Contribution ID: **797** Type: **Parallel talk**

Anomaly-free model building: algebraic geometry and the Froggatt-Nielsen mechanism

Saturday, July 13, 2019 9:20 AM (15 minutes)

We present a method to find anomaly-free gauged U(1) Froggatt-Nielsen type models using results from algebraic geometry. These methods should be of general interest for model building beyond the Standard Model when rational charges are required. We consider models with a gauged U(1) flavour symmetry with one flavon and provide several model examples based on different physical assumptions. The models we study are; anomaly-free with all fermions being Dirac particles, anomaly-free with seesaw mechanism for neutrino masses and minimal supersymmetric model where the anomalies cancel via the Green-Schwarz mechanism. With these different models we show how algebraic methods may be used in model building; both to reduce the charge constraints by calculation of Gröbner bases, and to find rational solutions to cubic equations using Mordell-Weil generators.

Moreover, we show that the UV-behaviour of these models are in general plagued by Landau poles. Two different UV-completions are considered; through vector-like fermions and through Higgs doublets. In the fermion completion, the gauge couplings are in general plagued with Landau poles while in a scalar completion this may be avoided, but instead the quartic couplings generally blow up. Thus, the generic case is that neither completion works, but the scalar completion might be saved by appropriate choice of parameters in the scalar potential. This conclusion does not change if we allow U(1) to be anomalous or global.

Primary author: TELLANDER, Felix

Presenter: TELLANDER, Felix

Session Classification: Flavour Physics and CP Violation

Track Classification: Flavour Physics and CP Violation