



ASSEGNO DI RICERCA

Titolo: Analisi dei dati dell'esperimento LHCf a LHC

Title: Data analysis for the LHCf experiment at LHC

DESCRIZIONE ATTIVITA' DI RICERCA

Descrizione: L'assegnista lavorerà principalmente all'analisi dati dell'esperimento LHCf per la misura della produzione di particelle neutre in avanti in collisioni di alta energia. Queste misure sono fondamentali per il miglioramento dei modelli di interazione adronica usati per simulare l'interazione dei raggi cosmici primari in atmosfera. Con il completamento del run III di LHC, l'esperimento raggiungerà i suoi principali obiettivi scientifici, grazie al run in collisioni p-p a 13.6 TeV, eseguito nel 2022, e al run in collisioni p-O e O-O previsto per il 2024. Sui dati acquisiti dall'esperimento è prevista un'intensa attività di analisi con molteplici pacchetti di lavoro, relativi alla misura della produzione in avanti di neutroni, pioni neutri e mesoni η , oltre che del K_0 , per il quale è attualmente in corso lo sviluppo dell'algoritmo di ricostruzione. Oltre all'importanza in sé, queste misure, opportunamente confrontate con quelle relative a collisioni p-p a 7 TeV, consentiranno di testare la validità di leggi di scala quali il Feynman scaling e di comprendere come la produzione in avanti sia modificata dal numero di nucleoni del nucleo bersaglio. Al candidato sarà richiesto, in base al proprio interesse di contribuire a uno o più dei pacchetti di lavoro sopra descritti. A tale scopo, il candidato acquisirà dimestichezza con il framework di simulazione, di ricostruzione e di analisi dell'esperimento, al cui sviluppo contribuirà con attività di diverso tipo a seconda del pacchetto di lavoro scelto. Il candidato verrà inoltre coinvolto nelle varie attività previste presso le strutture del CERN di Ginevra nel corso del 2024 e relative alla preparazione dell'apparato sperimentale, alle operazioni di installazione e disinstallazione su LHC, alla presa dati relativa al run p-O e ad un test di calibrazione con fasci di particelle che verrà eseguito all'SPS successivamente al run p-O.

Description: The grant holder will work mainly on data analysis of the LHCf experiment for the measurement of neutral particles emitted in the forward direction in high-energy hadronic collisions. These measurements are fundamental for the improvement of hadronic interaction models used to simulate the interaction of primary cosmic rays in the atmosphere. At the end of the LHC run III, the experiment will achieve its main scientific goals, thanks to the run with p-p collisions at 13.6 TeV performed in 2022 and the run with p-O and O-O collisions scheduled for 2024. An intense analysis activity is planned on these data with multiple work packages,



relative to the measurement of the forward production of neutrons, neutral pions and eta mesons, as well as K_0 , for which the development of a reconstruction algorithm is currently underway. In addition to their own importance, these measurements, appropriately compared with those relative to p-p collisions at 7 TeV, will allow to test the validity of scaling laws, such as the Feynman scaling, and to understand how forward production is modified by the number of nucleons of the target nucleus. The candidate will be asked, based on its interest, to contribute to one or more of the work packages described above. To this end, the grant holder will become familiar with the simulation, reconstruction and analysis frameworks of the experiment, and will contribute to their development with different types of activities depending on the work package chosen. The candidate will also be involved in the various activities planned at the CERN facilities in Geneva during 2024, relative to the preparation of the experimental apparatus, installation and de-installation operations at the LHC, to the data taking in the p-O run and to a calibration test with particle beams which will be performed at the SPS after the p-O run.

