



Dear Selection Committee,

I know Mr. Radha Raman Gautam for last four years. When he joined as Junior Research Fellow at Himachal Pradesh University, Shimla, I had just completed my Ph.D. So, I couldn't work/collaborate with him. However, I have closely followed his work as it was directly relevant to my own research interests. Moreover, I used to take his advise on the research problems I was working upon. I have been greatly benefitted by his perspective and ideas in the field of neutrino physics. Recently, I collaborated with him on a paper in which we studied the phenomenology of four texture zeros in a framework of SO(10) GUT. At present, I am working with him on a neutrino mass model based upon  $A_4$  symmetry. I wish I could collaborate with him on more projects.

Mr. Gautam has written ten papers in the reputed international journals. He has five publications in **Physics Letters B**, two in **Physical Review D** and one publication in each of the following journals: **European Physics Journal**, **Journal of Physics** and **Modern Physics Letters A**.

In the high energy physics research group at Shimla, it has become almost a custom to write the name of the supervisor as the first author. To make it worse, the names of other authors are written according to their seniority. For example, in a recent paper we wrote in collaboration ["Four zero texture fermion mass matrices in SO(10) GUT", S. Dev, Sanjeev Kumar, Surender Verma, Shivani Gupta and Radha Raman Gautam, Eur.Phys.J. C72 (2012) 1940], it was he who did the most of the calculations and the replied the referee's comments although his name appears in the end of the author list since the names are in the order of seniority. So, the tradition is simply unprofessional, as it does not reveal who has contributed most to a research paper. So, I would like to highlight the papers to which he has contributed as the main author and which form an integral part of his Ph.D. thesis.

His first major contribution was to come up with a model for the presence of texture zeros in the neutrino mass matrix proposed by Frampton, Glashow and Marfatia based upon cyclic family symmetries ["Zero textures of the neutrino mass matrix from cyclic family symmetry", S. Dev, Shivani Gupta and Radha Raman Gautam, Phys. Lett. B 701 (2011) 605-608]. It was first successful attempt by him at model building. As a next innovative idea, he studied the phenomenology of a neutrino mass matrix with completely broken  $S_3$  symmetry and its implications for the non-zero  $\theta_{13}$  recently measured at various neutrino experiments. This resulted in two publications ["Broken  $S_3$  symmetry in the neutrino mass matrix", S. Dev, Shivani Gupta and Radha Raman Gautam, Phys. Lett. B702 (2011)28-33 and "Broken  $S_3$  symmetry in the neutrino mass matrix and non-zero  $\theta_{13}$ ", S. Dev and Radha Raman Gautam, Phys. Lett. B708 (2012)284-289]. He quickly extended his model-building skills and come up with another model for a neutrino mass matrix with vanishing minors (as a consequence of zeros in the mass matrix for the right hand neutrinos) which allowed a non-zero  $\theta_{13}$  for a nearly maximal  $\theta_{23}$  ["Near maximal atmospheric mixing in neutrino mass matrix with two vanishing minors", S. Dev, Shivani Gupta, Radha Raman Gautam and Lal Singh, Phys. Lett. B706 (2011)168-176]. This work has been cited 17 times in a period of just one year. He also

proposed a very useful parameterization for the neutrino mixing matrix (the PMNS matrix) in terms of the charged lepton corrections [S. Dev, Shivani Gupta and Radha Raman Gautam, Phys. Lett. B704 (2011)527-533 ]. All these papers are the basis of his Ph.D. thesis.

All these research papers are highly innovative and are definitely important contributions to the field of neutrino physics. For example, his realization of texture zeros [“Zero textures of the neutrino mass matrix from cyclic family symmetry”, S. Dev, Shivani Gupta and Radha Raman Gautam, Phys. Lett. B 701 (2011) 605-608] is simpler and minimal (in the sense of the particle content and the symmetry groups assumed) as compared to most of the other existing models (listed in the references of this paper). The exceptionally high quality of his research work is reflected by the fact that he has received about 7 citations per paper (total 71) in just a span of 2 years.

His main area of research has been neutrino physics. He has a detailed understanding of the field with special emphasis on the models of neutrino mass matrix based upon family symmetries. His innovativeness and creativity can be seen in the selection of the research problems. When he joined his Ph.D., his collaborators were satisfied with studying phenomenology of certain textures of the neutrino mass matrix. He, for the first time, studied how these textures can be realized from family symmetries. He has the ability to independently select new problems and solve them. His work on broken  $S_3$  symmetry is an example of preference for the research topics outside his comfort zone.

In summary, I have been deeply influenced by his innovativeness, independence, problem solving skills, open mindedness and deep understanding. He is always full of new ideas and perspectives. I strongly recommend him for the postdoctoral position at your institution. I would have been glad to have him as a postdoctoral fellow working with me at Delhi University.

Yours truly,

Sanjeev Kumar