At the same time, and from a physical point of view, the unreasonableness and unphysicality of the locally Euclidean topological (C^0) and differential (C^\infty) manifold model M for spacetime is especially pronounced when one considers:

- (a) **Pointedness of events:** M's pathological nature in the guise of singularities that plague general relativity—the classical theory of gravity—which are mainly due to the geometric point-like character of the events that constitute it, as well as due to the algebras of C^\infty-smooth functions employed to coordinatize these point events [48] (and also due to (b) next).

- (b) **Continuous infinity of events:** M's problematic nature due to the fact that one can in principle pack an uncountable infinity of the aforementioned point events in a finite spacetime volume resulting in the non-renormalizable infinities that impede any serious attempt at uniting quantum mechanics with general relativity (at least at the 'calculational' level).\(^2\)

- (c) **Non-dynamical and non-quantal topology:** Its non-variable and non-quantal nature when one expects that at Planck scales not only the spacetime metric, but also that the spacetime topology partakes into quantum phenomena [80]. That is to say, it is a dynamically variable entity whose connections engage into coherent quantum superpositions. We may distill this by saying that the manifold topology is, quantally speaking, an unobservable entity not manifesting quantum dynamical fluctuations or interference between its defining connections [62, 58]—a rigid substance, once and forever fixed by the theorist, that is not part of the dynamical flux of Nature at microscopic scales.\(^3\)

Furthermore, the (algebras of) commutative C^\infty-determinations of the manifold’s point events indicate another non-quantal (classical) feature of the spacetime manifold [61, 48].

- (d) **Additional structures:** M’s need of extra structures required to be introduced by hand by the theorist and not being ‘naturally’ related to the topological manifold (i.e., the C^0-continuous) one. Such structures are the differential (i.e., the C^\infty-smooth) and Lorentzian metric (i.e., the smooth metric field g_{\mu\nu} of absolute signature 2) ones [5], and they are implicitly postulated by the general relativist on top of M’s fixed continuous topology in order to support the apparently necessary full differential geometric (i.e., Calculus based) panoply of general relativity. The 4-dimensional, C^\infty-smooth Lorentzian manifold assumption for spacetime concisely summarizes the kinematics of general relativity [73, 47, 62, 48].