From Hopf fibrations to exotic causal replacements

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Resumen

Topological solitons are relevant in several areas of physics. Recently, these configurations have been investigated in contexts as diverse as hydrodynamics, Bose-Einstein condensates, ferromagnetism, knotted light and non-Abelian gauge theories. In this paper we address the issue of wave propagation about a static Hopf soliton in the context of the Nicole model. Working within the geometrical optics limit, we show that several nontrivial lensing effects emerge due to nonlinear interactions as long as the theory remains hyperbolic. We conclude that similar effects are very likely to occur in effective field theories characterized by a topological invariant such as the Skyrme model of pions.

Palabras clave

KeyWords Plus: Cosmic Vortons; Field-Theory; Models; Equations; Solitons; Geometry; Physics; Knots; Maps