

**TENURE-TRACK FACULTY POSITION IN PHYSICS
INSTITUTE OF PHYSICS, UNIVERSITY OF SÃO PAULO, BRAZIL**

Announcement IF-19, 2025

Announcement of an open tenure-track faculty position at the Institute of Physics, University of São Paulo, Brazil, Level MS-3, RDIDP (Full-time dedication to teaching and research) at the Department of Materials Physics and Mechanics.

The Director of the Institute of Physics at the University of São Paulo, Professor Kaline Rabelo Coutinho, invites applications for a full-time tenure-track faculty position in the field of **“Experimental or Theoretical Research in Condensed Matter Physics”** to be appointed in 2025. Eligible candidates should have a Ph.D. and postdoctoral research experience. Applicants should possess an outstanding potential to establish an independent research program and a commitment to teach undergraduate and graduate courses in Portuguese, 2 years after appointment. This position comprises full-time dedication to research and teaching, level MS-3, RDIDP. Salary is **R\$15.498,97**, non-negotiable. The position nº **1231944** at the Department of Materials Physics and Mechanics is open for applicants for 90 days, from **March 6th, 2025, at 12:01 a.m. to June 3th, 2025, at 11:59 p.m. (GMT -3, Brasília time)**. The following is the detailed description of the program for the examinations:

Introduction to Solid State Physics (4300402) Crystalline structure. X-ray diffraction and reciprocal lattice. Crystalline bonds. Lattice vibrations, phonons, and thermal properties. Fermi gas of free electrons. Energy bands. Semiconductors. Metals and Fermi surfaces. Optical processes. Magnetism. Superconductivity.

Quantum Physics (4302311) 1. Evidence for an atomic description of matter. 2. Experimental evidence for the quantization of electromagnetic radiation: the black body problem, specific heat of solids, photoelectric effect, Compton effect, production and annihilation of the electron-positron pair. 3. The Rutherford model and the problem of atomic stability, the Bohr model. 4. The wave-particle duality in the case of electromagnetic radiation. X-ray and electron diffraction. The Broglie hypothesis and wave-particle duality. 5. Postulates of Wave Quantum Mechanics. 6. Wave packets, group velocity, and uncertainty relations. 7. The one-dimensional time-dependent Schrödinger equation. Discussion of some stationary solutions of the Schrödinger equation with one-dimensional constant potentials. 8. The Schrödinger equation in three dimensions. Particle in the cubic box. Degeneration. 9. The Schrödinger equation for central potentials and the radial solution of the hydrogen atom in quantum mechanics.

Applications

1. Applications must be submitted exclusively via the link <https://uspdigital.usp.br/gr/admissao> during the period stated above, informing his/her personal data and the Department for which he/she is applying, accompanied by the following documents:

- I - Detailed Curriculum Vitae (.pdf), outlining his/her experience in the specific area of the opening, list of published papers, activities related to the field of application, a two years research project and any complementary information which enables assessing the merits of the applicant;
 - II - Proof of a PhD degree with national validity, or accredited by the Institute of Physics of the University of São Paulo;
 - III – For Brazilian male applicants, proof of discharge from military service;
 - IV - For Brazilian applicants, electoral discharge certificate or detailed certificate issued by the Electoral court less than 30 days before the start of the application period.
 - 1.1. An applicant already appointed at USP is exempted from the requirements III and IV, if these requirements were met during his/her appointment.
 - 1.2. Foreign applicants are exempted from the requirements III and IV, instead, he/she must submit a copy of the identity pages in the passport.
 - 1.3. An appointed foreign applicant may only take office if holding a temporary or permanent visa, which grants to the holder permission to exercise remunerated activities in Brazil.
 - 1.4. Upon registration, foreign applicants may submit a written request to take the application exams in English. The contents of the examinations conducted in English or in Portuguese will be identical.
 - 1.5. Upon registration, applicants with disabilities or special needs must submit a request for the necessary conditions being provided during the examinations.
2. The General Committee of the Institute of Physics will judge and announce the formal acceptance of the applications.
 - 2.1. The examination of the candidates will take place within 30 and 120 days, after the formal acceptance of the applications.
 3. The examination of the candidates will consist of the following exams.
 - I) Analysis and public examination of the Curriculum Vitae – weight 4 .
 - II) Teaching exam (public lecture on a subject within the topics described above) – weight 3.
 - III) Public examination of the research project - weight 3.
 - 3.1. The list of eligible applicants will be published in the São Paulo State Official Gazette.
 - 3.2. Candidates who arrive late to the exams will be ineligible to proceed.

