Preprint Series in Particles and Cosmos Physics
nº IPARCOS-UCM-25-023

$SO(4)$ gauged $O(5)$ Skyrmion on $mathbb{R}^4$

by Francisco Navarro-Lerida and D. H. Tchrakian

April 2025

Plaza de las Ciencias, 1 28040 Madrid, Spain
www.ucm.es/iparcos/

INSTITUTO DE FÍSICA
DE PARTÍCULAS Y DEL COSMOS
IPARCOS

UNIVERSIDAD
COMPLUTENSE
MADRID

IPARCOS
INSTITUTO DE FÍSICA
DE PARTÍCULAS Y DEL COSMOS

Abstract

We have studied an $SO(4)$ gauged $O(5)$ Skyrmion on $mathbb{R}^4$ which can be seen as a static soliton in $4+1$ dimension. This is a sequel of the known $SO(D)$ gauged $O(D+1)$ Skyrmions on $mathbb{R}^D$ in $D=2$ and in $D=3$, with both of which its properties are compared. Two families of solutions are found, of these only one possessing a gauge decoupling limit. The curvatures of both of these solutions decay as r^{-3}, are bounded below by the topological charge, and are localised to an absolute scale. As such, they may have the potential of being interpreted as instantons.

UNIVERSIDAD COMPLUTENSE MADRID