1165-83-304 **Maik Reddiger*** (maik.reddiger@ttu.edu) and **Bill Poirier**. *On a rigorous Framework for a Quantum N-Body Theory on curved Spacetime.* Preliminary report.

We begin by showing how to generalize the mathematical spacetime concept to the case of N bodies, $N \in \mathbb{N}$. The physical justification of the definition lies in the fact that it provides an adequate setting both for the description of point masses and for a 'natural' relativistic generalization of the quantum-mechanical N-body Born rule. Regarding the latter, we show how the conservation of probability is mathematically tied to the validity of a scalar many-body continuity equation—as one would a priori expect. If it holds, the integrand for calculating the respective detection probability turns out to be an absolute invariant (in the sense of Poincaré-Cartan), so that a 'preferred spacetime splitting' is not required. The formalism overcomes some conceptual problems of related approaches in the literature, including the use of non-canonical geometric structures and overly restrictive causal/topological conditions (see Reddiger & Poirier, ArXiv:2012.05212 [Math-Ph] (2020)). (Received January 19, 2021)