PUBLIC EXAMINATION OF THE CURRICULUM VITAE

4. The evaluation of the Curriculum Vitae includes a public examination graded by each member of the Committee.

Sole paragraph - The grading of the Curriculum Vitae must consider: I – the scientific, literary, philosophical, or artistic production; II - university teaching activities; III - services to the community; IV - professional or other activities, if applicable; V - degrees and university honors.

TEACHING EXAM

5. The public Teaching Exam consists of a 40 to 60-min lecture on a topic drawn from a list of topics. The lecture will begin 24 hours after the drawing.

I – The Examining Committee will prepare and announce a list of ten topics within the program detailed above;

II – Immediately after becoming aware of the examination topics, candidates may ask to replace one or more topics they understand not belonging to the program. The Examining Committee will decide the claim and if necessary, substitute the topics under objection.

III – After drawing the topic, a 24-h period to prepare the lecture will start. The lecture will begin the next day, at the same time of the drawing. The candidate may not waive this deadline.

IV - Candidates may use and consult all materials he/she deems necessary.

PUBLIC EXAMINATION OF THE RESEARCH PROJECT

6. The examination of the Research Project will be in the form of a dialogue: A short oral presentation of the project to the Committee (if asked for), up to sixty minutes questioning by the Committee and the same time, sixty minutes, for the answers of the candidate.

I - The Research Project, should consider its actual feasibility at the existing infrastructure of the Institute and must be framed within the field of the announcement.

GRADING

7. After the exams, members of the Examination Committee will individually grade each candidate.
8. The grades may range from zero to ten, with one decimal place.
9. Each candidate will have a final grade given by each member of the Examination Committee. The final grade is calculated as a weighted average (according to the weights given in item 3) of the grades of each exam.

§ 1º - Differentiated score formula to be applied for candidates of Black, Mixed-race, and Indigenous ethnicities (PPI candidates):

$$PD = (MCA - MCPPI) / MCPPI$$

Where:

- PD is the differentiated score to be added to the grades of all candidates who expressed interest in participating in the differentiated score.
- MCA is the average score of the broad competition among all candidates, excluding those who did not reach the minimum score referred to in item 10 of this Edict and PPI candidates participating in the differentiated score.
- MCPPI is the average score among all PPI candidates, excluding those who did not reach the minimum score referred to in item 10 of this Edict.

§ 2º - The formula to account for the differentiated score in the final grades of PPI candidates is:

$$NFCPPI = (1 + PD) * NSCPPI$$

Where:

- NFCPPI is the final grade of the public examination, after applying the differentiated score. It will generate the candidate's classification in the public examination stage, limited to the maximum grade stipulated in the Edict. At the end of the public examination, the final grade will be considered the candidate's simple grade.
 - NSCPPI is the simple score of the PPI candidate, on which the differentiated score will be applied.
 - § 3º - The calculations referred to in §1 and §2 of this item must consider two decimal places and fractions greater than or equal to 0.5 (five-tenths) must be rounded to the next whole number.
 - § 4º - The differentiated score (PD) provided for in this article applies to all qualified candidates, that is, those who have achieved the minimum performance established in the Edict, considering for this last purpose the simple score.
 - § 5º - If there are no PPI candidates with differentiated score among those qualified, the differentiated score will not be calculated.
 - § 6º - The differentiated score will not be applied when, in the differentiated score (PD) calculation formula, the MCPPI (average PPI competition score) is greater than the MCA (average broad competition score).
10. To be eligible, candidates must achieve a minimum final grade of seven from the majority of examiners.
 11. Each examiner will nominate the candidate he/she graded highest.
 12. The candidate receiving most nominations by the Examination Committee will be indicated for appointment.
 13. The Examination Committee will publicly announce the results of the examination immediately after its completion.
 14. The effective appointment to the position depends on a medical examination conducted by the State's Department of Medical Skills (DPME), pursuant to article 47, VI, of Law No.10.261/68.
 15. Further information and relevant rules for the examination are available at the Academic Assistance Department of the Institute of Physics, University of São Paulo, and e-mail ataac@if.usp.br.

