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Simulating orbiting bodies: can a soap film make a good spacetime replica?

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The intricacy of general relativity has fostered the creation of numerous simplified models and representations, that are founded on the principle of a stretched membrane distorted by bodies moving on its surface. However, an inherent limitation in these systems is that these bodies are solid discrete masses, hence limiting their potential for representing complex merging dynamics like those witnessed in galaxies. In this talk, we investigate the potential of a new system based on a horizontal soap film, stretched over a circular frame, to shed light on these phenomena. Indeed, if a drop of water is placed on such a film, it creates a lens that distorts it as a result of gravity, with steady dimensions for durations of the order of a minute. Hence, it is possible to have multiple lenses interact, allowing them to mutually attract each other under the influence of the film's deformation, before merging in complex dynamics. Currently, our team is developing models to study this system, and our aim is to investigate its potential and limitations for conducting analog cosmology experiments in the future.

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