Contribution ID: **51** Type: **not specified**

Erasure of Topological Defects

Thursday, September 24, 2020 2:40 PM (20 minutes)

Topological defects–such as domain walls, cosmic strings, and magnetic monopoles–are expected to appear during a phase transition in Grand Unified Theories of particle physics. Such monopoles were estimated to be the dominant matter during the early universe. However, this prediction is in tension with the fact that monopoles have not been observed. The former is known as the cosmological monopole problem. Different solutions to this problem were proposed, being inflation the most well known. In 1997, Dvali, Liu, and Vachaspati proposed an alternative solution. The main idea is that domain walls-that are generated during the same phase transition as the monopoles-swept away the monopoles before decaying. This solution proposes that defect interactions lead to a defect erasure mechanism.
In the present work, we bear out the Dvali, Liu, and Vachaspati (DVL) mechanism in the (2+1) dimensional Abelian-Higgs model with sextic potential. We study the unwinding process of a vortex line during the collision with a non-topological domain wall containing a core with a Coulomb-like phase, inside which the whole symmetry group is restored. We simulate the collision between a vortex and a domain wall for different regimes of the model's parameters. Within this approach, it is found that none of the vortices crosses the Coulomb vacuum layer. We observe how the collision leads to the unwinding of the vortex and the unconfinement of the magnetic flux, dissipating in the domain wall's core. According to these results, we suggest the independence of the DVL mechanism from the parameters' values and how it may be generalized.

Primary author: VALBUENA BERMUDEZ, Juan Sebastian (University of Munich (LMU))

Presenter: VALBUENA BERMUDEZ, Juan Sebastian (University of Munich (LMU))

Session Classification: CoCo