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**Stability of renormalization group trajectories and the fermion flavor problem** ERVIN GOLDFAIN, Welch Allyn Inc., Photonics CoE — An outstanding puzzle of the current standard model for particle physics (SM) is that both leptons and quarks arise in replicated patterns. Our work suggests that the number of fermion flavors occurring in the SM may be directly derived from the dynamics of renormalization group equations. The starting point is the system describing the coupling flow in the gauge sector

$$\frac{dg_i}{dt} \doteq \beta_i(g_i) = b_i(N, n_f) g_i^3 + O(g_i^5)$$

where $i = (1, 2, 3)$ labels the gauge group of dimension $N$, $n_f$ is the number of fermion flavors and $t$ the sliding scale. With the help of the Routh-Hurwitz criterion, we find that the SM solution $n_f = 6$ follows from demanding stability of the linearized flow about its fixed points.

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