*f.to Responsabile scientifico
Prof. Oscar Adriani*



BANDO TOTALE CARICO

THE DIRECTOR

- HAVING REGARD TO the Law n. 240 of 30 December 2010, art. 22 and subsequent amendments and additions;
- HAVING REGARD TO the Decree-Law n. 192 of 31 December 2014, converted into Law n. 11 of 27 February 2015;
- HAVING REGARD TO the Law n. 476 of 13 August 1984 and subsequent amendments;
- HAVING REGARD TO the Law n. 335 of 8 August 1995 and subsequent amendments;
- HAVING REGARD TO the Law n. 127 of 15 May 1997 and subsequent amendments;
- HAVING REGARD TO the D.P.R. n. 445 of 28 December 2000;
- HAVING REGARD TO the Law n. 241 of 7 August 1990 and subsequent amendments;
- HAVING REGARD TO the Statute of the University of Florence;
- HAVING REGARD TO the current University Regulations for the implementation of the Law n. 241/1990 and subsequent amendments and additions, regarding access to administrative documents;
- HAVING REGARD TO the Legislative Decree n. 196 of 30 June 2003, Code on the protection of personal data;
- HAVING REGARD TO the current University Regulations on the protection of personal data;
- IN VIEW of the current Code of Ethics of the University of Florence;
- HAVING REGARD TO the D.R. n. 550 of 14 May 2020 of enactment of the “Regulations for the awarding of research grants” pursuant to art. 22 of the law n. 240 of 30 December 2010;
- HAVING REGARD TO the Decree of the Minister of Education, University and Research n. 102 of 9 March 2011 which establishes the gross annual minimum amount of research grants;
- HAVING REGARD TO the resolutions of the Academic Senate and of the Board of Directors respectively of 29 and 30 April 2020 which establish the maximum annual gross amount of research grants;
- RECALLED the President’s decree of 09/04/2020 Ref. n. 56053 (Directory n. 471/2020) containing the Guidelines for carrying out the online competition procedures for research grants and scholarships and research;
- HAVING REGARD TO the resolution of the Council of the Department of Fisica e Astronomia of 07/11/2023 which approves the opening of a new selection for research grants financed by Department for an amount of € 30.000,00 that will be borne by the project funds proportionately on the projects: 58504_MASSIMOBONGIRICATEN23 - Ricerca di Ateneo 2023 (€ 8.036,52) ADDEND17ADRIARTD - Addendum n. 2 di aprile 2017 all'Accordo CALET di JAXA n. 2013-018-R.0 - B98C13000540005 (€ 21.963,48)
- VERIFIED by the Director of the Department the availability of sufficient funds in its budget to cover the amount granted by this Call for Applications;

DECREES

the issuing of the following:

Call for applications, evaluating qualifications and interview for n. 1 grant in the Area of Area Scientifica for carrying out research activities.

Art.1

Object of the Call



A selection is called, based on qualifications and interview, for n. 1 grant for carrying out research activities to be performed as indicated below:

ACADEMIC DISCIPLINE	RESEARCH PROGRAMME	CURRICULAR REQUISITES AND ACADEMIC TITLES AS PER ART.3 OF THE REGULATIONS	ADDRESS OF THE UNIT OF AFFILIATION
FIS/01	Title of the Research: Data analysis for the LHCf experiment at LHC Scientific Supervisor: Prof. Oscar Adriani	<ul style="list-style-type: none">- Ph.D. in Physics- Ph.D. in research-related subjects or equivalent qualification obtained abroad- PhD in Physical Sciences- Ph.D., or equivalent qualification obtained abroad in a scientific field related to the subject of the call- Scientific-professional curriculum suitable for carrying out the research	FIS-ASTRO Via Sansone, 1 Sesto Fiorentino (FI)

The detailed research programme is an integral part of this call.

Art.2

Awarding of the grant – Renewal

The selected candidate will be awarded a grant for the amount of € 24.319,56 per year, inclusive of the social security costs payable by the grant holder. The grant will be paid in deferred monthly instalments.

The grant is awarded for the duration of **12 months with effect from 01/03/2024** and may possibly be renewed to the same person for a maximum of **six** years overall, as regulated by art. 22 of Law 240/2010 and subsequent amendments, with the exception of the period in which the grant was received in connection with the research doctorate, within the maximum limit of the legal duration of the PhD programme.

For the purposes of calculating the maximum duration, the periods spent on maternity leave or sick leave are not counted according to the provisions of current legislation.

In the event of renunciation or revocation, the places made available can be assigned to candidates placed in a useful position in the ranking for a period of not less than 12 months and compatibly with the available resources.

The renewal, at the same conditions of the original contract, is decided by the Director of the Department upon request by the Scientific Supervisor. The renewal is subject to the positive evaluation of the activity carried out by the research manager, as well as to the actual budget availability.



Art.3

Requisites for admission to the selection

For participation in the selection, the following qualifications and curricular requirements are mandatory:

Requirements:

- DT - Ph.D. in Physics
- DT - Ph.D. in research-related subjects or equivalent qualification obtained abroad
- DT - PhD in Physical Sciences
- Related Doctorate - Ph.D., or equivalent qualification obtained abroad in a scientific field related to the subject of the call

In case the prerequisite is a post-graduate degree only, a PhD will represent a preferential title for the purpose of awarding the grants.

The requirements must be met by the deadline of the Call for Applications.

All academic qualifications obtained abroad (degree, doctorate and any other qualifications) must, as a rule, be previously recognized in Italy according to current legislation on the matter. The equivalence of foreign qualifications, if not yet officially recognised, will be evaluated exclusively for the purposes of the admission of the candidate to this selection by the Admissions Board at the time of assessment of academic titles, based on the appropriate documentation (art.4 para.4).

