Author: Sousa Sánchez, Kepa
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Stellingen

behorende bij het proefschrift

Consistent Supersymmetric Decoupling in Cosmology

- After a supersymmetric truncation of a $\mathcal{N} = 1$ supergravity theory the kinetic terms of the corresponding reduced theory are characterized by a totally geodesic Kähler submanifold of the Kähler manifold associated to the parent theory.

Chapter 3

- When integrating out the "would be" heavy sector of a $\mathcal{N} = 1$ supergravity theory it cannot be taken for granted that the integrated fields remain massive for arbitrary values of the light fields.

Chapter 4

- In a supersymmetric truncation of a $\mathcal{N} = 1$ supergravity theory where the truncated and the surviving sectors are described by a separable Kähler function, any local maximum of the Kähler function along the truncated directions is always a perturbatively stable configuration, no matter how large the value of the cosmological constant is.

Chapter 4

- It is possible to construct $\mathcal{N} = 2$ supergravity models characterized by a Calabi-Visentini symplectic section which admit supersymmetric cosmic string solutions, despite the runaway behavior of the scalar potential.

Chapter 7

- The supersymmetric cosmic string solutions of the $\mathcal{N} = 2$ supergravity model presented in this thesis are consistent with a reduction of supersymmetry from $\mathcal{N} = 2$ to $\mathcal{N} = 1$, but they are not compatible with the known mechanisms of spontaneous supersymmetry breaking down to $\mathcal{N} = 1$.

- The low-energy scattering of two parallel cosmic string solutions of the critically coupled Abelian Higgs model lying along the $z-$axis can be described using the moduli space approximation. As a result of substituting the time variable by z in this time-dependent solution, we obtain a *static* configuration of two *almost parallel* cosmic strings, with their core positions slowly varying along the $z-$axis.

- The quadrupolar excitations around a static cylindrically symmetric 2-vortex configuration can be interpreted as splitting modes. In the global U(1) model the evolution of such modes represent a right-angle scattering process. The same modes in the Ginzburg-Pitaevskii theory represent two vortices describing *stable* orbits around each other.

- Numerical simulations show that two isolated Schrodinger-Chern-Simons vortices near the critical coupling describe epicycles as they orbit around each other. Such a motion can be explained assuming a coupling between the translational modes and the massive excitations of the two-vortex configuration.

- "*Lo que no anda pa'lante, anda pa'trás, pero las cosas quietas no se quedan.*" (What doesn't move forward moves backwards, but nothing stays still.)

Formulation of the Second Law of Thermodynamics used in Cádiz (Spain).

Kepa Sousa Sánchez