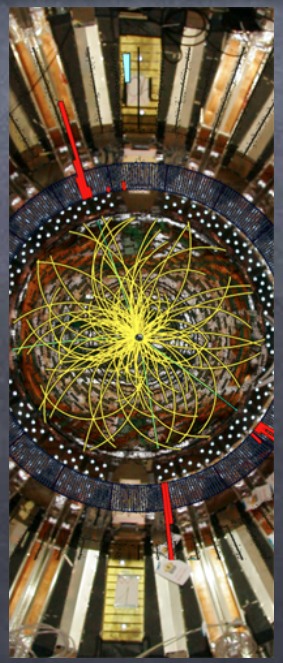
Faculté de **physique et ingénierie**
Université de Strasbourg

M2-PSA

Master science, technologie, santé mention Physique

Spécialité Physique subatomique et astroparticules



✗ **Responsable / contact**

Jerome.Baudot@iphc.cnrs.fr

Google: m2-psa strasbourg

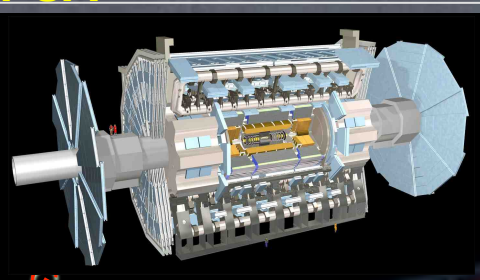
www.physique-ingenierie.unistra.fr/psa

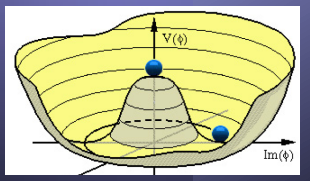
✗ **Laboratoire d'accueil**

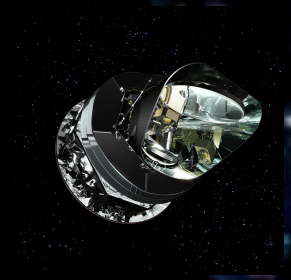
iphc.cnrs.fr

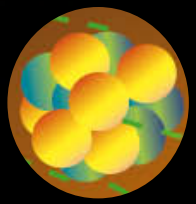
IPHC
Institut Pluridisciplinaire Hubert Curien
STRASBOURG

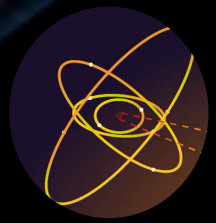
Les thématiques











Big Bang
Grand-unification
« Higgs »
Baryons
Nucleons
Stars
Galaxies

Astroparticle physics

- Cosmic rays / waves
- Dark matter / energy
- Antimatter
- Cosmology

Nuclear physics

- Stability / Super-heavy
- Star fuel
- Nuclear energy

- Radiochemistry
- Radiation protect.

Particle Physics

- Standard Model
- Higgs
- Neutrinos
- Flavors
- Quarks & gluons
- New(?) physics

Les cours du 1er semestre

Common lectures

- ✘ **Subatomic physics (78 h)**
  - ➛ Quantum Field theory
  - ➛ Nuclei & Nucleons Interactions
  - ➛ Particle Physics
  - ➛ Students' Seminar
- ✘ **Detector & Analysis (48 h)**
  - ➛ Radiation Interaction with Matter
  - ➛ Detectors: Physics & systems
  - ➛ Data Analysis & Modelization

5 Chosen lectures (100 h)

(1 possibly in another M2)

- ➛ Theoretical Nuclear Physics
- ➛ From Nuclei to Star

- ➛ Standard Model theory
- ➛ Beyond Standard Model
- ➛ Strong interaction at hadron coll.

- ➛ General Relativity & Cosmology
- ➛ Astroparticle & Observational Cosmology

- ➛ Reactors & Applications of Nuclear Physics
- ➛ Complements in Quantum Mechanics & Special Relativity

Both theoretical & experimental points of view ➡ Knowledge

Les projets & stages

Learning by practice ➡ Competences

✗ 1 month Project

- Solving a « small » problem /computer
  - within a research group @ IPHC

or

- Performing a real « small » experiment
  - EXcellence by Experiment (EX^2 diploma)
  - 8 platforms: accelerator, high-tech det.

