



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 ONE **Junior Research Fellow (JRF)** position to work on the “**Sub-micron Resolution Imaging System to Detect Individual Ions/ Atoms**” project at its **Precision & Quantum Measurement lab** (PQM-lab: <https://pqmlab.iucaa.in/>). This project is funded by the Board of Research in Nuclear Sciences (BRNS), Govt. of India for three years

Description:

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, 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 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 candidate is expected to design and fabricate a high-resolution imaging system together with computer interfacing of it, which will be used to detect individual trapped ions. Additionally, the research fellow 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 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-fledged experiment involves multiple work-packages; developing those require expertise in interdisciplinary fields. Within the lab, this can be achieved by working in a 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 candidate must fully engage himself/ herself to deliver fruitful work in a collaborative manner.



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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 / Electronics / 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. The total tenure of the position is for three 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 **August 15, 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

- (i) Applications in a “**single PDF**” must include
- (ii) A detailed curriculum vitae mentioning working experience,
- (iii) List of publications
- (iv) 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.