



Announcement of four Tenure Track Research Positions in the Optics Department of the *Instituto Nacional de Astrofísica Óptica y Electrónica* (*INAOE*) Tonantzintla, Puebla, Mexico

The *Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE)*¹ is a federally funded public research center in the state of Puebla, Mexico, dedicated to basic and applied research. It offers graduate programs in Astrophysics, Optics, Electronics, Computer Science, Space Science and Technology and Biomedical Technology, accredited by the “*Sistema Nacional de Posgrados (SNP)*”² of the CONACyT³. INAOE provides an intellectually stimulating work environment, undertaking state-of-the-art research as well as high quality technological development and certified quality graduate courses.

INAOE is one the most renowned Public Research Centers in Mexico, and its Coordination of Optics (CO) is among the most prominent leaders in research in the different disciplines of Optics in Mexico, with 33 full-time researchers, from of which 26 are members of the National System of Researchers. In addition, the CO offers master’s and Doctorate studies included in the SNP in the Internationally Competent category. Furthermore, our students have the benefit of scholarships for graduate studies. This announcement provides the opportunity to join the research group of the Coordination of Optics of the INAOE to four highly motivated researchers with demonstrable experience in any of the following areas: Quantum Optics, Optical Fibers, Image Science and Visual Physics, or Optical Instrumentation.

Based on INAOE’s General Director’s attributes, established in Article 20, Section I, of the “Decree by which the Instituto Nacional de Astrofísica, Óptica y Electrónica is Restructured”, and aiming at finding the best candidates to fill these positions, while efficiently contributing to meet institutional goals, the INAOE hereby invites all those professionals, Mexican or foreign, who would like to earn the position of Senior Researcher for an initial one year period, as stated in Article 24, Section I, of the Faculty Statute of the INAOE, to undertake scientific and technological research, as well as technological innovation associated to the needs of different social sectors, and prepare high quality human resources through graduate studies, to apply for one of these positions according to the following

Terms

I. Academic Background

A doctoral degree or equivalent in Physics, Optics or related areas, and a research career showing a proven, successful academic capability to autonomously undertake research projects and to teach graduate courses with a focus on research and development in any of the following areas: Quantum Optics, Optical Fibers, Image Science and Visual Physics, and Optical Instrumentation.

¹ National Institute for Research on Astrophysics, Optics and Electronics

² A registry of accredited graduate programs issued by CONACyT

³ The National Council for Science and Technology





II. Candidate's Profile

Selected candidates must contribute to the advancement of the INAOE Department of Optics by developing research projects with external funding, contributing to the activities of our postgraduate programs, establishing academic and research collaborations with other researchers from our optics coordination, and further INAOE coordination's. They must also have excellent teamwork and communication skills. It is equally desirable that the candidate belongs to the National System of Researchers (SNI) or has an academic profile that allows them to enter the SNI quickly. In addition, candidates must have the following specific knowledge and meet the following requirements, depending on their area of specialty:

- 1) *Quantum Optics* - have solid knowledge and demonstrable experience in areas related to the emulation of quantum systems in waveguide arrays, classical light propagation in photonic arrays, optomechanical systems that contain nonlinear media, and, in general, hybrid optomechanical systems, Lie-algebraic methods, coupled harmonic oscillators with and without time dependence, time-dependent systems: Koopman-von Neumann mechanics and Ermakov-Lewis invariants, trapped ions in one and two dimensions and simulation of thermodynamic-quantum processes, verifiable experience in the numerical solution of Schrödinger-type equations and master equations using Quantum Toolbox in Python (QuTiP) and Runge-Kutta. In addition, is necessary minimum postdoctoral experience of one year and solid academic productivity demonstrated through publications in indexed international journals (according to the Journal Citation Report - JCR).
- 2) *Optical Fibers* - have solid knowledge and demonstrable experience in areas related to the design and operation of continuous-wave and pulsed fiber-optic lasers. It is in our interest to strengthen the area of lasers and fiber optic devices. Fields of interest are fiber-optic lasers and nonlinear effects in fiber optics, both in the 1500 and 2000 nm regions. Be a member of the National System of Researchers (SNI), preferably SNI II. Have teaching experience to teach courses of basic subjects and their specialty in the graduate program in Optics. The candidate must show ability, experience in research projects, and contributed to human resources training through the direction of graduate students. Have completed a postdoctoral stay of at least one year. The competitive position is open to researchers in the consolidation process (SNI I or II) who have solid training in Optics, have a doctorate focused on the area of optical fibers, and have the profile to become a leader in their field specialty.
- 3) *Imaging and Visual Physics* - experience in research and development of applications related to Physical Optics, mainly in interference, diffraction, wavefront propagation, analysis, and representation of wavefront aberrations in terms of Zernike polynomials. General knowledge of human eye models, statistical analysis of aberrations in eye populations, optical design, adaptive optics, tunable lenses, and Optomechatronic systems are required. Have contributed to the training of human resources through management or co-management, of thesis at the undergraduate and graduate level. Demonstrable teaching experience at the undergraduate and graduate levels. Verifiable work experience in the laboratory, especially in the assembly and alignment of optical





