COVER LETTER

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Dear Sir/Madam,

I am writing to express my greatest interest in applying for the postdoc position at your institute. I am seeking a postdoc position in the field of high energy physics (phenomenology).

I have submitted my Ph.D. thesis in May 2012. In my Ph.D. thesis I have investigated the theoretical as well as phenomenological implications of various Ansätz of lepton masses and mixings. This work will help in the identification of possible underlying symmetries and mass models operative in the lepton sector.

The main area of my research is the origin of fermion (especially neutrino) masses and mixings. In my opinion flavor symmetries provide the most promising approach to the problem of fermion masses and mixings and I am interested in continuing my research on this line. I am, also, very interested in exploring other areas such as Cosmology, LHC Phenomenology.

I think that working as a postdoc at your prestigious institute will greatly benefit me as a researcher.

If you require any future information kindly call me or contact me by email at gautamrrg@gmail.com.

Thank you very much for your time and consideration.

Sincerely Yours

Radha Raman Gautam

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ADDRESS OF CORRESPONDENCE

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PERSONAL DETAILS

Date of birth: 27/03/1983
Place of birth: Hamirpur (H. P.), India
Citizenship: Indian
Marital status: Single

EDUCATIONAL QUALIFICATIONS

1998	10^{th}, Central Board of Secondary Education.
	60% First Division
2000	12^{th}, Central Board of Secondary Education.
	61% First Division
2001-2004	B.Sc., Himachal Pradesh University.
	58% Second Division
2004-2006	M.Sc. Physics, Himachal Pradesh University.
	63% First Division

ADDITIONAL QUALIFICATIONS

1) Qualified the CSIR-UGC (JRF) NET exam

2) Qualified the GATE Exam with 95.98 Percentile

3) Qualified the JEST Exam with 91.69 Percentile

DETAILS OF Ph.D. DEGREE:

i) Date of submission of Thesis:

07 May 2012.

ii) University where thesis has been submitted:

Himachal Pradesh University, Shimla, India

iii) Title of the Ph.D. Thesis

"Theoretical and Phenomenological Investigation of Some Viable Leptonic Mass Textures"

iv) Name and Address of the Supervisor:

Prof. S. Dev
Deptt. of Physics,
Himachal Pradesh University, Summerhill
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STATEMENT OF RESEARCH INTERESTS

Particle physics strives to describe the fundamental particles and interactions between them. The Standard Model (SM) of particle physics has enjoyed amazing success in describing a vast majority of particle physics phenomena. However, there are many theoretical and experimental reasons to go beyond the SM. I am interested in exploring the possible candidates for physics beyond SM.

The main area of my research is the origin of fermion (especially neutrino) masses and mixings. The origin of fermion masses and mixings along with CP-violation constitutes a formidable challenge for elementary particle physics. Since the fermion masses and mixings are derived from the Yukawa couplings, which are free parameters within the SM, these couplings must span several orders of magnitude to accommodate the strongly hierarchical pattern of quarks and leptons.

The pattern of lepton mixing with two large mixing angles and one not so small mixing angle is quite different from the quarks where there are two very small mixing angles and one not so small mixing angle. In addition neutrino masses are several orders of magnitude smaller than the masses of the corresponding charged leptons. Also, we do not know whether the neutrinos are normal or inverted hierarchical and if neutrinos are Dirac or Majorana particles.

Recently many experiments have unambiguously measured the last unknown mixing angle (reactor mixing angle), the not so small value of this angle has opened the doors for the measurement of Dirac-type CP-violating phase in the lepton sector. In addition, there are several ongoing and forthcoming experiments on neutrinoless double beta (NDB) decay which will give information about the effective Majorana mass of the electron neutrino (M_{ee}) which determines the rate of NDB decay. Observation of NDB decay will imply that neutrinos are Majorana fermions and will also give information on the absolute mass scale of neutrinos.

In think its a very interesting time to work on the problem of the origin of fermion masses and mixings in general and neutrino masses and mixings in particular.