Legal provisions: Announcement IF-19, 2025, approved during the 613th Ordinary Session of the Institute of Physics Committee, held on 02/27/2025. Decree GR 8602, 2024, Deliberation GR/Circ/109, art. 125, paragraph 1, of USP's General Regulations and by the Rules of the Institute of Physics: Resolutions No. 4,087 of June 21, 1994, 4,265 of May 3, 1996, 5,367 of October 18, 2006 and 5,829 of April 4, 2010. Authorization for taking exams in English: paragraph 8 of art.135 of the General Rules. The joining to the faculty in the Full-Time Regime (RDIDP) is conditional upon the approval of the Special Work Regime Committee (CERT), in accordance with Resolution 7271/16 and other applicable rules, and implies in exclusive relationship with USP, under ARTICLE 197 of the General Rules.

São Paulo, February 27th, 2025.

ANNEX – JUSTIFICATION FOR THE GRANTING OF THE FACULTY POSITION

Current Situation of the Department/Area

The primary mission of the Department of Materials Physics and Mechanics, as outlined in its Academic Project, is to conduct creative and high-impact research in both fundamental and applied science, contributing to the development of a community of young leaders in the field of condensed matter physics. This impact arises from a blend of fundamental physics and applications, theory and experiment, as well as the integration of research and innovative teaching, all aimed at fostering a stimulating intellectual atmosphere within a welcoming and academic environment. The Department of Materials Physics and Mechanics comprises two major research groups: one focused on theoretical research in condensed matter physics and materials, and the other dedicated to the experimental aspects of condensed matter physics.

General Goal

The hiring of the new faculty member aims to strengthen the teaching staff of DFMT and IFUSP. The new faculty member is expected to engage in activities related to research, teaching, and outreach, and will also be encouraged to participate in initiatives related to innovation, always striving for excellence in all areas of their work. Regarding the specific area chosen (Experimental or Theoretical Research in Condensed Matter Physics), a broad scope has been selected to encompass all research areas within the department. We intend to hire the most outstanding candidate, regardless of their specific area of expertise. The new position will help maintain the department's competitiveness.

INDIVIDUALIZED PLAN

a) Teaching - Goals

The newly hired faculty member will collaborate with the Department and the Institute in undergraduate and graduate teaching activities. There is an expectation that the new member will teach foundational physics courses, including courses from other faculties, as well as advanced courses in the area of Condensed Matter Physics, including at the graduate level. The faculty member is also expected to actively engage in the quality mentorship of undergraduate and graduate students, as well as in the supervision of postdoctoral researchers. It is anticipated that teaching activities will commence upon hiring, while other mentoring activities should begin within the first year of the contract.

b) Research and Innovation - Goals

The goal of the Department of Physics and Materials Science (DFMT), as outlined in its academic project, is to enhance all research-related metrics (per faculty member), including the number of published articles, the number of articles in prestigious journals, the number of productivity grant holders, and the quantity of research projects funded by agencies and companies. In this context, it is expected that the new faculty member at DFMT will maintain a robust research program. This includes submitting funding applications to grant agencies

within the first year of employment; applying for a productivity grant in the first year of employment; supervising undergraduate and graduate students (with applications for funding submitted to grant agencies) in the first year of employment; and publishing noteworthy articles in journals within the field of condensed matter physics.

c) Culture and Outreach - Goals

In relation to Culture and Outreach, we have identified numerous opportunities for faculty engagement within the department, all linked to the research conducted at DFMT. This encompasses, among other topics, cryogenic research, superconductivity phenomena, virtual reality, and artificial intelligence. These subjects are of broad interest to the general public, thereby creating a window of opportunities for interaction between faculty and society through knowledge dissemination initiatives.

EXPECTED IMPACT WITH THE HIRING

The hiring of a new Professor in the field of Experimental or Theoretical Research in Condensed Matter Physics, considering the ongoing objective of enhancing undergraduate programs and their respective courses, will contribute to the set of goals outlined in the Academic Project of the Department and the Institute. This individual will collaborate with the Graduate Program, both in proposing and offering courses and in supervising thesis and dissertations. Furthermore, they will support the smooth progression of the Department's Culture and Extension activities, as well as those of the Institute of Physics. With the appointment of the new faculty member, the Department aims to improve all its research-related metrics.

Short, Medium, and Long-Term Perspectives: Considering the temporal scope, we can anticipate the following impacts:

In the short term: immediate replenishment of the teaching staff at DFMT and IF.

In the medium and long terms: an increase in research-related metrics, including the number of published articles, the number of research productivity scholarships, and the quantity of research projects funded by funding agencies and private companies; an expansion of national and international scientific collaborations; an enhancement in fundraising efforts aimed at modernizing the instrumental infrastructure; an improvement in computational and laboratory facilities; and a continued prominent role in the national community of condensed matter physics and materials science.