Contribution ID: **75** Type: **not specified**

Lie symmetry analysis of the field equations in multi-Higgs models

Wednesday, September 24, 2025 2:45 PM (15 minutes)

We show how to apply Lie symmetry analysis of partial differential equations (PDEs) to the Euler-Lagrange equations of multi-Higgs models, to determine their scalar Lie point symmetries. A Lie point symmetry is a structure-preserving transformation of the spacetime variables and the fields of the model, which is also continuous and connected to the identity. The Lie point symmetries can be divided into strict variational symmetries, divergence symmetries and non-variational Euler-Lagrange symmetries, where the first two are collectively referred to as variational symmetries. Variational symmetries lead to conserved currents and are usually lifted to the quantized theory. We demonstrate that there are no scalar divergence or non-variational symmetries in the two-Higgs-doublet model (2HDM), and re-derive its well-known strict variational symmetries, thus confirming the consistency of our implementation. Moreover, we consider the scalar Lie point symmetries of the standard model (SM) augmented with one or two real, scalar gauge singlets. Lie symmetry analysis of PDEs is a broadly applicable method for finding Lie symmetries, while missing discrete symmetries can be identified through the automorphism groups of the Lie symmetry algebras thus obtained.

Primary author: SOLBERG, Marius (Norwegian University of Science and Technology)

Presenter: SOLBERG, Marius (Norwegian University of Science and Technology)

Session Classification: Parallel 3

Track Classification: Parallel