



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) position to work on the

- **“Sub-micron Resolution Imaging System to Detect Individual Ions/ Atoms”**. This project is funded by the Board of Research in Nuclear Sciences (BRNS), Govt. of India.
- **“Optical clock based accurate time stamping in quantum communication”**. This project is funded by Department of Science and Technology (DST) under their flagship Quantum Enhanced Science and Technology (QuEST) program.

For both projects the selected candidates shall work at the Precision & Quantum Measurement lab (PQM-lab: <https://pqmlab.iucaa.in/>), IUCAA.

Brief description of the project:

The 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 temperature using ion trapping and laser cooling techniques. Such an atomic clock will have unprecedented accuracy, which is an indispensable 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, we are interested to investigate yet unanswered questions in foundation of science using the developed atomic clock. Some of these experiments shall aim to measure the 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 frequency 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 ample of 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 high-resolution imaging system and its computer interfacing, developing low-noise analog & digital electronics, developing FPGA based systems, ultra-high vacuum, mechanical sub-component, software development and so on. Apart from the instrumentation, the students will have to work on physics problems which is necessary to meet the experimental goals.



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For these 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 candidate must fully engage himself/ herself to deliver fruitful work in a collaborative manner.

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

Qualification & Experience:

M. Sc. or M. Tech in Physics / Instrumentation / Optical engineering/ other related areas with minimum 60% marks. The candidate must have valid score from CSIR or UGC NET- JRF / NET-LS/ GATE/ INAT/ JEST. Final year students waiting 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 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 the pandemic situation / mutually agreeable date. Tenure of the positions are for two years or till the end of the projects, whichever comes first, and is renewable annually based on performance.

Application process: The deadline for applications and letters of recommendation is **July 03, 2022 12:00:00** midnight of IST.

At least one letter of recommendation is needed, which the reviewers can send directly to application@iucaa.in

Applications by the candidate in a “**single PDF**” must include

- (i) A detailed curriculum vitae mentioning working experience,
- (ii) A statement of purpose

Please mention in the subject line ‘**JRF application at the PQM-Lab**’ and send the PDF file to application@iucaa.in. Incomplete applications will be rejected.