Job description
Tenure track 2024 (chaire de professeur junior)

Faculté des Sciences et Ingénierie

Department: LPTHE, Laboratory of Theoretical and High Energy Physics
Location: Sorbonne Université, Faculté des Sciences et Ingénierie, Campus Pierre et Marie Curie, 4 place Jussieu, 75005 PARIS

Job Identification

Discipline: Astroparticle physics
Corresponding CNU sections: 29
Job title: Tenure track
Duration of the contract: 3 years
Quotity: 100%
The minimum monthly remuneration is fixed by decree at 3,443.50 euros gross
Etat du poste: open

Profil (in french)

Astroparticules et modèles théoriques de Matière Noire

Job Profile
Astroparticle physics and theory models for Dark Matter

Education

Summary of the teaching plan:
The successful candidate will be required to teach in the Master degree in fundamental physics and applications, in particular in the NPAC course which trains students in research in nuclear physics, particle physics and cosmology. Its goal is to prepare students to begin a theoretical PhD thesis in large research organizations and universities. In the fields of cosmology and astroparticle physics, the search for dark energy and dark matter represents a very important scientific challenge for the years to come; a Nobel Prize in 2011 rewarded the progress in this field. The enthusiasm of some of our students for the foundations of physics and astrophysics makes it possible to consider the development of dedicated teaching units (not only in master course), in which the recruited CPJ professor could perfectly fit, in particular by delivering lectures in English.

Distribution of financial needs:
- Use of the ANR start-up package: €200,000
- Total: €200,000

Use of the ANR start-up package:
- Post-doctoral fellow: €110,000
- Operation (travel, conferences, etc.): €90,000

Research

ERC scientific theme: Physics

Institutional strategy:
The search for Dark Matter and, more generally, theoretical astroparticle physics, at the cross-roads between elementary particle physics, cosmology and astrophysics, are often cited as the new frontier of particle physics, after the discovery of the Higgs boson, and constitute a very promising and expanding theme of activity at the national and international level. This is a field of research in full development and with strong international visibility within the Laboratory of Theoretical Physics and High Energies (LPTHE), which is a broad-spectrum laboratory (from cosmology to condensed matter) and strong international influence. The scientific context of the CPJ fits naturally into the University plan whose primary focus is academic excellence in research and training, and the strengthening of essential and dynamic disciplinary fields. The proposal is in line with one of the criteria used for the selection of CPJ proposals: welcoming emerging disciplines which are not represented or poorly represented at SU.
After the CPJ on the GRAND project (2023, IAP), this proposal is also part of a broader vision to strengthen and consolidate this type of research at SU and make it one of the world leaders in the field. It is therefore important to recruit in the field of building innovative models of dark matter and the study of new phenomena going beyond the framework of existing theories. This point is particularly crucial: "historical" research directions are already exploited and a large part of the community is redirecting toward new paths. Due to its transversal nature, this research theme requires a wide range of skills and a great scientific openness, hence a junior professor profile.

Host laboratory strategy:
Astroparticle physics is an area developed since 2015 at LPTHE, with the recruitment of Mr. Cirelli (DR CNRS) and his group. This research, and the complementary approaches of other particle physicists at the LPTHE on the study of candidates for Dark Matter within supersymmetric theories or string theory, have made the LPTHE a major player in this field. The creation of a CPJ on the subject aims to strengthen this positive dynamics and maintain the excellence of the work, as well as to compensate for the recent departures of two colleagues. Theoretical research on Dark Matter, which aims both at confronting existing data and at inspiring future research, is complementary to the experimental research component developed at the LPNHE and to the study of its astrophysical and cosmological properties carried out at the IAP.

Summary of the scientific project:
Cosmological data show that the matter in our Universe is composed of 15.7% ordinary matter and 84.3% Dark Matter, which is only revealed to us through its gravitational interactions. Its existence is essential to describe the Universe, but the particles that compose it and their non-gravitational interactions are unknown. Understanding their nature is crucial for a better understanding of the evolution and structure of our Universe, would constitute a major discovery and would unravel new fundamental physics. In the coming years an enormous amount of new experimental data from a wide variety of sources will become available. This point is particularly crucial; what is needed is to go beyond the framework of existing theories by constructing new innovative models.

