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

Announcement IF-68,2023

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 Mathematical Physics Department at the Institute of Physics, University of São Paulo.

The Director of the Institute of Physics at the University of São Paulo, Professor Manfredo Harri Tabacniks, invites applications for a full-time tenure-track faculty position in the field of **"Mathematical Physics"** to be appointed in 2023. 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$14.761,02**, non-negotiable. The position nº **1093376** at the Mathematical Physics Department is open for applicants for 90 days, from **november 29th, 2023, at 12:01 a.m. to february 26th, 2024, at 11:59 p.m. (GMT 3, Brasília time)**. The following is the detailed description of the program for the examinations:

Mathematical Physics II (4302307) – 1. Topology of metric spaces, completeness. Continuity of applications between metric spaces. Compactness. Banach and Hilbert spaces. Banach's fixed point theorem. 2. Existence and uniqueness theorems for solutions to initial value problems. Complete orthogonal sets in Hilbert spaces. 3. Continuous and self-adjoint linear operators. Compact operators in Hilbert spaces and the spectral theorem. 4. The regular Sturm-Liouville problem and the completeness of eigenfunctions. Examples: trigonometric functions, Legendre polynomials, spherical harmonic functions, Hermite functions, **Bessel functions. Applications to the solution of several differential equations in Physics.**

Mathematical Physics III (4302322) - 1. Notions of measure theory and Lebesgue integration. Lebesque monotone and dominated convergence theorems. Measure spaces as models of Kolmogorov's axioms. 2. Elements of probability theory. Riesz-Markov representation theorem. Distribution theory. Schwartz spaces and temperate distributions. Fourier transform of distributions. 3. Green's functions and their applications to the solution of various differential equations in Physics.

Quantum Mechanics I (4302403) - 1. General Structure of Quantum Mechanics. 2. Operator methods and two level systems. 3. The Schrödinger equation in three dimensions. 4. Central potentials. Angular momentum. Hydrogen atom. 5. Spin. Identical particles. Pauli exclusion principle. 6. Time-independent perturbation theory and applications.

Quantum Mechanics II (4302404) - 1. Addition of angular momentum. 2. Two-particle systems with spin. Clesbsch-Gordan coefficients. 3. Heisenberg representation. Time evolution in terms of operators. 4. Approximation methods: time-independent perturbation theory; variational method. 5. Fine-structure of the hydrogen atom. 6. Time-dependent perturbation theory. Einstein coefficients. 7. Atom in the presence of a radiation field. Fermi's golden rule. 8. Scattering theory. Born approximation. Partial waves.

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 examinersEach examiner will nominate the candidate he/she graded highest.

11. The candidate receiving most nominations by the Examination Committee will be indicated for appointment.

12. The Examination Committee will publicly announce the results of the examination immediately after its completion.

13. 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.

14. 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-68, 2023, approved during the 599th Ordinary Session of the Institute of Physics Committee, held on 09/28/2023. Information 431/23, 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, november 22th, 2023.

ANEXO – JUSTIFICATIVA PARA CONCESSÃO DO CLARO DOCENTE

The main objective of the requested contract is to allow the continuation of research focused on Mathematical Physics in its various aspects, thus contributing to the enrichment of the fabric made up of the different areas of Theoretical Physics represented within the DFMA, as well as within the Institute of Physics at USP and other related units.

The proposed contract is intended to recover DFMA's teaching staff and also continue the training of students in this fundamental area, continuing a process that has lasted decades.

Mathematical Physics is an area of great development and scientific impact, having emerged from common concerns of Physics and Mathematics, which characterizes it as a multidisciplinary area. The targeted hiring will allow the Department to keep pace with the latest developments and prepare a new generation of students and postgraduates in their future research activities. It will also allow the Department to coordinate with other related research areas present at IFUSP, where several researchers dedicate themselves to related topics, such as the Theory of Probabilities and Stochastic Processes, the Differential Equations, Differential Geometry, Functional Analysis and Operator Algebras and its many applications in Physics.