

# Semi-Empirical Flavor Mixing Phenomenology and T2K $\theta_{13}$ Data

E. M. Lipmanov

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Stimulated by recent T2K indications on a surprisingly large neutrino mixing  $\theta_{13}$  angle we suggest that this last unknown one is not independent but determined by the known large  $\theta_{sol}$  and  $\theta_{atm}$  neutrino oscillation angles via simple, symmetric, positive-definite equation  $\cos^2(2\theta_{sol}) + \cos^2(2\theta_{atm}) + \cos^2(2\theta_{13}) = 1$ . Encouragingly, it appears in agreement with the recent new long base-line appearance  $\nu_{\mu}$  to  $\nu_{e}$  neutrino oscillation T2K data. At zero approximation this equation determines the benchmark bimaximal neutrino mixing matrix as its unique solution with one texture zero. An extension to quark mixing angles leads to zero approximation equation  $\cos^2(2\theta_{12}) + \cos^2(2\theta_{23}) + \cos^2(2\theta_{13}) = 3$  with unit quark mixing matrix as its sole solution. All six accurate realistic three neutrino and three quark mixing angles are explicitly expressed as small deviations from the zero approximation benchmark ones by one small empirical universal parameter. Thus in considered here semi-empirical flavor phenomenology, the system of two related neutrino and quark equations is the primary zero-approximation source mostly responsible for the well known empirical flavor rule of 'large neutrino mixing angles versus small quark ones'. The discussed symmetric neutrino mixing-angle equation is opportune, relevant, specific and suggestive. It may be further confirmed, or falsified, by coming accurate neutrino oscillation appearance and disappearance T2K, MINOS and reactor data for the  $\theta_{13}$  angle.

Comments: 8 pages. Title changed. Extension to quarks included. Complete particle mixing semi-empirical phenomenology is base on the system of two related neutrino and quark mixing-angle equations and one small empirical epsilon-parameter

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