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Localized oscillating configurations formed by real scalar fields

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Self-gravitating real scalar fields can form extremely long living localized spherically symmetric oscillating objects, which are generally called oscillatons. These objects are very similar to boson stars, except that the geometry is not static, the metric components oscillate in time. In case of a zero cosmological constant oscillatons lose energy very slowly by scalar field radiation. However, in most cases this radiation is negligibly small, because the radiation amplitude decreases exponentially when the total mass of the oscillaton decreases. Since a negative cosmological constant acts as an effective attractive force, in that case exactly periodic non-radiating oscillatons exist, even for massless non-self interacting scalar fields. Numerical and analytical results will be presented about the one parameter family of oscillatons emerging from the nodeless linearized solution of the problem, both for the zero and negative cosmological constant cases. The stability range of these configurations was also investigated by applying a numerical time-evolution code.

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