Candidates in possession of an academic qualification obtained abroad, which has not yet been declared equivalent by the Italian authorities, must send the official translation with the “dichiarazione di valore” of the foreign qualification by the competent Italian diplomatic or consular representations in the country of origin, according to the regulations in force on the subject, within thirty days from the decree approving the selection results and in any case **within 30 days** from the decree approving the selection results and in any case at the time of signing the contract.

In case the documents are not received within this period the candidate will be not be eligible to sign the contract.

Art.4

Submission of the application and the academic titles

The application for participation in the selection, drawn up in accordance with the facsimile set out in **Annex 1**, must be sent to the Director of the Department of Fisica e Astronomia Via Sansone, 1 exclusively via electronic means, according to the following methods:

- a) by **certified email (PEC)** to the following address: fisica@pec.unifi.it. The candidates in turn must have a certified PEC email as well.
- b) by **email** to the following address: ricerca@fisica.unifi.it

To fill in the application, it is necessary to use the "Online applications" section:
<https://stlabtest.dinfo.unifi.it/beta/akademia-candidature/>

The generated application must be signed by the candidate and sent, according to one of the methods mentioned above, in PDF format together with a scan of a valid photo ID.

Please note: ALL documents must be in PDF format.



The subject line of the email must contain the following: “Application for the grant as announcement D.D. n _____ of _____”

The deadline for submitting the selection application is 22/01/2024 at hour 8.00 a.m. under penalty of exclusion for late submissions.

The interview will be held on **02/02/2024 at 15.00** in **online mode**.

The above information constitutes a formal and final convocation for the interview.

In order to be admitted to the interview all candidates must present a valid ID.

The interview will be conducted electronically in accordance with the Guidelines for the conduct of telematic competitive procedures for research grants and scholarships and research (R.D. No. 56053 (471) of 09/04/2020).

In the application letter the candidate must indicate the exact denomination of the Call they wish to apply to, indicating the Area and the Research project as per art.1.

They must furthermore declare under their responsibility, as provided for in DPR n. 445/2000, the following:

- name and surname, tax identification number (codice fiscale), date and place of birth; citizenship;
- residence and the address of the domicile chosen for the purposes of the selection (specifying the area code and telephone number) as well as the email address for any communications relating to this notice;
- the degree required, the date, the university and the country where it was obtained;
- that they do not currently have any pending administrative or criminal proceedings and, in case of past criminal or civil convictions, list all charges in detail (the date of the judgment, the judicial authority and the type of judgment, the violated rules, the number of proceedings and the penalties reported);
- that they have been dismissed, released from previous employment with a public administration for persistent insufficient performance and that they have never been discharged from other state employment pursuant to art. 127 letter d) of the Consolidated Law 10 January 1957, n. 3, for having obtained the employment through the production of false documents or formally defective, or not to be prevented from public service following disciplinary dismissal;
- that they are not aware of being subjected to criminal proceedings, or to have ongoing criminal proceedings. In the latter case, indicate the offenses for which the criminal proceedings are underway, the Authority and the status of the proceedings;
- that they enjoy civil and political rights;
- that they are not part of the permanent staff of the universities and other bodies indicated in art. 22, paragraph 1, Law n. 240/2010;
- if they are holders of research grants relating to previous periods carried out pursuant to art. 22 of Law 240/2010;
- that they are aware of the bans on accumulation and incompatibilities provided for in art.12 of this announcement;



- that they will promptly communicate any change of residence or address.

Art.5

Documents to be attached to the application

Candidates must attach to the application:

- scan of a valid ID;
- a scientific-professional CV in Italian or in English, using the European template. The CV must be signed and completed with all relevant documents and attachments;
- the scientific publications and articles in pdf format;
- a self-certification relating to the academic qualifications held, both those required for participation in the selection and any further qualifications deemed useful for the assessment, with an indication of the institution that issued them and the date it was awarded (**Annex 2**);
- for the qualification obtained abroad, if already declared equivalent, attach the relevant documentation; otherwise, attach a copy of the foreign qualification with a translation in Italian or English;
- signed and dated list of all attached titles, awards and certificates and any other document mentioned with all necessary information to retrieve them (**Annex 3**);
- **(if applicable)** Declaration of acceptance of the online mode for the interview (**Annex 5**).

In order to allow the subsequent insertion of the data relating to the researcher contract in the MIUR database, the CINECA form (**Annex 4**) must be **completed in full and signed by the candidate**, the content of which must coincide with what is indicated in the application.

The data of the successful candidate will also merge into their individual profile inside the MIUR website <https://loginmiur.cineca.it>, to which the grant holder will have access, once registered.

