

Abstract

We start with a review of the basic setting of Covariant Quantum Mechanics in a curved spacetime equipped with absolute time and a Riemannian spacelike metric.

Then, we discuss the Lie algebras of infinitesimal symmetries of the main covariant geometric objects of covariant quantum mechanics: the time form, the hermitian metric, the upper quantum connection, the quantum lagrangian. Indeed, these infinitesimal symmetries are generated, in a covariant way, by the Lie algebra of time preserving conserved special phase functions. Actually, this Lie algebra of special phase functions generates also the Lie algebra of infinitesimal symmetries of the main classical objects: the time form and the cosymplectic 2-form. A natural output of the classification of the quantum symmetries is a covariant approach to quantum operators.

Further, we discuss the classical and quantum currents associated with special phase functions. Actually, the well known probability current turns out to be a very particular case of the above approach to quantum currents.