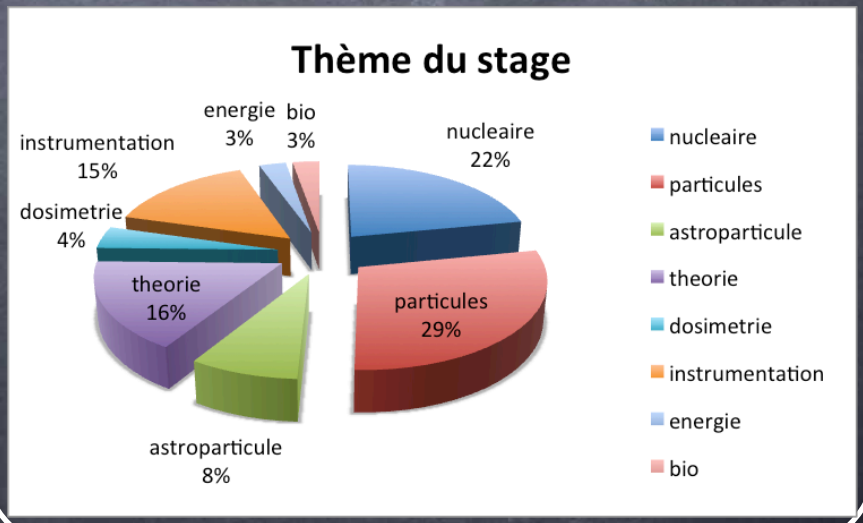
or

✗ 1 month European School in Instrumentation

- Near Geneva
- Small groups
- Advance courses by intern'l experts
- Labs @ CERN

✗ ~4 months Internship

- RESEARCH project
- 1st step toward thesis
- 75% France, 25% abroad
  - Major labs (CERN, IHEP, DESY…)
  - CNRS / Université / CEA
  - Private companies (if research)



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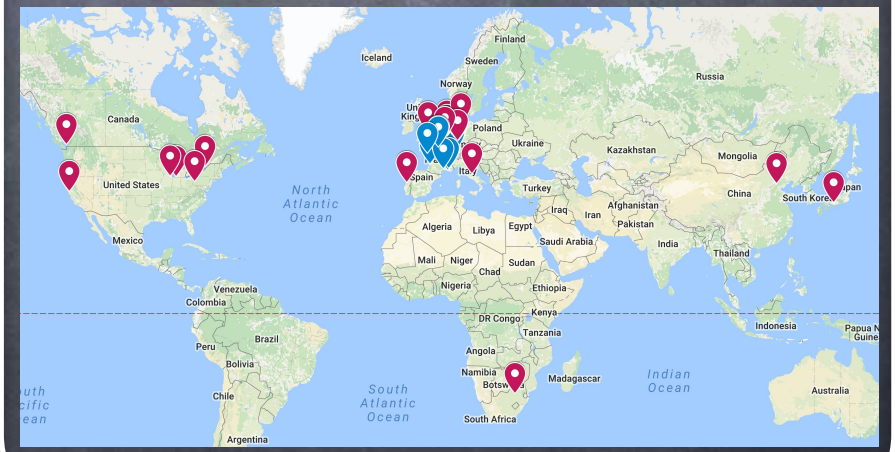

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✗ 1 month European School in Instrumentation

Unaivalable to TPS students

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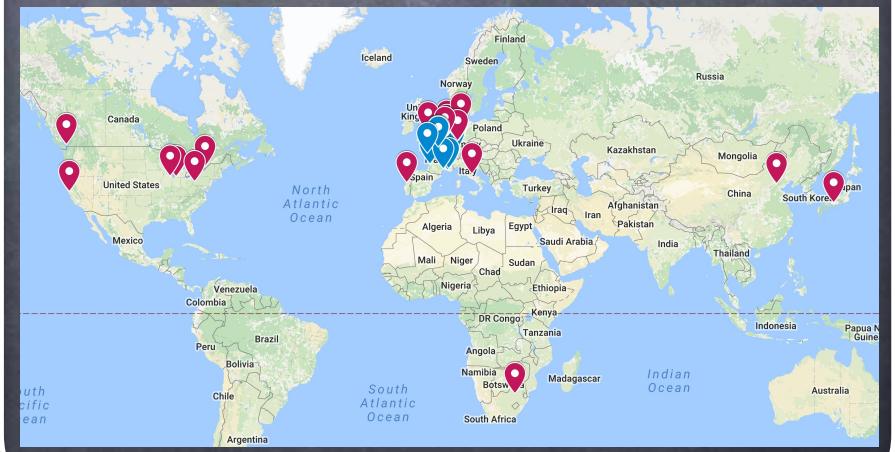


L'organisation de l'année

1st week of September

Common lectures (126 h) — early October: Internsip presentation

end of Octobre

Fall holidays (1 week)

Exams on common lectures — 1st week Nov.

early November

+ CERN & GANIL visits

Lectures by choice (5 subjects, 100h)

Project choice

End of year holidays (2 weeks)