The Administration cannot be held responsible of the consequences deriving from incorrect indications by the candidate or from any technical/IT issues in submitting the application.

Art.6

Exclusions

Candidates are excluded from participation in the selection when any of these situations occur:

- the application has been submitted after the deadline set out in art.4;
- the application has been submitted after the deadline set out in art. 4 they have not attached the required self-declarations regarding the possession of the admission requirements, or that they have produced false or non-compliant declarations, certifications and/or documentation;

The following candidates are NOT ALLOWED under any circumstances to take part to the selection procedure those who have a relationship of kinship and affinity, up to and including the fourth degree, with academic staff belonging to the Department where they are asked to carry out the Research Project, or with the President, the General Manager or a member of the University's Board of Directors, as required by art. 18, paragraph 1 letter c) of Law n. 240, and in accordance with art. 4, paragraph 2, letter c) of the current Code of Ethics of the University of Florence, or with any of the members of the Selection Board.

The Administration may enforce these exclusion measures at any time in all cases of lack of the required prerequisites.

The Administration will carry out checks on the truthfulness of the content of the substitute declarations.

Art.7

Composition of the Admissions Board



The Admissions Board, nominated following the deadline of the call with a decree from the Director of the Department of Fisica e Astronomia, published on the Official Register of the University, it will be composed of three members chosen from tenured professors and researchers belonging to the same scientific area in which the research will be carried out. The Board can be supplemented by a representative of the funding body, if applicable. In any case, the research manager whom the grant holder will collaborate with, will be a member of the Admissions Board.

Art.8

Evaluation of qualifications and interview

The Admissions Board will evaluate, for the sole purpose of candidates' admission to the selection, the equivalence of qualifications obtained abroad that have not yet been recognized in Italy according to the legislation in force on the matter.

The Admissions Board will then carry out a comparative evaluation of the candidates by formulating an analytically motivated judgment and identifying the name of the successful candidate. With the same score, the youngest candidate in the ranking precedes.

For the evaluation of the candidates, the Admissions Board will have 100 points, **60** of which to be attributed overall to the candidate's qualifications and scientific professional curriculum and the remaining **40** points to be reserved for the interview.

The evaluation of qualifications will be carried out before the interview.

The Admissions Board will proceed first thing with the assignment of the overall scores to the evaluable items, the qualifications and the curriculum, as indicated below:

- educational qualifications, additional to the requirements for admission: up to a maximum of 5 points
- professional scientific curriculum: up to a maximum of 55 points

The Admissions Board establishes the following minimum score that candidates must achieve in the evaluation of qualifications in order to be admitted to the interview: **20** points

The Admissions Board establishes the following minimum score that candidates must achieve in the interview in order to be considered suitable: **24** points

The Admissions Board will not proceed with the evaluation of the qualifications, unless all the elements and data necessary for such evaluation are indicated.

As part of the interview, the Admissions Board will proceed to ascertain, among other aspects, the knowledge of the field subject of the call, the clarity of presentation and the suitability of the candidate to carry out the research called for.

The Admissions Board results will send a report with the final evaluation to the Director of the Department for approval.

The results of the evaluation will be published on the University's Official Register.

The results of the selection will be communicated personally to the selected candidate(s) by the Department. Any complaint against the approval decree must be filed to the Director of the



Department within ten days from the date of publication, in accordance with art. 12 the current Regulations for the assignment of research grants.

Art.9

Insurance

Research fellows are insured by the University for Civil Liability against Third Parties and for Accidents starting from the beginning of the research activity without charges against them (information on the University website on the http page: <http://www.unifi.it/vp-3514-schema-tipo-di-contratto-per-collaborazione-ad-attivita-di-ricerca.html#assicurazioni>).

Art.10

Contract and required documents

The Department will contact the successful candidate in order to sign a contract regulating collaboration in the research activity, after checking the actual availability of the funds.

To such contract must be attached a copy of the insurance policy as per previous article.

The successful candidates must, at the time of signing the contract submit copies of the following documents:

- a valid photo ID;
- tax identification number (codice fiscale);
- resident permit where it is indicated a reason consistent with the research grant (only for non-EU citizens).

Citizens of countries outside of the European Union must be in possession of one of the residence permits provided for by the current immigration legislation in order to sign the contract for research fellowship with the University of Florence. Therefore, it will not be possible to proceed with the stipulation of the contract if the winner is not in possession of a suitable residence permit. If this condition occurs, the aforementioned candidate will be declared lapsed and the contract will be offered to the next suitable candidate in the ranking.

The ascertainment of this condition will be made at the time of signing the contract.

