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INTERNATIONAL THESIS CO-SUPERVISION AGREEMENT

BETWEEN

Claude Bernard Lyon 1 University
Located at 43 boulevard du 11 novembre 1918 - 69622 VILLEURBANNE Cedex - France
Represented by its President, Prof. Bruno LINA
Hereinafter referred to as Université Lyon 1

AND

Universidad Nacional de Rosario
Located at Maipu 1065, S2000CGK Rosario, Santa Fe - Argentina
Represented by its rector Franco BARTOLACCI
Hereinafter referred to as «UNR»

Université Lyon 1 and **UNR** are hereinafter jointly referred to as **"the institutions"** and individually as **"the institution".**
The **University Lyon 1**, **UNR** are hereinafter jointly referred to as the "parties" and individually as the "party".

In accordance with the provisions set out:

For the University Lyon 1
Considering the Order of 25 May 2016 establishing the national framework for training and the procedures leading to the award of the national doctoral diploma, and in particular Title III thereof, amended by the Order of 26 August 2022,
Considering the rules of the University Lyon 1 applicable to the defence of a co-supervised thesis,
Considering the University Lyon 1 cotutelle charter.

For UNR
Considering the Higher Education law 24.521
Considering the Ministerial Resolutions 160/11 and 2385/15,
Considering the Ordinance 666/10 of Universidad Nacional de Rosario – General Regulations for Postgraduate Careers and activities.

PREAMBLE

The purpose of this agreement is to set up a thesis co-supervision procedure between the two establishments mentioned above in order to define the terms and conditions for the preparation of the doctoral thesis of Mrs Camilla STRUBBIA MANGIARELLI, entitled "*Study of inelastic physical processes due to the impact of ions on biological matter and its application to clinical dose calculation for hadrontherapy.*" and described in the appendix.

It is mutually agreed that :

TITLE 1 - ADMINISTRATIVE CONDITIONS

ARTICLE 1.1 - Preparation of the thesis

The reference duration for the preparation of the thesis is three (3) years in full-time devoted to research. Beyond three years, and depending on the case, an extension of the deadline for the completion of the thesis may be conceded by the heads of the institutions, after approval by the director of the doctoral school.

This agreement is valid until August 2028. In the event of an extension, an amendment to this agreement will be drawn up and signed.

ARTICLE 1.2 - Registration for the thesis, registration fees, social security coverage and civil liability

1-2-1 The doctoral student will be registered simultaneously and without interruption in both institutions, each year. She will be registered in :

- The **Doctoral School Physique et Astrophysique (PHAST)** and **the University Lyon 1** from **the academic year 2024 / 2025**
and at
- **UNR** from **September 2023**

1-2-2 Registration and tuition fees are paid in one institution only, the other institution agrees to exempt the doctoral student from paying registration and tuition fees (subject to any fixed fees imposed by the legislation applicable in that institution). The registration fees will be paid according to the following schedule:

Academic year 2024 / 2025	**UNR**
Academic year 2025 / 2026	**University Lyon 1**
Academic year 2026 / 2027	**UNR**

In case of 4th and/or 5th or + the payment will be alternated

When registration fees are due to the University Lyon 1, the doctoral student must also pay the CVEC (Contribution Vie Etudiante et de Campus) to the CROUS using the platform: https://cvec.etudiant.gouv.fr/

1-2-3 The doctoral student must ensure that she has a medical coverage (including maternity and accident risk) in the host country

The doctoral student must take all the necessary formalities with an insurance company of her choice in order to be covered by a civil liability insurance.

ARTICLE 1.3 - Rights and obligations

1-3-1 While in the institutions, the doctoral student will be placed under the authority of the directors of the laboratories where she will be staying. She will be required to respect the rules and regulations in force in these premises, in particular those relating to safety, and in general, to comply with any instructions that may be given to him by his thesis supervisors and/or by the laboratory directors.

1-3-2 The doctoral student must comply with the regulations of the country where she will be staying, in terms of visa and residence status.

