



## 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 ONE Junior Research Fellow (JRF) position to work on the “**Synchronization of the optical atomic clocks located at IUCAA and IISER Pune by Ultra-stable Fiber Optic Channel (UsFOC)**” project at its Precision & Quantum Measurement lab (PQM-lab: <https://pqmlab.iucaa.in/>). This position is funded by the Chanakya Doctoral Fellowship program of I-Hub Quantum Technology Foundation for four years

### **Brief description of the project:**

IUCAA and IISER-Pune are developing optical clocks based on trapped ytterbium-ion and strontium atoms in optical lattice, respectively. The proposed development of the Ultra-stable Fiber Optic Channel (UsFOC) between the IUCAA and IISER-Pune will enable intercomparison of these two atomic clocks with unprecedented accuracies. The networked optical clocks using UsFOC will enable pursuance of fundamental science, quantum metrology, testing QKD, and various other quantum enabled technologies. The optical fiber phase noise cancellation via bi-directional communication through a single optical fiber require ultra-stable optical references at both terminating ends of the fiber together with standard tools those are used for fiber optic communication. The Precision & Quantum Measurement lab (PQM-lab: <https://pqmlab.iucaa.in/>) at IUCAA is developing requisite optical and electronics sub-components those will be used for UsFOC to connect the two optical clocks situated at IUCAA and IISER Pune.

The experimental facility at the PQM-lab shall comprise of a trapped ytterbium-ion (Yb<sup>+</sup>) 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.

The selected JRF is expected to design and develop an inhouse UsFOC at IUCAA, which will be used as the testbed of this novel technology. Upon successful in-house demonstration, the link will be extended between two neighbouring institutes IUCAA and IISER Pune. The student 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 low-noise analog, digital, FPGA-based electronics; and so on. A full-fledged IUCAA-IISER Pune link involves close collaboration with different agencies particularly IISER Pune and I-Hub.

It is not expected that the applicants shall have prior expertise in all these mentioned areas other than basic knowledge in Physics, Mechanics, Optics and Electronics, but it is desired that the candidate will be highly motivated to take-up challenges and will be enthusiastic 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](mailto:subhadeep@iucaa.in)), principal investigator of this project.



# INTER-UNIVERSITY CENTRE FOR ASTRONOMY AND ASTROPHYSICS

(An Autonomous Institution of the University Grants Commission)

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## Qualification & Experience:

M. Sc. or M. Tech in Physics / Electronics/ Mechanical / 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/ INSPIRE.

Final year students waiting for the final result may also apply, however, upon selection their joining will be accepted upon fulfilling the above-mentioned qualification requirements.

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 on a mutually agreeable date. The total tenure of the position is for four years or till the end of the project, whichever comes first, and is renewable annually based on performance.

**Application process:** The deadline for applications and letters of recommendation is **April 30, 2021** 12:00:00 midnight of IST.

At least one letter of recommendation is needed, which the reviewers can send directly to [application@iucaa.in](mailto: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 ‘**Chanakya JRF application**’ and send the PDF file to [application@iucaa.in](mailto:application@iucaa.in). Incomplete applications will be rejected.