Contribution ID: **44** Type: **not specified**

Global Aspects of Particle and Defect Physics

Thursday, 5 March 2026 16:25 (30 minutes)

In this talk, I will introduce the notion of global aspects in the physics of particles and topological defects. A well-known example is the global structure ambiguity of the Standard Model (SM) gauge group. I will discuss the correlation between the quantization conditions of axion–gauge couplings and this global structure, and its implications on axion domain wall physics.

As another example, I will describe how various global structures play important roles in the domain wall problem of the DFSZ axion model. A precise identification of the axion string–domain wall network—and hence the true nature of the domain wall problem—becomes possible by recognizing a discrete overlap between the Peccei-Quinn symmetry and the SM gauge group.

An elegant solution to the domain wall problem can also be realized by introducing another global structure shared between the color and family gauge groups, which gives rise to discrete non-invertible Peccei-Quinn symmetries. This discrete non-invertible symmetry can then be slightly broken by small instanton effects in a UV completion in the form of an SU(9) color–flavor unification.

If time permits, I will also discuss group-theoretic methods for analyzing topological sectors and global structures in Grand Unified Theories, and homotopy group and their exact sequence analysis for non-topological as well as topological defects.

Presenter: HONG, Sungwoo