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

Announcement IF-68, 2019

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 Experimental Physics Department.

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 "**Applied Physics with Ionic Beams and Radiation**" to be appointed in 2020. 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$11.069,17, non-negotiable. The position nº **1234960** at the Experimental Physics Department is open for applicants for 90 days, from **December 13th, 2019, at 12:01 a.m. to March 11th, 2020, at 11:59 p.m. (GMT -3, Brasília time)**. The following is the detailed description of the program for the examinations:

Physics I (4302111): Laws, theories and realm of validity. Units of physical quantities, unit systems, order of magnitude. Vector kinematics. Circular motion. Concept of force and Newton's law. Friction forces. Work and mechanical energy. Conservative forces and potential energy. Energy conservation. Power. Systems of particles and center of mass. Linear momentum conservation, impulse and collisions in one and two dimensions. Rigid body kinematics. Torque, moment of inertia and angular momentum. Conservation of angular momentum and dynamics of rigid bodies.

Physics II (4302112): Oscillations: harmonic, damped, driven, damped-driven. Resonance. Basic notions of elasticity. Waves in elastic media. Wave reflection. Wave superposition. Interference and diffraction. Beats. Confined waves. Properties of ideal and real gases and relations among macroscopic and microscopic quantities. First Law of Thermodynamics. Important concepts: Heat, Work, Internal Energy, Enthalpy. Second Law of Thermodynamics. Important concepts: Entropy, Gibbs and Helmholtz Free Energy. Applications: engines/refrigerators.

Experimental Physics V (4302313): Experimental foundations of Quantum Mechanics. Through the making of complex experiments, requiring systematic measurements and their correlations: 1. practice careful and systematic data taking; 2. automate the experiments; 3. correlate independent data sets in order to extract a more complex physical interpretation; 4. develop a critical analysis of the data set. For the treatment of data, develop the concepts of: 1. experimental simulations; Monte Carlo method; 2. generic and non-linear function fits. Maximum likelihood method; 3. Correlated data analysis (covariance); 4. uncertainty propagation with covariance among parameters. 5. Curve extrapolation; 6. Treatment of great amounts of data; 7. Systematic uncertainties of measurements. For analysis, synthesis and

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presentation of results: 1. elaborate syntheses of experiments adequately selecting the obtained information and relating them to the measurements previously made; 2. elaborate oral presentations of the experimental results.

Modern Physics I (4300375): Review of the open problems in physics at the end of the 19th century. I. Duality of electromagnetic radiation. Photoelectric effect. Energy and momentum of the photon. Production of X rays in electron stopping. Compton effect. X ray diffraction. Electromagnetic wave-photon duality. Rutherford atomic model and the problem of the stability of the atom in classical physics. Bohr's model. II. Duality of matter: particle-wave. Particles and waves. The de Broglie hypothesis. The Davisson-Germer experiment. Discussion of the two slit experiment with photons and electrons. III. Schrödinger's wave mechanics. Wave packets. The uncertainty principle. Born's probabilistic interpretation. A wave equation for "electron waves". The time-dependent Schrödinger equation in one dimension. Plane wave solutions and the principle of superposition. Static unidimensional problems: bound states and scattering. Expected values. The Schrödinger equation in three dimensions. Particle in a cubic box. Degeneracy. Quantum mechanics and the hydrogen atom.

Applications

1. Applications must be submitted exclusively via the website **https://uspdigital.usp.br/gr/admissao** during the period stated above. Applicants must download, sign and submit the available application form addressed to the Director of the Institute of Physics, containing his/her personal data and the Department for which he/she is applying, accompanied by the following documents:

I - Detailed Curriculum Vitae outlining his/her experience, list of published papers, academic activities, and any complementary information that enables assessing the merits of the applicant in the specific field of this announcement, and associated documents proving the information provided;

II - A two years research project;

III - Proof of a PhD degree valid in Brazil, or accredited by the Institute of Physics of the University of São Paulo;

IV – For Brazilian male applicants, proof of discharge from military service;

V – For Brazilian applicants, copy of voter identification card;

VI – For Brazilian applicants, proof of vote in the last election (both turns), or proof of payment of the respective fine, or proper justification.

1.1. A foreign applicant, who has not done the official validation of his/her diplomas in Brazil, must write to the president of the Graduate Commission (cpgusp@if.usp.br) asking for a temporary accreditation document to be issued by the director of the Physics Institute. This procedure may take several weeks. No application will be accepted without an accredited PhD title.

1.2. It is the solely responsibility of the applicant to verify the integrity of the uploaded files.

1.3. An applicant already appointed at USP is exempted from the requirements IV, V and VI, if these requirements were met during his/her appointment.

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1.4. Foreign applicants are exempted from the requirements IV, V and VI. Instead, he/she must submit a copy of the identity pages in the passport.

1.5. 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.

1.6. 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.

1.7. 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 Examining 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.

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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 on 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 Examining 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 in the specific field of this announcement.

GRADING

7. After each exam, members of the Examination Committee will individually grade each candidate. Each candidate will have a final grade from each member of the Examination Committee. These final grades are calculated as a weighted average (according to the weights given in item 3) of the grades of each exam.

8. The grades may range from zero to ten, with one decimal place.

9. To be eligible, candidates must achieve a minimum final grade of seven from the majority of examiners.

10. Each 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.

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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, 2019, approved during the 560th Ordinary Session of the Institute of Physics Committee, held on 11/29/2019. Decree GR 7512, 2019, 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 29th, 2019.

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