1st week of January

Revision — mid-January

Exams on chosen lectures — late January

15 ECTS

end of January — Introduction to C++, ROOT, LaTeX

projects TI2P2 or ESIPAP school (3 weeks)

late February

Winter holidays (1 week)

defence of TI2P2 projects — early March

early March

Research internship (13 weeks)

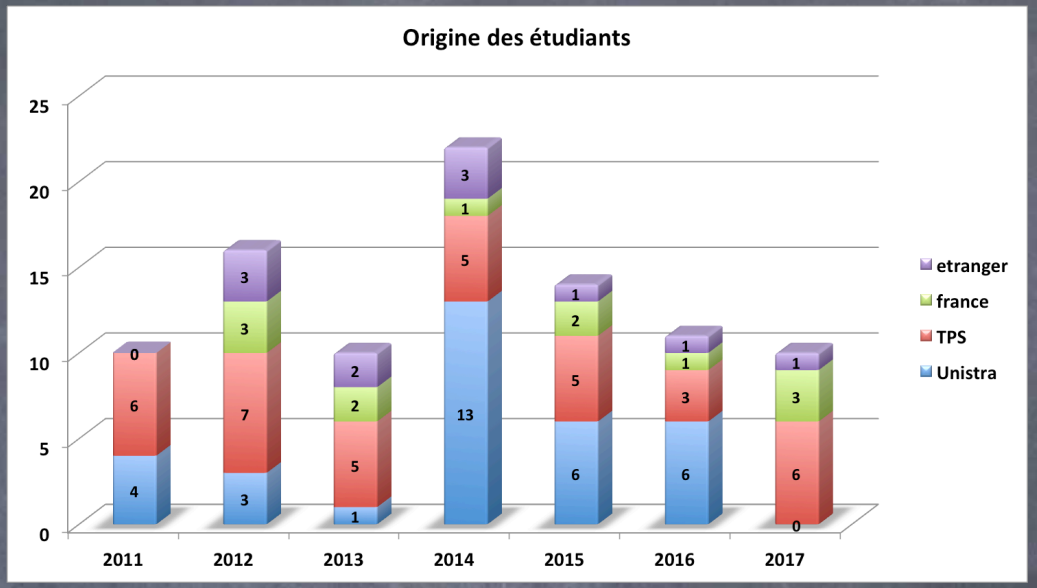
mid-June

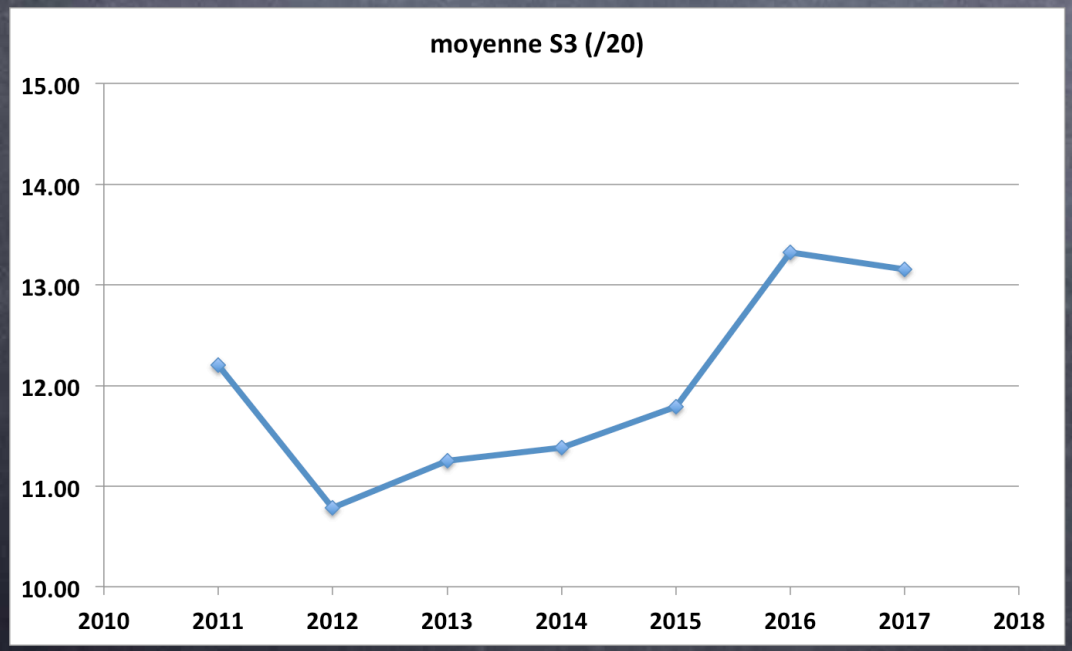
defence of internship — mid-June

15 ECTS

La réussite au M2

- **Quelques statistiques**
  - En moyenne 15 étudiants
  - Taux de réussite ~ 89%

