Qeios

Peer Review

Review of: "The Sagnac Effect and General Relativity Foundations"

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Dear Justo,

I totally agree with you that the analysis of Engelardt is flawed. He unfortunately explained the effect by misapplying Galilean transformations. Besides that, he did not realize that transformations are not needed at all in the classical solution, at least in the case of the first-order approximation used by Sagnac, solvable very easily with one inertial system at rest with the axis of rotation.

I agree that Langevin's approach is valid. The Einstein synchronization procedure, the basis of Special Relativity, is not applicable there. The Langevin metric is a “distorted one,” arbitrary to affirm that it is “Minkowskian flat.” If we compare it with Schwarzschild, no reference to effects of gravitation indeed, and one part is missing. Nevertheless, the part related to time is basically a dual of the part related to time in the Schwarzschild metric. Instead of upgrading SR to make things it cannot do (by following Lugunov), it is just the case to let the machinery of GR work in a more limited realm.

Besides that, it is shown by Kassner (in his paper you referred to) that the speed of light cannot indeed be measured as constant by an observer sitting on a disk in motion. I cannot see a convincing falsification of Selleri's argument either. It is, in fact, as claimed by Kassner, certainly possible to approximate an inertial system with a suitable circular motion with a sufficiently wide radius by keeping its tangential speed constant. That allows keeping the measured speed of light by the observer in motion, asymmetric eventually in any system in motion in the preferred one, which is the one at rest in static gravitation. The arguments involving the equivalence principle are more or less fine only to a first-order approximation because they are very local approximations or, better say, linearizations. Either in free fall or not, the equivalence of gravitation and a rectilinear accelerated frame is based on a homogeneous gravitational field, at variance with any existent gravitational field. The equivalence of a free fall with an inertial

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system relies on the fact that gravitation in free fall should locally disappear; again, it is a linearization more than a physical equivalence...

Declarations

Potential competing interests: No potential competing interests to declare.