



INTER-UNIVERSITY CENTRE FOR ASTRONOMY AND ASTROPHYSICS

(An Autonomous Institution of the University Grants Commission)

Tel.: (020) 25691414 Fax: (020) 25604699 Webpage: www.iucaa.in

Junior Research Fellowships in Precision & Quantum Measurement lab (PQM-lab) at IUCAA, Pune

Inter-University Centre for Astronomy and Astrophysics (IUCAA) is inviting applications for TWO Junior Research Fellow (JRF) positions to work on the “Optical clock based accurate time stamping in quantum communication” project at its’ **Precision & Quantum Measurement lab (PQM-lab)**. This project is funded by Department of Science and Technology (DST) for three years under their flagship Quantum Enhanced Science and Technology (QuEST) program.

Description:

PQM-lab is developing an optical atomic clock using ytterbium-ion, which will be confined in an electrodynamic trap and cooled to nearly zero Kelvin using ion trapping and laser cooling techniques. Such an atomic clock will have unprecedented accuracy, which is an unavoidable requisite for most of the quantum-phenomena based technologies. India is keen on developing such atomic clocks to support its quantum mission, which has various applications starting from strategic sector, advanced communication & navigation, meteorology, finance, e-governance and many more. Apart from supporting various emerging quantum technologies, at IUCAA we are interested to conduct sophisticated experiments to investigate yet unanswered questions in foundation of science. Some of these experiments shall aim to measure constancy of the fundamental constants; violation of the fundamental symmetries and Geodic measurements.

The experimental facility at the PQM-lab shall comprise of a trapped ytterbium-ion (Yb^+) optical clock for the absolute optical referencing, ultra-stable Fabry-Perot (FP) cavity that acts as a steady optical oscillator and used to generate narrow line-width ultra-stable laser to probe the clock transition, stabilized optical frequency-comb to synthesize frequency of the clock transition and phase stabilized link-fibre for dissemination of the reference photons without losing their characteristics. Collaborative support on different aspects of the experimental and instrumental works, such as, lasers & optics, electronics, mechanical, designing, simulation will be required to develop this state-of-the-art experiment.

The selected candidates will get opportunity to work on interdisciplinary areas those are required for setting up of the experiment. Some of these are, simulation; designing, fabrication, testing of indigenous instruments in the field of lasers & optics, developing low-noise analog & digital electronics, developing FPGA based systems, ultra-high vacuum, mechanical & software development and so on. Apart from the instrumentation, they will have to work on physics problems which is necessary to meet the experimental goals. A full fledge experiment involve multiple work-packages, developing those require expertise in interdisciplinary fields. Within a lab, this can be achieved by working in collaborative manner.

For the JRF positions, it is not expected that the applicants shall have prior expertise in all these mentioned areas other than basic knowledge in Physics, Optics and Electronics, but it is desired that the candidate will be highly motivated to take-up challenges and will be interested to learn new topics. The candidates have to fully engage themselves to deliver fruitful work in a collaborative manner. The selected candidates will have ample of opportunity to work with other national and international collaborators.

For any further query or discussion about the project, interested candidates feel free to contact principal investigator of this project Dr. Subhadeep De (subhadeep@iucaa.in).



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Qualification & Experience:

M. Sc. or M. Tech in Physics / Electronics / Instrumentation / Optical engineering/ other related areas with minimum 60% marks. As per DST's requirement (Ref. DST OM No – SR/S9/Z-08/2018 dated January 30, 2019) the candidate must have CSIR or UGC NET-JRF / NET-LS/ GATE/ INAT/ JEST. Final year students awaiting for results can also apply.

Desirable experience in any of the programming languages like C, C++, Python, Matlab, Mathematica / VHDL/ LabVIEW will be useful.

The Offer:

The selected JRF candidates will receive a monthly fellowship of Rs. 31,000 + HRA (HRA will be provided only if he/she does not avail IUCAA's accommodation).

Depending on performance in first two years, the candidate can be promoted to Senior Research Fellow (SRF) after two years. In case promoted to SRF, the fellowship will be enhanced to Rs. 35,000 + HRA per month.

The finally offered candidate can start to work immediately after the selection or later depending on pandemic situation / mutually agreeable date. The total tenure of the position is for three years, renewable annually based on performance.

Application & recommendation letters deadline: September 30, 2020 12:00:00 midnight of IST

How to apply:

Applications must include:

- (i) A detailed **curriculum vitae mentioning theoretical, experimental, instrumentation or other working experience,**
- (ii) **List of publications,**
- (iii) **Statement of purpose and**
- (iv) **One confidential letters of reference sent directly by the persons recommending to application@iucaa.in for full consideration.**

In your email application, compile items (i)-(iii) in a single Portable Document Format (PDF), please mention in the subject line '**JRF application at the PQM-lab**' and send that to application@iucaa.in.