ARTICLE 1.4 - Financial resources

The student expresses that she is the holder of a PhD fellowship granted by Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) of Argentina,
In France, It's the responsibility of the thesis directors to ensure that the doctoral student has the correct and sufficient material and financial conditions to guarantee the successful completion of her thesis, and, if necessary, to ensure that they comply with the rules of the institution.

Financial resources of the doctoral student

Type of funding	Origin	Amount net / month	Duration of funding
Grant	Conicet scholarship	**700 €**	until April 2028
MAMBA	Européan project	**1600 €**	until October 2027
Research contract	LabEx PRIMES	**payment of plane tickets**	Ends 2025

TITLE 2 : PEDAGOGICAL AND SCIENTIFIC MODALITIES

ARTICLE 2.1- Supervision and follow-up of the thesis

2.1.1 The thesis will be prepared under the joint supervision of :

For **the University Lyon 1**

Name and surname of the thesis director:	**Professeur Mickaël BEUVE**
Title:	**Professeur des Universités**
Laboratory:	**UMR5822 – IP2I**

and for **UNR**

Name and surname of the thesis director:	**Mariel Elisa GALASSI**
Title:	**Associate Professor**
Laboratory:	**Rosario Institute of Physics**

The supervisors agree to fully exercise the function of thesis director with the doctoral student. Their role is defined by the legislation in force in each institution.
If, during the preparation of the thesis, a change of thesis director occurs, the modification will have to be the object of an amendment to this agreement.
The coordination of the actions of the thesis directors is notably expressed through exchanges of information and periodic meetings. Each laboratory is responsible for paying the costs of travel and accommodation that result from these meetings. In the case of UNR, the travel expenses will be covered by international projects which allow to finance mobility.

At the University Lyon 1, the thesis director agrees to respect the internal regulations of the **Doctoral School PHAST**

2.1.2 Follow-up of the thesis:

- At the **University of Lyon 1**, the doctoral student's **« Comité de suivi de thèse » (CSI)** ensures that the thesis is progressing well, based on the doctoral charter and the training agreement.

In an interview with the doctoral student, the Committee evaluates the conditions of her formation and the progress of her research. It makes recommendations and sends a report on the interview to the director of the doctoral school, the doctoral student and the thesis director.
The Committee meets at least once a year from the first year of the thesis until the thesis defense. The CSI is obligatory for the re-registration in the next year.

- At **UNR**:
At the UNR: the Academic Committee of the Doctoral Programme in Physics will supervise the doctoral candidate and may request annual progress reports, oral presentations and any other case aimed at improving the course of study and progress in the programme. During the third year of the development of the thesis plan, the doctoral candidate must make a presentation on the progress made in the work plan, the approval of subjects and the participation in scientific events in the presence of an evaluation committee appointed ad hoc by the Academic Committee. This committee will give its opinion on the information provided by the doctoral candidate to the Academic Committee. A positive evaluation of the presentation given will be a necessary condition for the continuation of the corresponding doctoral studies.

Article 2.2 - Organization of scientific work

2-2-1 The doctoral student's research work will be carried out:

- At the **University Lyon 1** within the research unit

Name of the Research Unit :	**UMR5822 - Institute of the 2 Infinitie Physics of Lyon (IP2I)**
Name and surname of the Laboratory Director:	**Dr. Anne EALET**
Full adress	**Campus LyonTech la Doua Bâtiment Robert Van De Graaff 4 rue Enrico Fermi - 69622 Villeurbanne**

- At **the UNR** within the research unit

Name of the Research Unit :	**FCEIA Universidad Nacional de Rosario**
Name and surname of the Dean:	**Mauro Soldevila**
Full adress	**Av. Pellegrini 250, S2000 BTP, Santa Fe, Argentine**

2-2-2 The research work will be executed alternately in the two establishments according to the calendar elaborated below jointly by the two thesis directors. The schedule is provisional and may be modified by the thesis directors according to the progress of the work. The administrative services (see Title V) must be informed of any changes made.

