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Post-doctoral position opening at Clermont

CP-violation Physics analyses in LHCb with charmless *b*-flavoured hadron decays. Flavour Physics prospective and electromagnetic calorimeter R&D for FCC-ee.

Program

The French Institute for nuclear and particle physics (IN2P3-CNRS) is funding one post-doc position to work for a period of two years primarily on physics analyses with the LHCb Run III data in the LHCb group at the Clermont Physics Laboratory (LPCA). A secondary project concerns novel developments for high energy physics calorimeter detector in the context of the Future Circular Colliders pre-TDR phase. The profile of this position will allow the successful applicant to develop simultaneously detector and physics analysis skills.

The LHCb-oriented part of the project aims first at measurements of three-body charmless decay modes of neutral *b*-flavoured mesons containing one neutral pion in the final state, searching for imprints of Beyond Standard Model contributions to *CP*-violating observables. The LHCb collaboration, and in particular the Clermont group, has explored in some details two classes of companion modes: the three-body charmless decay modes including a K_S^0 in the final state on one hand, and the three-body radiative decays on the other hand. The former class features a similar physics as the modes of interest in this project while the latter will be one of the important background sources to control.

The LHCb collaboration promotes an ambitious upgrade project of the LHCb experiment to make the best use of the High-Luminosity-LHC phase. In order to cope with the large number of interactions per bunch crossing, all sub-detectors must be upgraded and the Clermont group contributes to the electromagnetic calorimeter upgrade through electronics R&D related to the time measurement of the calorimeter clusters. The first prototype of the SPIDER ASIC has been produced and the first campaign of tests has started in summer 2025. The successful candidate can contribute to these tests. This instrumental work will be complemented by physics studies at simulation level to assess the required performance and guide further adjustments of the ASIC design. The decay channels with a neutral pion in the final state described above can constitute natural benchmarks in this context. Novel ideas, such as the possibility to reconstruct the decay $B^0 \rightarrow \pi^0 \pi^0$, considering one neutral pion to experience the Dalitz decay $\pi^0 \rightarrow e^+ e^- \gamma$, have been recently initiated. The obvious interest of such a reconstruction is the knowledge of the decay vertex of the *B* meson, enabling a time-dependent analysis. The successful applicant will be welcome to take part in these studies.

The last element in the scope of this post-doctoral position concerns R&D and physics prospective studies for the Future Circular Collider Study hosted by CERN in its pre-approval stage. The Clermont group is involved in the project since the beginning of the Design Study in 2014. The successful applicant is expected to contribute part-time to establish calorimeter requirements, in particular related to Flavour Physics cases. The very same decay channels that are studied in the context of the LHCb experiment can therefore be advantageously considered as well for FCC-ee. These physics prospective studies are meant to



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complement an R&D program about a novel idea of high energy-resolution electromagnetic calorimeter, studied and developed mostly in collaboration with IJCLab. Depending on interest and skills, the successful candidate can be welcome to contribute either in the instrumental or the physics sensitivity studies areas.

Context, position and main responsibilities

The successful candidate will join the Clermont Physics Laboratory (LPCA), a joint CNRS/UCA unit. The LPCA is a laboratory with approximately 150 staff, including physicists, engineers, technicians and administrative personnel, and has two main areas of research: elementary particle physics and observational cosmology on the one hand, and applications in health and the environment on the other. It conducts its experimental fundamental physics research in particular through major international particle physics collaborations at the European particle physics laboratory at CERN. Two groups are involved in this postdoctoral position: the LHCb and FCC-ee teams comprise around ten physicists and as many technical staff. The successful candidate will work within these teams and, more broadly, will be welcomed into these two international collaborations. This post-doctoral contract at LPCA will enable the candidate to work on both high-impact physics analyses with present data and detector instrumental developments. The successful candidate is expected to rapidly take on scientific responsibilities in either area.

Required qualifications

The successful applicant must have completed a PhD in Particle Physics. Acquaintance with flavour physics is preferred though not mandatory. A former experience in detector developments is a plus but is not mandatory neither.

Programming: skills in C++, ROOT and python, acquaintance with the LHCb software is preferred though not mandatory.

Language: fluency in spoken and written English.

Good communication skills and ability to work in a team.

Information

Type of contract:	<i>temporary contract</i>
Appointment period:	<i>the appointment is 24 months</i>
Scheduled Hire date:	<i>from the 15th of October 2025 [not later 1st of December 2025]</i>
Working Quota:	<i>full time</i>
Remuneration:	<i>starting from €3,021 gross per month, depending on experience</i>
Workplace:	<i>LPCA, Clermont-Ferrand, France</i>
Attachment:	<i>LHCb and FCC-ee collaborations</i>
Trips:	<i>regular travels to CERN</i>
Required level of education:	<i>PhD in Particle Physics</i>

How to apply

The applicants should submit a detailed Curriculum Vitae (including a description of their research with a list of publications highlighting their personal contributions) and a cover letter explaining the interest in the position. Application should be made through CNRS recruitment website:

<https://emploi.cnrs.fr/Offres/CDD/UMR6533-STEMON-003/Default.aspx?lang=EN>

For any additional information (or help with the national platform web application), please contact Régis Lefèvre and / or Stéphane Monteil at the following addresses: regis.lefevre@clermont.in2p3.fr, monteil@in2p3.fr. At least two letters of recommendation shall be sent directly by the referees to the two addressees above.

The deadline for the submission of the application is the 15th of October, 2025. We reserve the right not to make an appointment and continue searching after the closing date. Only shortlisted candidates will be contacted.



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