Contribution ID: **176** Type: **Parallel Session talk**

Dipole operator constraints on composite Higgs models

Tuesday 27 May 2014 15:30 (20 minutes)

Flavour- and CP-violating electromagnetic or chromomagnetic dipole operators in the quark sector are generated in a large class of new physics models and are strongly constrained by measurements of the neutron electric dipole moment and observables sensitive to flavour-changing neutral currents, such as the $B \to X_s\gamma$ branching ratio and ϵ'/ϵ. We analyze these effects in models with partial compositeness, where the quarks get their masses by mixing with vector-like composite fermions. These scenarios can be seen as the low-energy limit of composite Higgs or warped extra dimensional models. We study different choices for the electroweak representations of the composite fermions motivated by electroweak precision tests as well as different flavour structures, including flavour anarchy and $U(3)^3$ or $U(2)^3$ flavour symmetries in the strong sector. In models with "wrong-chirality" Yukawa couplings, we find a strong bound from the neutron electric dipole moment, irrespective of the flavour structure. In the case of flavour anarchy, we also find strong bounds from flavour-violating dipoles, while these constraints are mild in the flavour-symmetric models.

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Session Classification: Composite higgs

Track Classification: SuSy and other BSM phenomenology