常量变化与 EP 违反的联系

EP[1]

WEP

1. The trajectory of a freely falling “test” body[2] is independent of its internal structure and composition.

[1] lrr-2014-4

[2] one not acted upon by such forces as electromagnetism and too small to be affected by tidal gravitational forces

常量变化与 EP 违反的联系

EP

EEP

1. The trajectories of freely falling test bodies are independent of its internal structure and composition (UFF).
2. The outcome of any local non-gravitational experiment is independent of where and when in the universe it is performed (LPI) and the velocity of the freely-falling reference frame in which it is performed (LLI).

常量变化与 EP 违反的联系

EP

SEP

1. The trajectories of freely falling self-gravitating bodies as well as test bodies are independent of its internal structure and composition.

2. The outcome of any local test experiment is independent of where and when in the universe it is performed and the velocity of the freely-falling reference frame in which it is performed.

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G 变化导致 UFF 违反
质点作用量为

$$S = -\int mc\sqrt{-g_{\mu\nu}u^\mu u^\nu}\,\mathrm{d}t$$

m 和常量有关, 由 S 得

$$u^\nu \nabla_\nu u^\mu = \ldots$$

如果常量不是常量, m 就不是常量, 就有 $\ldots \neq 0$.
如果 m 是个宏观物体, 有内势能要计入 m, 内势能和 G 有关.