemannian manifolds

On flat space $\mathbb{R}^d$, several distinguished quantizations are available. One can argue that the Weyl quantization is the most natural choice and that it has the best properties (e.g., symplectic covariance, real symbols correspond to Hermitian operators). On a generic manifold, there is no distinguished quantization, and a quantization is typically defined chart-wise.

In this talk I will present a quantization that, we believe, has the best properties for studying natural operators on pseudo-Riemannian manifolds. I will also describe the application of this quantization to the computation of the asymptotics of the heat semigroup $\mathrm{e}^{t\Delta}$ and the Green operator $(\Delta + m^2)^{-1}$, as well as their Lorentzian counterparts, the proper time dynamics $\mathrm{e}^{\mathrm{i}s\Box}$ and the Feynman propagator $(\Box - \mathrm{i}0)^{-1}$.

Joint work with J. Dereziński and A. Latosiński.