Strategy in terms of international attractiveness:
The search for Dark Matter and, more generally, in theoretical astroparticle physics, at the intersection between elementary particle physics, cosmology and astrophysics, are often cited as the new frontier of particle physics after the discovery of the Higgs boson, and constitute a very promising and expanding theme of activity at the national and international level. Sorbonne University has already recognized the importance of this type of research by granting a CPJ on the GRAND project, shared between the Institute of Astrophysics of Paris (IAP) and the Laboratory of Nuclear Physics and High Energy (LPNHE). It also very recently granted a lecturer position at the LPNHE on the topic of experimental research on Dark Matter. The interaction between theoretical models and experimental data is essential in order to be able to seize the revolutionary opportunities offered by the enormous amount of data that will arrive in the years to come. The LPTHE has played a leading role in the construction of such models and wishes to continue to do so in the future, also exploiting the complementarity with the IAP and the LPNHE. Internationally, the recruited junior professor will be able to benefit from the close and already well-established links between SU (the LPTHE group) and the University of Milan (partner in 4EU+), as well as CERN in Geneva (University of Geneva in 4EU+ also) and DESY in Germany. He/she will bring his/her network of international collaborations.
The LPTHE group working on the topic has recently established several joint doctoral supervisions with foreign partners, notably with the University of Turin. Welcoming foreign students is central to this highly internationalized discipline, and perfectly in line with SU’s international strategy.

Scientific dissemination:
Like all research subjects, the achievements obtained in the context of the CPJ will result in publication in international journals and will be presented at international conferences and congresses. As this is fundamental research, no knowledge transfer activity other than publications or scientific outreach is envisaged. Concerning research, the recruited junior professor will engage in the construction of innovative models of dark matter and in the study of new phenomena going beyond the framework of existing theories. He/she will have the opportunity to interact with researchers present at LPTHE and in neighboring or partner laboratories. He/she will promote the discipline, the laboratory and the University by participating in international conferences and workshops to present the results. Concerning supervision, the recruited junior professor will have the possibility of recruiting a postdoc or a student thanks to the “package” provided. He/she will also be able to co-supervise a postdoc funded by SU in the group (contract start October 2024).
and one or more students and interns. Concerning service tasks, the recruited junior professor will take care of the organization of the group's seminars. He/she will invest in outreach with the general public.

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<th>Sigle (UMR, UMRS, etc.)</th>
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<td>Laboratory of Theoretical and High Energy Physics</td>
<td>UMR</td>
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**Application procedure**

Applications are open from 2024/03/29 10:00 am (Paris time) to 2024/04/29 4:00 pm (Paris time). Applications must be submitted on the Galaxie website. Candidates who do not have access to this Galaxie application (in particular non-French candidates) may exceptionally submit the complete application electronically according to the established schedule and procedures. Send the application files to sciences-drh-gestioncoEC@sorbonne-universite.fr with the subject "Candidature CPJ".

The documents to be attached to the application file are set by the [decree of February 6, 2023](#), as amended, concerning the general terms and conditions for the transfer, secondment and recruitment by competition of lecturers, university professors and junior professors (see in particular Title III - articles 24 to 27 and Title IV - articles 28 to 31).

Candidates who do not hold a doctorate must have their university diplomas, qualifications and titles recognized as equivalent to a doctorate, in accordance with one of the procedures provided for in article 5 of decree no. 2021-1710 of December 17, 2021 concerning the junior professorship contract provided for in article L. 952-6-2 of the Education Code and article L. 422-3 of the Research Code. Any incomplete application by the above-mentioned deadline will be declared inadmissible.

Only candidates who have been selected by the selection committee based on their applications will be invited to an interview, according to a timetable and procedures that will be communicated shortly.

Professional simulation: Non

The aforementioned [decree n° 2021-1710 of December 17, 2021](#) determines the conditions of renewal of the contract, the modalities of assessment, before the tenure, of the scientific value and the aptitude to carry out the missions of each body, the modalities of appointment of the members of the selection and tenure commissions and the conditions of the commitment to serve.

**Contacts**

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