Furthermore, even if the loss of possession of the residence permit occurs after the contract has been signed, such condition will constitute cause for its termination.

In case the candidate holds a foreign title as one of the prerequisites, and then fails to obtain by the competent Italian diplomatic or consular representations in the country of origin, and then submit within 30 days, the required legalisation and declaration of value of such academic title, he or she will be ineligible to sign the contract.

Art.11

Intellectual property

The management of industrial and intellectual property rights deriving from research carried out by university staff is governed by art. 65 of the Industrial Property Code (Legislative Decree n. 30 of 2005 and subsequent amendments) and by the "*Regulation for the management of industrial and intellectual property rights with reference to the research activities carried out by university staff*" issued with D.R. n.82735 (526) of 08/05/2019, which provides that, in the case of bound research, i.e. funded in whole or in part by private entities, or carried out in the context of specific research projects funded by public entities other than University, the industrial property rights that may result belong to the University, which remains the owner of any rights deriving from inventions obtained with the contribution of its researchers, pursuant to art.3 of the aforementioned Regulations.

Pursuant to art.1 para. 3 of the Regulations, the grant holder, with the stipulation of the contract, declares to accept the application of the rules indicated therein.



Art.12

Prohibition of cumulation – incompatibility

The grant cannot be combined with scholarships of any kind, except with those awarded by national or foreign institutions for the purpose of integrating training and research activities with stays abroad. Research grants cannot be awarded to permanent staff of universities, institutions and public research and experimentation bodies, the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) and Italian Space Agency (ASI), as well as of institutions whose scientific specialization diploma has been recognized as equivalent to the title of research doctor pursuant to art.74, fourth paragraph, of the decree of the President of the Republic 11 July 1980, n.382.

Employees serving in public administrations or private entities other than those specified in the paragraph above, with full-time, part-time or fixed term contract, are entitled to hold a research grant on the condition that they be placed on leave without pay for the duration of the research project or that their private employment contract is put on hold.

The awarding of the grant is not compatible with participation in degree programmes of any level including specialist or professional master courses, PhD with scholarship or medical specialization, in Italy or abroad.

The holder of the grant cannot be in a relationship of kinship and affinity up to the fourth degree included with any academic belonging to the Department where the research is carried out, or with the President, the General Manager or a member of the University's Board of Directors, as required by art.18, paragraph 1, letter c) of Law n.240/2010, and in accordance with art.4, paragraph 2, letter c) of the current Code of Ethics of the University of Florence as well as with any member of the Admissions Board as per art.6 of this Call.

The research grant holder can carry out self-employed work only after authorization by the Department Council, having heard the motivated opinion of the scientific director of the grant, after verifying that this activity is:

- a. compatible with the research activity set out in the grant;
 - b. not prejudicial to the conduct of research activities;
 - c. not in conflict of interest with the specific research activity carried out;
- also taking into account the reporting rules set forth by the funding body.

Art.13

Suspension of the contract

The research activity must be suspended for maternity leave. In this case, the provisions of the decree of the Minister of Labour and Social Security 12 July 2007, published in the Official Journal n.247 of 23 October 2007 will apply.

The period of compulsory suspension for maternity will be recovered at the end of the natural expiry of the contract in accordance with the provisions of current legislation.

The research activity can be suspended for grave illness or for serious family reasons and also in this case, the suspension periods can be recovered at the end of the natural expiry of the contract, subject to agreement with the academic in charge and in compliance with the limits imposed by the funds available.

During the period of compulsory maternity leave, the allowance paid by INPS, or by another social security fund, is integrated up to the full amount of the grant with monies paid by the University. In case of maternity or any other type of leave, reference is made to art.22 paragraph 6 of Law n.240/2010.

Concerning sick leave, the law that applies is n.296, art.1, paragraph 788 and subsequent amendments and integrations.



The suspension measure is ruled by a decree from the Director of the Department where the research is conducted.

Art.14

Termination of the contract

If the researcher does not continue the activity foreseen by the research program without a justified reason or is responsible for serious or repeated shortcomings, at the motivated request of the Research Manager and with the resolution of the Council of the Department, the termination of the contract can be ordered, pursuant to art.1453 et seq. of the civil code.

The termination measure is ruled by a decree from the Director of the Department where the research is conducted.

Art.15

Withdrawal by the research grant holder

The grant holder has the right to withdraw from the research programme, giving a notice of at least **15 (fifteen)** days addressed to the Director of the Department and to the research project manager.

Failure to do so implies the withholding of the amount corresponding to the period of mandatory advance notice.

