

by: Rohit Verma

Feb 9, 2013

Prof. G.C. Branco,
Centro de Fisica Teorica de Particulas
Instituto Superior Tecnico
Av. Rovisco Pais, P-1049-001 Lisboa, Portugal

Dear Prof. Branco,

I am writing to inquire about the possibility of a postdoctoral position in your Theoretical High Energy Physics group. I have recently (4 Feb 2013) completed my Ph.D. titled "***Implications of precision measurements on CKM phenomenology, Neutrino Oscillations and Mass Matrices***" under the supervision of Prof. Manmohan Gupta, Department of Physics, Panjab University, Chandigarh, India. Currently, I am working as Associate Professor at Rayat Institute of Engineering and Information Technology, Ropar, Punjab, India and have been teaching physics to Engineering undergraduates for the last 8 years.

After performing reasonably good in my B.Sc. (3rd in University) and M.Sc. (2nd in University) courses from Department of Physics, Panjab University, Chandigarh, I registered for Ph.D. in the same department upon clearing the entrance examination. During the course of Ph.D. work, I have become very interested in the work initiated by your group on Weak Basis Transformations and texture zeros in flavour physics as well as on discreet flavour symmetries.

My work has focused on the phenomenological fermion mass matrices, their diagonalization, exact and numerical, and finding clues from these for flavour physics both from the "Bottom Up" as well as "Top Down" perspectives. Attempts were made to undertake a rigorous study of texture 6 zero, 5-zero and 4 zero hermitian fermion mass matrices in the quark and lepton sectors involving both Dirac as well as Majorana neutrino mass matrices incorporating See-Saw mechanism. Successful efforts were also made to understand the reduction of the most general fermion mass matrices to 2 zero and 3 zero matrices using the facility of Weak Basis Transformations as well as S_3 Transformations when the condition of naturalness is imposed on these matrices. Attempts were made to explore the compatibility of texture 4 zero Fritzsch like mass matrices with SO(10) inspired mass matrices using 10, 120 and 126 Higgses and it was observed that the anti-symmetric 120 couplings play a vital role in explaining the current data. Efforts were also successfully made to develop perturbative techniques for analysis of mass matrices involving hermitian and non-hermitian perturbations. In conclusion it seemed that the texture 4 zero mass matrices emerged as most general fermion mass matrices when the condition of naturalness was imposed on these. In addition, these matrices also appeared to be compatible within the framework of SO(10) GUTs.

During the last five years, work was published in Physics Letters B, Physical Review D, Journal of Physics G, International Journal of Modern Physics A and Modern Physics Letters A. Some papers are also in preparation. International exposure was also gained recently by participating in 5th International Pontecorvo School on Neutrino Physics organized by JINR, Russia and held at Ukraine in 2012. There have been participations in various symposia, workshops and conferences at national level. Furthermore, there is experience of Intel Parallel Studio XE using Fortran and graph plotting using MATHEMATICA and SIGMAPLOT.

Enclosed is a copy of my CV, list of publications and interest statement for research. I have also asked my references to send you recommendation letters on my behalf.

If selected, I would be interested in beginning as soon as possible. I look forward to hearing from you.

Sincerely yours,

Rohit Verma