

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

Announcement IF-50, 2022

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 General 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 **“21 cm Cosmology, especially Component Separation, Fast Radio Bursts and Cosmological Models of interacting Dark Matter and Dark Energy”** 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\$13.357,25**, non-negotiable. The position nº **1018230** at the General Physics Department is open for applicants for 90 days, from **December 1st, 2022, at 12:01 a.m. to February 28th, 2023, at 05:00 p.m. (GMT -3, Brasília time)**. The following is the detailed description of the program for the examinations:

Physical Cosmology I (4305292): Introduction to the standard cosmological model. Review of General Relativity, cosmic expansion, thermal history, cosmological perturbations, structure formation, inflation, observational cosmology, dark energy, and dark matter.

Statistical Mechanics (4302401): 1. The laws of thermodynamics 2. Notions of probability; 3. Microcanonical representation. Boltzmann entropy; 4. Canonical representation. Maxwell's velocity distribution law, Partition function and connection with thermodynamics; 5. Einstein's model for the specific heat in solids. Ideal monoatomic gas. Gibbs' paradox. Ideal diatomic gas; 6. Photon gas, thermal radiation. Phonon gas, a linear chain of harmonic oscillators, Debye's theory; 7. Grand-canonical representation. Bose-Einstein and Fermi-Dirac distributions; 8. Free electron gas, electronic thermal capacity; 9. Gases and liquids, configuration integral, second virial coefficient, van der Waals theory.

Thermodynamics (4302308): 1. First law of thermodynamics. Temperature, entropy, and cyclical processes. Ideal gas law. Thermodynamics coefficients, specific heat; 2. The second law of thermodynamics, thermodynamic stability. Fundamental relation and state equations. Thermodynamic potentials, Helmholtz's free energy, Enthalpy and Gibbs' free energy. Legendre transformations and convexity. Thermodynamic identities and Maxwell's relations; 3. Third law of thermodynamics and its fundamental consequences. Phase transitions, latent heat, Clausius-Clapeyron equation. Van der Waals equation and criticality; 4. Ideal gas mixtures, Entropy of mixing. Binary mixtures. Solutions. Magnetic systems, Curie's law, and ferromagnetic phase transitions. Dielectrics. Debye's Law.

Gravitation(4300156): From the geocentric to the heliocentric universe. Kepler's Laws. Angular momentum and its conservation. Newtonian theory. Inertial mass and gravitational mass. Gravitational potential and gravitational field. Limits of the Newtonian theory. The topicality of the issue. Applications

1. Applications must be submitted exclusively via the link <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 (.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, proof of vote in the last election (both turns), or proof of payment of the respective fine or proper justification.
 - 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.

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-50, 2022, approved during the 590th Ordinary Session of the Institute of Physics Committee, held on 09/29/2022. Decree GR 7735, 2022, 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 28th, 2022.