

Stomachs and Butane gas cylinders can falsify Einstein's Equivalence Principle

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How can we know, in a closed lab with no windows, whether we are inside a constant accelerated rocket or at rest in the surface of a planet, feeling its gravity?

The following experiment must be performed. Consider a liquid Butane gas cylinder. Since, the Butane is stored at high pressure, part of it is liquid and the remainder is gas. So, in the surface of a planet at rest, the liquid inside the cylinder tends to be at the bottom and the gas tends to be at the top. So, 'bottom' is always the closer place in the cylinder to the center of masses of the gravitational field, whereas 'top' is the most far-off place. Now, at rest in the planet surface, you shake the Butane cylinder, such that liquid and gas get temporarily mixed. After stop shaking, you can measure the least time needed for the liquid to return back to the bottom and the gas to return back the top. Of course, there will always be a certain percentage of gas remaining within the liquid, and also a certain percentage of liquid within the gas. Anyway, call that time restoration time, and call rest places both to bottom and top.

If that experiment is performed in a constant accelerated rocket, the restoration time will be slightly larger. Why? Because in a kinematical acceleration the directions towards what we call 'bottom' and 'top' are better defined, so Butane molecules are forced by mutual collisions to move in parallel paths in the way to their respective rest places for gas and liquid states. In a planet's surface, directions toward a rest place are spanned, because the planet is not a point-like body. A way to a rest place, inside the Butane cylinder, can be found faster when there are several spanned directions to be chosen, so the shortest path in time is always chosen. IOW, in a kinematical accelerated rocket, the shortest paths in *_space_* are found toward the rest places, whereas in a lab at rest in a planet's surface, they are the shortest paths in *_time_*.

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Am I wrong? :-)

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