Academic year 2024 /2025		
Location : University Lyon 1	From 03/09/2024	To 03/12/2024
Location : UNR	From 04/12/2024	To 31/08/2025
Academic year 202 /202		
Location : University Lyon 1	From 01/09/2025	To 15/12/2025
Location : UNR	From 16/12/2025	To 31/08/2026
Academic year 202 /202		
Location : University Lyon 1	From 01/09/2026	To 15/12/2026
Location : UNR	From 16/12/2025	To 31/01/2027
Location : University Lyon 1	From 01/02/2027	To 31/05/2027
Location : UNR	From 01/06/2027	To the defence

Article 2.3 - Doctoral formation

In addition to her work, the doctoral student will receive formation, and must satisfy the requirements of the doctoral program of each of the partner institutions.

For the **University Lyon 1**, the formation program of the **ED PHAST** is the following:

- 30 hours of professional training and 30 hours of scientific training, including training in research ethics and/or scientific integrity.
The training courses may be chosen from the UDL training catalogue or proposed to the PHAST Doctoral School Management by the doctoral student in accordance with his/her professional project.

The Doctoral School may, after validation with the doctoral student, recognise the training courses followed by the doctoral student in the partner institution.

For information: At the University of Lyon 1, French language courses can be given to non-French speaking PhD students: https://scel.univ-lyon1.fr/francais-langue-etrangere-fle

For the **UNR**, the formation program of the doctorate in Physics is the following:

a) Basic cycle (210 hours, 21 credits)
b) Advanced cycle (340 hours, 34 credits)
c) Doctoral thesis (700 hours, 70 credits)

TITLE 3 : DEFENSE AND DIPLOMAS

Article 3.1 - Authorization to defend

3.1.1 Before considering defending her thesis, the doctoral student must ensure that she has all the prerequisites necessary for the ED PHAST to give a favourable opinion.

3.1.2 Authorization to defend the thesis is granted by the two heads of establishment following an assessment and defence procedure that complies with the rules in force in each of the partner establishments.

The defence of the thesis is subject to the prior examination of the research work by at least two reviewers proposed by the thesis co-supervisors, external to the two co-supervision partner institutions, to the doctoral student's research units and unrelated to the thesis or its follow-up.

Article 3.2 - Composition of the jury and thesis defence

3.2.1 The files for the organization of the defence and in particular the documents concerning the selection of the reviewers and the members of the jury **must be submitted for validation to the administrative services of both institutions at the same time**. The responsibility to coordinate this process resides with the doctoral student and her supervisors at both institutions.

3.2.2 The jury is appointed jointly by the two institutions. It must be composed of :
- **a balanced proportion of members from each institution**. For the University of Lyon 1, the presence of the thesis director and a Lyon 1 research professor (Professor or Senior Lecturer) on the jury is obligatory;
- **at least 50% of the members must be external to the two institutions and the doctoral student's research units**;
- **at least50% of professors or equivalent personnel**;
- **abalanced representation of men and women**.

The number of jury members shall be uneven, comprising no less than five (5) and no more than seven (7) members.

3.2.3 The travel and subsistence expenses of the members of the thesis jury are the responsibility of :

- For the **University of Lyon 1: UMR5822 – IP2I**
- For **UNR: EPEC FCEIA – IFIR CONICET. Funds available from international mobility projects will be used to cover expenditure.**

3.2.4 The members of the jury designate from among themselves a president who cannot be one of the thesis co-directors. The president writes a single defence report countersigned by the members of the jury. The language used for the writing of the defence report considers the nationalities present in the jury, in the interest of the doctoral student.

3.2.5 **Exceptionally**, and with the exception of the president of the jury, the members of the jury may participate in the defence by videoconference or electronic communication means that allow them to be identified and to participate effectively in a collegial deliberation and that meet the technical characteristics that guarantee the continuous and simultaneous transmission of the debates.
For the University of Lyon 1, a derogation request for the use of videoconferencing must be made beforehand to the PhD & HDR Center in charge of organizing the defence.

