The handle [http://hdl.handle.net/1887/19115](http://hdl.handle.net/1887/19115) holds various files of this Leiden University dissertation.

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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-Vi\text{e}ntini 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’trés, 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