Family Symmetries

Family symmetries have been often invoked to explain the features of fermion masses and mixings. In particular non-Abelian discrete family symmetries have been extensively used to explain the masses and mixings in the lepton sector. With the recent results on the reactor mixing angle it has become important to look for models based on such family symmetries which predict a relatively large value of the reactor mixing angle. In my opinion flavor symmetries provide a promising approach to the problem of fermion masses and mixings and I am interested in continuing my research on this line.

Grand Unified Theories

Grand Unified Theories (GUTs) present an excellent framework for the study of fermion masses and mixings because they predict fermion mass matrices to be related. Since, Grand Unified models intend to explain the masses and mixings in both the quark and the lepton sectors simultaneously, they provide an optimal framework in which possible solutions to the flavor problem could be embedded. One particular line of work I am interested in is to embed successful models of family symmetries into GUTs such as **SO(10)**.

Secondary Research Interests

Although my main research interest is the problem of fermion masses and mixings, I am, also, very interested in exploring other areas such as cosmology, physics of supernovae, Collider/LHC Phenomenology. I believe that diversifying my research into one or more of the aforementioned areas will greatly benefit me as a researcher.

1 List of Publications

1. S. Dev, Surender Verma, Shivani Gupta and **R. R. Gautam**, " Neutrino mass matrices with a texture zero and a vanishing minor" *Phys. Rev.* **D 81**, 053010 (2010), arXiv:1003.1006 [hep-ph].

2. S. Dev, Shivani Gupta and **Radha Raman Gautam**, " CP-odd weak basis invariants for neutrino mass matrices with a texture zero and a vanishing minor," *J. Phys.: Nucl. Part. Phys.* **G 37**, 125003 (2010), arXiv:1010.3839 [hep-ph].

3. S. Dev, Shivani Gupta and **Radha Raman Gautam**, " Parallel hybrid textures of lepton mass matrices," *Phys. Rev.* **D 82**, 073015 (2010) arXiv:1009.5501 [hep-ph].

4. S. Dev, Shivani Gupta and **Radha Raman Gautam**, " Tribimaximal mixing in neutrino mass matrices with texture zeros or vanishing minors," *Mod. Phys. Lett.* **A 26** 501(2011), arXiv:1011.5587 [hep-ph].

5. S. Dev, Shivani Gupta and **Radha Raman Gautam**, " Zero Textures of the Neutrino Mass Matrix from Cyclic Family Symmetry," *Phys. Lett.* **B 701**, 605-608 (2011), arXiv:1106.3451 [hep-ph].

6. S. Dev, Shivani Gupta and **Radha Raman Gautam**, " Broken S_3 Symmetry in the Neutrino Mass Matrix," *Phys. Lett.* **B 702**, 28 (2011), arXiv:1106.3873 [hep-ph].

7. S. Dev, Shivani Gupta and **Radha Raman Gautam**, " Parametrizing the Lepton Mixing Matrix in terms of Charged Lepton Corrections," *Phys. Lett.* **B 704**, 527 (2011), arXiv:1107.1125 [hep-ph].

8. S. Dev, Shivani Gupta, **Radha Raman Gautam** and Lal Singh, " Near Maximal Atmospheric Mixing in Neutrino Mass Matrices with Two Vanishing Minors," *Phys. Lett.* **B 706**, 168 (2011), arXiv:1111.1300 [hep-ph].

9. S. Dev, **Radha Raman Gautam** and Lal Singh, " Broken S_3 Symmetry in the Neutrino Mass Matrix and Non-Zero θ_{13}," *Phys. Lett.* **B 708**, 284 (2012), arXiv:1201.3755 [hep-ph].

10. S. Dev, Sanjeev Kumar, Surender Verma, Shivani Gupta and **R. R. Gautam** "Four Zero Texture Fermion Mass Matrices in SO(10) GUT," *Eur. Phys. J.* **C 72**, 1940 (2012), arXiv:1203.1403 [hep-ph].

ADDRESSES OF THE THREE REFERENCES

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