3.2.6 The thesis will be defended in a single session at: **Universidad Nacional de Rosario**

- The defence will be presented in **English and Spanish** and completed by an extended oral summary in **French and in Spanish.**
- The thesis will be written in **English** and completed by a substantial summary in **French. At UNR, the doctoral student will present the thesis written in Spanish.**

At the end of the defence, if admitted, the doctor will have to swear an oath before her peers and the President of the jury who will be the guarantor of this oath.

Article 3.3 - Diplomas awarded

In accordance with the regulations in force in each partner institution and on the basis of a favorable defence report:

- The University of Lyon 1 will confer on **MrsCamilla STRUBBIA MANGIARELLI** the degree of Doctor and will deliver to her the corresponding University of Lyon 1 diploma.
- The UNR will confer on **MrsCamilla STRUBBIA MANGIARELLI** the grade of Doctora en Física and will deliver to her the corresponding diploma of the Universidad Nacional de Rosario.

On both diplomas, there is an indication of the specialty or discipline, the title of the thesis or the title of the main work, the mention of the co-supervision and the collaboration of the partner institution, the names and titles of the jury as well as the date of the defence.

In order to receive the title, the doctoral student must meet the conditions required by each institution.

Article 3.4 - Deposit, reporting and reproduction of the thesis

The deposit, reporting and reproduction of the thesis are governed by the regulations in force in each country and ensured according to the procedures of each institution.

TITLE 4- PROTECTION AND EXPLOITATION OF RESULTS

Article 4.1 - Protection and exploitation of results

Protection of the subject matter of the thesis together with the publication, use and protection of the results of the research emanating from the work of the Student in the two establishments shall be

governed by the regulations in force and secured in accordance with the specific procedures proper to each of the countries involved in the joint supervision.

Nothing in this agreement shall affect the ownership of the parties' own knowledge and related intellectual property rights existing prior to the entry into force of the agreement or generated outside the thesis work.

"Results" refers to the results, whatever their nature, form or medium, resulting from the thesis work, whether or not they can be protected by an intellectual property right, and the related intellectual property rights.

Each institution is the sole owner of the Results developed by its own staff. This establishment may decide at its sole discretion to protect the said Results by an intellectual property title, such as a patent application, in its sole name and at its own expense in any country whatsoever, mentioning the name of the inventor.

If, in the course of carrying out the thesis work, the two institutions jointly contribute to the Results in such a way that this Result is indivisible and that, under applicable law, it is not possible to separate them for the purposes of filing and/or maintaining patent protection or any other intellectual property right available to protect these Results, the institutions will be co-owners of these Results in proportion to their intellectual contributions to the joint Results (hereinafter "Joint Results").

The results developed by the doctoral student are the joint results of the institutions.

In the case of patentable Joint Results, the institutions will decide whether the Joint Results should be the subject of patent applications filed in their joint names. Through their technology transfer services, the institutions will designate which of them will be responsible for carrying out the formalities for filing and maintenance. Unless otherwise agreed in writing, the costs of filing, obtaining and maintaining new patents in joint ownership will be borne by the joint owner institutions according to their share of ownership as defined above.

Each establishment has a worldwide, non-exclusive, non-transferable, non-sublicensable and fully-paid right to use all the Results for internal non-commercial research and teaching purposes.
In the event of commercial exploitation of the Joint Results, the establishments undertake - prior to any exploitation - to sign an agreement setting out the conditions for the exploitation of the Joint Results.

For the avoidance of doubt, the stipulations described above do not affect the copyright established by the doctoral student as part of her thesis work.

Protection of the subject matter of the thesis together with the publication, use and protection of the results of the research emanating from the work of the Student in the two establishments shall be governed by the regulations in force and secured in accordance with the specific procedures proper to each of the countries involved in the joint supervision.