Art.16

Attending PhD courses

The research grant holder can attend, as an extra and without the right to any scholarship, PhD courses, provided that he/she passes the required admission tests and, if applicable, pays any fee connected to the courses.

Art.17

Tax and social security provisions

The provisions of Art.4 of the Law n.476 of 13 August 1984 and subsequent amendments and additions, apply to research grants regarding tax matters. As far as social security is concerned, the applicable law is n.335 of 8 August 1995, art.2, paragraphs 26 and following and subsequent amendments.

Art.18

Personal data processing

Candidates are invited to read the “Information for the processing of personal data of interested parties to participate in personnel recruitment procedures or selection procedures for admission to courses with a limited number or for the awarding of research grants, scholarships, collaborative and/or teaching assignments” available at:

https://www.unifi.it/upload/sub/protezionedati/Informativa_SELEZIONI.pdf

The application forms and documents produced by the candidates constitute “administrative documents” with respect to which, except in exceptional cases, the need for confidentiality must be excluded. These documents, once acquired by the selection procedure, are no longer considered to be within the personal sphere of the participants who, therefore, do not take on the role of counter parties, in any claim to access the documents of the procedure by another party. In any case, the provisions of the GDPR (EU Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 published on the OJEU of 04 May 2016), relating to the protection of individuals with regard to the processing of Personal Data and the movement of such data, will be abided to.

Art.19

Procedure manager



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DIPARTIMENTO DI
FISICA E ASTRONOMIA

The manager for this selection procedure is Dott.ssa Paola Maffia, address Via Sansone, 1 - 50019 - Sesto Fiorentino, ph. 0554572082, e-mail ricerca@fisica.unifi.it, Certified e-mail (pec) fisica@pec.unifi.it

Art. 20

Final provisions and publication

For all matters not provided for in this announcement, reference is made to the current legislation in force.

The notice will be posted in the University's Official online Register, on: <https://www.unifi.it/vp-391-assegni-di-ricerca.html>, on the website of the Ministry of Education and Research (MIUR) and on the European Union's Euraxess website.

Sesto Fiorentino,

THE DIRECTOR OF THE DEPARTMENT

Prof. Duccio Fanelli



RESEARCH GRANT

Title: Data analysis for the LHCf experiment at LHC

Titolo: Analisi dei dati dell'esperimento LHCf a LHC

DESCRIPTION OF THE RESEARCH ACTIVITY

Description: The grant holder will work mainly on data analysis of the LHCf experiment for the measurement of neutral particles emitted in the forward direction in high-energy hadronic collisions. These measurements are fundamental for the improvement of hadronic interaction models used to simulate the interaction of primary cosmic rays in the atmosphere. At the end of the LHC run III, the experiment will achieve its main scientific goals, thanks to the run with p-p collisions at 13.6 TeV performed in 2022 and the run with p-O and O-O collisions scheduled for 2024. An intense analysis activity is planned on these data with multiple work packages, relative to the measurement of the forward production of neutrons, neutral pions and eta mesons, as well as K₀, for which the development of a reconstruction algorithm is currently underway. In addition to their own importance, these measurements, appropriately compared with those relative to p-p collisions at 7 TeV, will allow to test the validity of scaling laws, such as the Feynman scaling, and to understand how forward production is modified by the number of nucleons of the target nucleus. The candidate will be asked, based on its interest, to contribute to one or more of the work packages described above. To this end, the grant holder will become familiar with the simulation, reconstruction and analysis frameworks of the experiment, and will contribute to their development with different types of activities depending on the work package chosen. The candidate will also be involved in the various activities planned at the CERN facilities in Geneva during 2024, relative to the preparation of the experimental apparatus, installation and de-installation operations at the LHC, to the data taking in the p-O run and to a calibration test with particle beams which will be performed at the SPS after the p-O run.

Descrizione: L'assegnista lavorerà principalmente all'analisi dati dell'esperimento LHCf per la misura della produzione di particelle neutre in avanti in collisioni di alta energia. Queste misure sono fondamentali per il miglioramento dei modelli di interazione adronica usati per simulare l'interazione dei raggi cosmici primari in atmosfera. Con il completamento del run III di LHC, l'esperimento raggiungerà i suoi principali obiettivi scientifici, grazie al run in collisioni p-p a 13.6 TeV, eseguito nel 2022, e al run in collisioni p-O e O-O previsto per il 2024. Sui dati acquisiti dall'esperimento è prevista un'intensa attività di analisi con molteplici pacchetti di