and optoelectronic information processing systems. Have completed at least one postdoctoral stay in projects related to vision physics.

- 4) *Optical Instrumentation* - having worked for five years in the use and maintenance of a thermal evaporation system for depositing thin films, as well as maintenance and repair of the high vacuum system of BALZERS type systems. Proven experience and solid knowledge in thin-film design, fabrication, and characterization, especially in optical interference filters. Proven expertise in deposits with various compounds: aluminum, silver, gold, calcium, lithium fluoride, molybdenum oxide, among others. The ability to maintain a high vacuum cryogenic pump system allows monitoring variables such as temperature, pressure, and vacuum. Have completed at least one postdoctoral stay in projects related to thin films.

III. Job Description

The chosen candidates must:

- Perform high quality, original research in his/her area of expertise, working in a team;
- Publish the results of their research activities in top-of-the-line conferences and the highest ranked refereed journals in their field;
- Collaborate with all the other members of the faculty, as well as other researchers in the INAOE;
- Teach high quality and high-level graduate courses, especially those of the programs of the Electronics Department;
- Supervise master's theses and doctoral dissertations;
- Serve as a reviewer of theses and dissertations directed by colleagues;
- Fulfill the administrative tasks related to the position;
- Participate in the different activities of the Institute.

IV. Additional considerations

- Availability to live in or nearby the city of Puebla, Mexico.
- A positive attitude when confronted with challenges, and to work in general.
- A high sense of responsibility.
- Willingness to work in a team.
- Foreign nationals should be in possession of required legal documents to allow them to work and perform the duties herein established.

V. Deadline for application and procedure

The candidates aspiring to obtain the position of Tenure Track Researcher under this announcement, must present:

- A letter stating their motivation to work in INAOE.
- A research project proposal for the middle run (3 years), in less than five pages, including personal professional development goals, academic, and scientific and technological development aims,





highlighting the main foreseen scientific contributions, and indicating how they will integrate with the existing faculty of the Electronics Department.

- A résumé with evidential documents.
- Copies of their three most relevant publications.
- Contact information of three researchers of worldwide prestige that could be asked to provide a letter of recommendation of the candidate in digital form.

All the documents must be delivered or sent by **November 30, 2021**, to:

Dirección de Investigación y Desarrollo Tecnológico

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For questions related to this call, please contact Dr. Fermín Granados Agustín, Head of the Optics Department, at the following e-mail address: fermin@inaoep.mx.

All applications will be reviewed by a committee consisting of personnel from the Optics Department, who will program interviews with them through the Research and Development Directorate. The opinion of this committee will be considered by the General Director of the INAOE, who will, in case all the requirements established in Article 24, Section I, of the Faculty Statute of the INAOE are fulfilled, grant the position to the selected candidate. These positions will remain open until they are satisfactorily filled.

VI. Additional Information

Let it be known that once the one-year period established in this announcement for the selected candidates comes to an end, they can apply for permanence, promotion, and tenure, based on the Faculty Statute of the INAOE and all the other pertinent regulations. All offered positions are full-time, with a position and salary in accordance with the academic trajectory of each candidate. The position includes the following fringe benefits besides salary: Social Security for the researcher and his/her immediate family, sick leave, paid vacation after six months of work, and a retirement package. Based on internal regulations, selected candidates will be offered a temporary contract, which will be reviewed at the end of the first and third years. The initial position is the equivalent to an Associate Professor in the United States. Besides the salary and benefits, the researchers in the INAOE can qualify for an additional stipend based on a merit scale. They can also apply to become part of the SNI and receive a monthly fellowship in case of meeting the requirements. As part of their benefits, the researchers can apply for a three-month paid leave every year to collaborate with other academic institutions, as well as to enjoy a paid sabbatical leave after a period of six years of uninterrupted work.