Article 4.2 - Confidentiality

Each establishment undertakes not to disclose to any third party any information disclosed to it under this agreement and marked by the disclosing party as confidential or declared confidential in writing. This obligation shall remain in force after the expiry or termination of this Agreement.
The above obligations of confidentiality do not apply to information (i) which was in the possession of the recipient prior to the conclusion of this agreement, (ii) which has entered the public domain prior to or subsequent to its disclosure, without breach of this agreement, (iii) which has been lawfully received from a third party, iv) the use or disclosure of which has been authorised in writing by the institution from which it emanates, v) which has been developed by the staff of the receiving institution independently of this agreement and in good faith, or vi) which is required to be disclosed by law, court order or decision of the public authorities.
This clause applies to the doctoral student.

Article 4.3 - Publication and Communications

The arrangements for the submission, description and reproduction of the thesis are governed by the regulations applicable in each establishment.

Each Institution undertakes not to publish, in any way whatsoever, the proprietary knowledge of the other institution of which it may become aware, as long as this information is not in the public domain or as long as this institution has not received the prior agreement of the institution owning the proprietary knowledge concerned.

For the duration of the agreement and the two (2) years following its expiry or termination, any planned publication or communication of information relating to thesis work by one of the establishments must receive the prior written agreement of the other establishment.

The other establishment will make its decision known within a maximum of one (1) month from the date of notification of the request:

- unreserved acceptance of the publication or communication project; or
- requesting modifications, in particular if certain information contained in the draft publication or communication is of such a nature as to be prejudicial to the industrial and commercial exploitation of the proprietary knowledge and/or the Results; or
- request that the publication or communication be postponed if it considers that there are real and serious reasons for doing so, in particular if the information contained in the draft publication or communication needs to be protected under industrial property law.

In the absence of a response from an institution by the end of this period, the agreement of this institution will be deemed to have been obtained.

Publications and communications must mention the contribution made by each of the institutions to the completion of the thesis work, in compliance with the rules applicable in each institution (for Université Lyon 1: the signature charter for the scientific production of Université Claude Bernard Lyon 1). In the case of Universidad Nacional de Rosario, resolution 5425/2017 is in force: UNR Open Access Institutional Policy.

The stipulations of the present article may not prevent the doctoral student from defending her thesis. This defence is organised in compliance with university regulations and the stipulations relating to confidentiality. If necessary, it may be held in camera and each member of the jury will be bound by a confidentiality agreement.

TITLE V - ADMINISTRATIVE FOLLOW-UP

For any question or correspondence relating to the present agreement, it is necessary to contact the managers of the thesis cotutelles, namely

at the University of Lyon 1:
Mrs. Gisèle Barbier - gisele.barbier@univ-lyon1.fr
Université Lyon 1
DRED - Pôle Doctorat & HDR – Bâtiment Atrium
43 boulevard du 11 novembre 1918 - 69622 VILLEURBANNE Cedex - France

to UNR:
Mrs. Silvana Fittipaldi - silfittipaldi@gmail.com
Rosario National University
Av. Pellegrini 250, S2000 BTP, Santa Fe, Argentine

TITLE 6 : GENERAL CLAUSES

Article 6.1 - Effective date and validity

The present agreement will take effect on the date of the last signature. It shall be valid for the duration of the research work. This agreement will remain in force until August ,2028.

Article 6.2 - Termination

The present agreement will be terminated automatically in the event that the doctoral student renounces, in writing, to continue her thesis under cotutelage, or in the event that the heads of the institutions jointly decide not to authorize the doctoral student to continue her thesis.
In the event that one of the two co-directors resigns as thesis director, the doctoral student will be given a period of time to find a replacement. Failing this, the two institutions may terminate the agreement.

Any one of the parties can terminate this agreement by means of a written notice submitted at least SIX (6) months in advance. Requests for termination will not entitle any compensation whatsoever.

Such termination shall not become effective until three months after the complainant Institution has sent a registered letter with acknowledgement of receipt setting out the reasons for the complaint, unless within this period the defaulting Institution has fulfilled its obligations or has provided proof of an impediment due to force majeure.

Article 6.3 - Litigation

In the event of any difficulty concerning the validity, interpretation or execution of the present agreement, the establishments will endeavour to resolve their dispute amicably.