lavoro, relativi alla misura della produzione in avanti di neutroni, pioni neutri e mesoni eta, oltre che del K0, per il quale è attualmente in corso lo sviluppo dell'algoritmo di ricostruzione. Oltre all'importanza in sé, queste misure, opportunamente confrontate con quelle relative a collisioni p-p a 7 TeV, consentiranno di testare la validità di leggi di scala quali il Feynman scaling e di comprendere come la produzione in avanti sia modificata dal numero di nucleoni del nucleo bersaglio. Al candidato sarà richiesto, in base al proprio interesse di contribuire a uno o più dei pacchetti di lavoro sopra descritti. A tale scopo, il candidato acquisirà dimestichezza con il framework di simulazione, di ricostruzione e di analisi dell'esperimento, al cui sviluppo contribuirà con attività di diverso tipo a seconda del pacchetto di lavoro scelto. Il candidato verrà inoltre coinvolto nelle varie attività previste presso le strutture del CERN di Ginevra nel corso del 2024 e relative alla preparazione dell'apparato sperimentale, alle operazioni di installazione e disinstallazione su LHC, alla presa dati relativa al run p-O e ad un test di calibrazione con fasci di particelle che verrà eseguito all'SPS successivamente al run p-O.

*f.to Scientific Supervisor
Prof. Oscar Adriani*

TEMPLATE OF APPLICATION FORM

To the Director
of the Department of Fisica e Astronomia
Via Sansone, 1
50019 Sesto Fiorentino

I, the undersigned, request to participate in the selection referred to in the announcement issued by the Director's Decree n. of for the award of n. 1 research grant to join the Research Programme: Data analysis for the LHCf experiment at LHC of the Area Scientifica at the Department of Fisica e Astronomia.

Aware that in accordance with articles 75 and 76 of 28/12/00 n.445, in the case of false declarations, false information in the documents or use of false documents, I will incur the penal sanctions referred to and will immediately lose the right to the research grant

I THEREFORE DECLARE

Pursuant to art.19, 46 and 47 of the D.P.R. n.445/2000:

Family name First name

Place of birth (town).....(province/state and country.....)

Date of birth

Permanent address (town).....

(province/state and country.....)

street name, n Zip code.....

Domicile during the research project duration, if different from permanent address:

(town).....

(province/state and country.....)

street name, n Zip code.....

cell. ph.....

Tax ID number (codice fiscale).....e-mail

Nationality.....

I also declare the following

- I **hold** the foreign university title (specify if undergraduate, post-grad, etc)....., in (specify academic field)..... at the University of..... Graduation date..... Final mark.....
- I **hold** an Italian post-graduate degree obtained prior to 1999 in.....at the University of..... Graduation date..... Final mark.....
- I **hold** an Italian post-graduate degree according to D.M. 509/99 Class...../S in.....at the University of..... Graduation date..... Final mark.....
- I **hold** an Italian post-graduate degree according to D.M. 270/04 Class LM-..... in.....at the University of..... Graduation date..... Final mark.....
And not to exceed with this research grant the limit of 6 years total established in Article 6, paragraph 2a of Law n. 11/2015;
- I **am enrolled in the PhD programme** in (cycle.....) at the University of Date of commencement..... Ending on.....
() with grant () without grant
- I **hold a PhD title** in at the University of..... Graduation date..... OR – the discussion of my PhD thesis will be held before the date of the evaluation of the titles by the Admissions Board (specify the expected date of discussion of the thesis).....
- I **hold a Specialisation title** in Graduation date..... at the University of.....
- I **hold a research grant** (indicate for each grant the university of affiliation and related period)
from...../...../..... to/...../..... at
from...../...../..... to/...../..... at
from...../...../..... to/...../..... at
from...../...../..... to/...../.....at
And not to exceed with this research grant the limit of 6 years total established in Article 6, paragraph 2a of Law n. 11/2015;
- I have never received a research grant;
- I hold the following further academic and/or professional qualifications (*indicate all the data necessary for verification by the structure*):
.....
.....
.....
- I do not currently have any pending administrative, criminal or civil proceedings as per current legislation;
OR
- I have had past criminal convictions (list all charges with the date of the judgment, the judicial authority and the type of judgment, the violated rules, the number of proceedings and the penalties reported);
- that I have never been dismissed or released from previous employment with a public administration for persistent insufficient performance and that I have never been discharged from other state employment pursuant to art.127 letter d) of the Consolidated Law n.3/1957, for having obtained the employment through the production of false documents or formally defective; and that I have not been prevented from public service following disciplinary dismissal;
- that I am not aware of being subjected to criminal proceedings;
OR

- that I have ongoing criminal proceedings. In such case, indicate the offenses for which the criminal proceedings are underway, the Authority and the status of the proceedings;
- that I enjoy full civil and political rights;
- that I am not part of the permanent staff of the universities and other bodies indicated in art.22, paragraph 1, Law n.240/2010;
- that I am aware of the bans on accumulation and incompatibilities provided for in art.12 of this announcement;
- that I will communicate any change of residence or contact details.

