Contribution ID: **79** Type: **Poster session**

Data Driven Flavour Model

A bottom-up approach has been adopted to identify a flavour model that agrees with present experimental measurements. The charged fermion mass hierarchies suggest that only the top Yukawa term should be present at the renormalisable level. Similarly, describing the lightness of the active neutrinos through the type-I Seesaw mechanism, right-handed neutrino mass terms should also be present at the renormalisable level. The flavour symmetry of the Lagrangian including the fermionic kinetic terms and only the top Yukawa is then a combination of $U(2)$ and $U(3)$ factors. Once considering the Majorana neutrino terms, the associated symmetry is $O(3)$. Lighter charged fermion and active neutrino masses and quark and lepton mixings arise considering specific spurion fields à la Minimal Flavour Violation. The associated phenomenology is investigated and the model turns out to have almost the same flavour protection as the Minimal Flavour Violation in both quark and lepton sectors. Promoting the spurions to dynamical fields, the associated scalar potential is also studied and a minimum is identified such that fermion masses and mixings are correctly reproduced. Very precise predictions for the Majorana phases follow from the minimisation of the scalar potential and thus the neutrinoless-double-beta decay may represent a smoking gun for the model.

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Session Classification: Flavor and Precision Physics Session 2

Track Classification: Flavor and Precision Physics