In the event that the parties fail to resolve their dispute within three (3) months of notification by registered letter with acknowledgement of receipt to one of the parties, the parties shall bring the matter before the competent courts.

Article 7 - By signing this agreement, the doctoral student, Camila STRUBBIA, confirms her acceptance of its terms and obligations.

Agreement signed in three (3) original copies

On behalf the Rosario National University

The Rector
Lic. Franco BARTOLACCI
Date & Signature
15 DIC 2025

The Research Unit Director
Ing. Mauro SOLDEVILA
Date & Signature

The Doctoral School Director
Dr. Cristina PACINO
Date & Signature

The Thesis Supervisor
Dra. Mariel GALASSI
Date & Signature

On behalf the University Lyon 1

Pour Le Président et par délégation
Le Vice-Président Recherche
24 SEP. 2025

Professeur Arnaud BRIOUDE

The Research Unit Director
Dr Anne EALET
Date & Signature

Anne EALET
Directrice de l'Institut
de Physique des 2 Infinis
de Lyon

The Doctoral School Director
Thierry ALBOUSSIERE
Date & Signature

Thierry ALBOUSSIERE
Directeur de l'Ecole Doctorale
de Physique et d'Astrophysique de Lyon
ED 52 - PHAST
21/09/25

The Thesis Supervisor
Prof. Michaël BEUVE
Date & Signature
02/07/25

The Doctoral Student
Camilla STRUBBIA MANGIARELLI
Date & Signature
02/07/25

Annex :

« Study of inelastic physical processes due to the impact of ions on biological matter and its application to the calculation of clinical doses for hadrontherapy »

This doctoral thesis is positioned within the framework of the development of innovative radiotherapies, particularly hadrontherapy with protons and light ions, but also BNCT (Boron Neutron Capture Therapy). Generally, in radiotherapy, the effects of ionizing radiation are linked to the dose of radiation deposited, which is defined as the energy absorbed per unit mass of the medium. Since tumor control and the risk of complications strongly depend on the irradiation dose, care planning requires precise knowledge of the absorbed dose. According to the recommendations of the International Commission on Radiation Units and Measurements (ICRU), the dose to the target volume for the patient should be delivered with an uncertainty of less than 5%. In the case of ion irradiation (hadrontherapy and BNCT via fragments), the uncertainties are greater because the physical processes responsible for dose deposition are more complex and less known. In addition, the biological dose, a quantity closer to the clinical effects, is calculated by the product between the physical dose (energy absorbed) and the Relative Biological Effectiveness (RBE). This last parameter depends not only on the dose, the quality of the radiation, such as the type of particle and the Linear Energy Transfer (LET), micro- and nano-dosimetric parameters, but also on biological parameters.
This thesis is naturally positioned within the framework of biological dose modeling in hadrontherapy and for BNCT, which are two important areas of research in Argentina and France.

Objective of the thesis:
The objective is to establish a closer link between the primary cross sections of the ions and the predictions of the NanOx model, in order to develop a simpler version of the NanOx model and to facilitate its implementation in a commercial TPS (Treatment Planning System). Indeed, the calculation of the biological dose goes through a series of steps that are costly in terms of computer resources and quite complex. By establishing a direct link between lethal events and ion cross sections, we could avoid the step of evaluating nano dosimetry spectra, which is an important step.

The main stages of the project are as follows:
1- Study and calculate the cross sections of inelastic physical processes that occur due to the impact of ions and electrons on liquid water and cellular DNA and RNA bases
2- Study the influence of cross sections on biological dose predictions
3- Study the correlation between the cross sections and the quantities of the NanOx model
4- Build from steps 2 and 3 a simplified version of the NanOx model to facilitate its integration into a commercial TPS

Hoja de firmas

Sistema: sudocu
Razón: Cargado por NATALIA TIBALDO
Fecha de creación: 07/01/2026 07:13:09

Sistema: sudocu
Razón: Autorizado por Franco Bartolacci
Fecha de subida: 07/01/2026 15:01:24