I, the undersigned, declare that I am aware of the information for the processing of personal data of subjects willing to participate in selection procedures for staff recruitment, research grant/scholarship awarding or participation in restricted access courses and teaching or collaboration contracts. Such information can be consulted at this page:

https://www.unifi.it/upload/sub/protezionedati/Informativa_SELEZIONI.pdf

Date,

Signature

Attach a copy of your ID

**Declaration of affidavit
(Dichiarazione sostitutiva di atto di notorietà)
Given pursuant to art.19 and 47 of DPR n.445 of 28/12/2000**

I, the undersigned
Place of birth Date of Birth.....
Permanent address.....

Aware that pursuant to art.75 and 76 of DPR N.445 of 28/12/00, in the event of false declarations or use of false deeds, I will incur the criminal sanctions referred to and will immediately become ineligible for any assignment of the research grant:

I DECLARE

that all documents attached to the application and listed below are true copies of the originals in my possession:

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

Date,

Signature

LIST OF ATTACHMENTS

I, the undersigned, (family name and first name).....
Place of birth (town).....
(province/state and country.....)
Date of birth

Permanent address (town).....
(province/state and country.....)
street name, nZip code.....

Domicile during the research project duration, if different from permanent address:
(town).....
(province/state and country.....)
street name, nZip code.....

cell. ph.....

I hereby **ATTACH** to the application the following documents:

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

Date,

Signature

CINECA form for Research Grant Contracts

(the data provided below must be identical to those submitted in the call for application)

PERSONAL and CONTACT DETAILS

Tax Identification Number (Codice Fiscale) *(please write clearly and in block letters)*

Family name _____ **First name** _____

M/F _____ **Date of birth** *(dd/mm/yyyy)* ____/____/____ **Place of birth** (town, province, country) _____

Nationality _____

E-MAIL _____ **CELL. PH.** _____

ADDRESSES

PERMANENT ADDRESS:

(town) _____

(province/state and country) _____

(street name) _____ **n.** _____ **ZIP CODE** _____

DOMICILE: *(only if different from permanent address)*

(town) _____

(province/state and country) _____

(street name) _____ **n.** _____ **ZIP CODE** _____

FISCAL DOMICILE: *(only if different from permanent address)*

(town) _____

(province/state and country) _____

(street name) _____ **n.** _____ **ZIP CODE** _____

ACADEMIC TITLES:

(...) Foreign title _____

() Italian Laurea prior to 1999 _____

() Italian Laurea Specialistica DM 509/99. Class ____/S (_____)

() Italian Laurea Magistrale DM 270/04. Class LM-____ (_____)

obtained at the University of _____

Graduation date _____ (A.Y. ____/____) Final mark _____

() Specialisation title in _____ date _____

A.Y. ____/____ University of _____

() PhD in _____

Graduation date _____ at the University of: _____

Cycle _____ Date commencement _____ Date ending _____

months of duration _____

Grant NO () YES () from ___/___/___ to ___/___/___ n. months _____

PROFESSIONAL BOARD REGISTRATION N. _____

Board's name and address _____

CONTRACT DATA

Unit of affiliation: Fisica e Astronomia

Public call data: Director's Decree n. of

Duration (months): 12 Contract's beginning date (dd/mm/yyyy): 01/03/2024

Research Supervisor/Manager: Prof. Oscar Adriani

Title of the research project: Data analysis for the LHCf experiment at LHC

Academic discipline: FIS/01

Further disciplines (if applicable) _____

Date,

Signature

Declaration of acceptance for the evaluation session in distant mode of the selection for the assignment of a research grant as per Decree n. of (art.2 Guidelines for carrying out the online public competition procedures for research grants and scholarships (D.R. of 09/04/2020 Ref. n.56053 (Repertory n.471/2020))

I, the undersigned _____
Tax ID number _____
Place of birth (country) _____ (_____)
Date of birth ____/____/____
Permanent address _____

DECLARE

- that I accept the distant mode of this procedure;
- that I will not use any help tools;
- that I guarantee the absence of any person in the room that could provide support during the interview;
- I acknowledge and accept that the administration will have no responsibility for IT technical problems, which could occur during the connection for both the candidate and the Admissions Board.

Date:

Place:

Signature of the candidate

("firma digitale" or handwritten, in full and legible. In case of handwritten signature, a copy of the applicant's ID must also be attached)"firma digitale" or handwritten, in full and legible. In case of handwritten signature, a copy of the applicant's ID must also be attached)