**Advertisement for a Postdoctoral Fellow (PDF) Position**

**Department of Physics,**

**Indian Institute of Technology Ropar, Rupnagar, Punjab 140001**

**Project Title:** Energy-efficient Quantum Materials-based Magnetic Tunnel Junctions for Unconventional Computing Applications

**Overview:**Applications are invited for a Postdoctoral Fellow (PDF) position under the **MeitY-NSF Grant**. The project focuses on advancing energy-efficient spintronic devices by designing and studying novel heterostructures with high spin-orbit coupling (SOC) using Density Functional Theory (DFT) calculations. The research will investigate the electronic structure, magnetism, and transport properties of these materials to optimize their performance for unconventional computing applications. A significant component of the project involves employing machine learning and data-driven approaches to accelerate materials discovery and predict key properties efficiently. This interdisciplinary project bridges fundamental physics, computational modeling, and emerging technologies in spintronics.

**Research Supervisors:**The selected candidate will conduct research under the guidance of **Dr. Vivekanand Shukla** from the Computational Materials Physics Group in the Department of Physics, IIT Ropar, in close collaboration with experimentalists and the project’s Principal Investigator (PI) **Dr. Lakhan Bainsla** and Co-PI **Dr. Rakesh Kumar**.

**Key Areas of Research:**

* Development of heterostructures for spintronic devices, focusing on magnetic tunnel junctions.
* First-principles modeling of electronic, magnetic, and transport properties using DFT.
* Application of machine learning and data-driven approaches for property prediction and materials optimization.
* Design of energy-efficient quantum materials for unconventional computing applications.

**Essential Qualifications:**

* Ph.D. degree in Science or Engineering, with expertise in materials modeling and simulation.
* Candidates awaiting their final Ph.D. defense may also apply but must provide proof of thesis submission.

**Upper Age Limit:**

* 35 years (Relaxation as per GOI norms).

**Desired Qualifications:**

* Proficiency in Python or Fortran coding.
* Strong understanding of Solid-State Physics, Electronic Structure, and Magnetism.
* Experience with Density Functional Theory (DFT) calculations using standard electronic structure codes such as VASP, SIESTA, or Quantum ESPRESSO.
* Familiarity with machine learning frameworks (e.g., scikit-learn, TensorFlow, or PyTorch).
* Experience in disorder modelling, finite temperature simulations, and data-driven methods.

**Roles and Responsibilities:**

* Conduct high-quality computational research in materials design and spintronic applications.
* Integrate machine learning techniques into materials modeling workflows.
* Collaborate with team members, including Ph.D., Masters, and undergraduate students.
* Provide mentorship and guidance to Ph.D. and Masters students in the group, helping them develop their research skills.
* Contribute to the dissemination of research through publications and presentations.
* Be open to exploring and contributing to additional areas of research ongoing in the group, such as energy materials and hybrid perovskites.

**Duration:** The position is initially for **one year**, with the possibility of extension for up to **one additional year** based on performance or until the project’s completion, whichever is earlier.

**Salary:** The selected candidate will receive a consolidated fellowship of **Rs. 58,000/- per month** plus **HRA** as per GOI norms if accommodation on campus is not availed.

**Application Process:** Applicants must send the following documents as a **single PDF file** named in the format 2024\_Firstname\_Surname.pdf to **vivekanand.shukla@iitrpr.ac.in** by **January 31, 2025**:

1. **Cover Letter** — A one-page letter describing your background, research interests, and alignment with the project.
2. **Application Form** — Completed in the prescribed format (Appendix A).
3. **Curriculum Vitae** — Including a complete list of publications.
4. **Degree Certificates** — Soft copies of all relevant degree certificates.
5. **Thesis** — Soft copy of your Master’s and Ph.D. thesis.

**Selection Process:** Shortlisted candidates will be invited for an **online interview** at the end of **January 2025**. The interview details will be shared with the shortlisted candidates via email.

**Contact:** For any queries, please contact: **Dr. Vivekanand Shukla** Department of Physics, IIT Ropar Email: [vivekanand.shukla@iitrpr.ac.in](mailto:vivekanand.shukla@iitrpr.ac.in).

**A. Application Format**

1. Name:

2. Correspondence address

3. Permanent address

4. Email and contact number:

5. Gender:

6. Date of Birth:

7. Marital Status:

8. Category:

9. Nationality:

10. Whether differently abled:

11. Academic Qualification: (The qualification details must include the details starting from 10th standard onwards)

Qualification Subject Institute/University Year of Passing % of Marks/CGPA

12. Work experience in chronological order:

13. Professional Recognition/Award/Prize/Certificate/Fellowship received by the applicant:

14. Peer-reviewed publications in relevant area:

15. Patents:

**B. Declaration**

I hereby declare that all the statements made in this application are true and complete, and nothing has been concealed/distorted. I am aware that, if at any time I am found to have concealed/distorted any material information, my engagement is liable to be summarily terminated without notice.

Place:

Date: Signature of the Applicant