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Freely-falling bodies in standing-wave spacetime

The phenomena of standing waves are well known in a mechanical and electromagnetic setting where the wave has the maximum and minimum amplitude at the antinodes and nodes, respectively. In the context of the exact solution to Einstein's field equations, we analyze a spacetime that represents standing gravitational waves in an expanding Universe. The study of the motion of free masses is subject to the influence of standing gravitational waves in the polarized Gowdy cosmology with a three-torus topology. We show that antinodes attract freely falling particles and we trace the velocity memory effect.

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