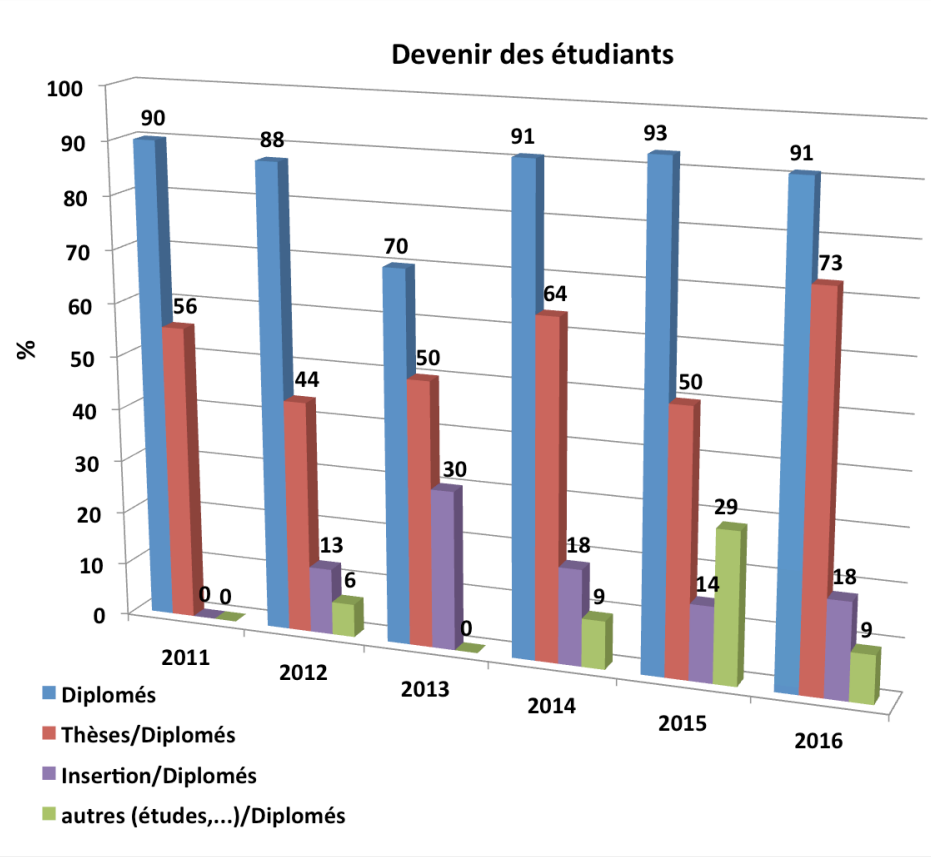




Après le M2

✗ Les propositions

- ~15 localement
- ~100 en France (20 labos IN2P3)
- >> 100 propositions dans le monde
- Continuation en thèse ~60%



✗ La thèse

- Labos académiques France, monde (25%)
- Labos recherche entreprise (<10%)
- Faites des stages pendant l'été !

✗ Une entreprise après ?

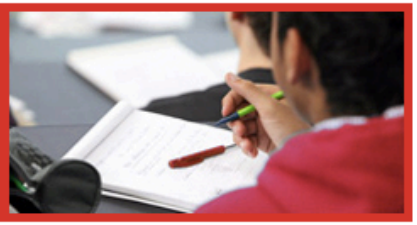
- Énergie nucléaire
- Instrumentation / radiations
- Analyse de données (Big Data)
- Simulations physiques
- …
- Journaliste scientifique
- Police scientifique

- Soit directement après le M2 soit après la thèse

➡ Réseau : linkedin.com, groupe M2-PSA

Via: www.physique-ingenierie.unistra.fr/psa

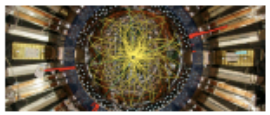
Les Formations



International Master of Science in Physics : Subatomic and Astroparticle Physics

This Master programme focuses on fundamental and applied research programmes conducted at the large accelerator centres in particle physics (LHC at CERN, Geneva, Switzerland) or in nuclear physics (SPIRAL at GANIL, Caen, France) and on the strong connections with modern cosmology and astrophysics. The two-year Master programme includes advanced lectures on theoretical methods and experimental techniques and requires active participation of the students in research projects to prepare them for a professional career in science.

English flyer
Flyer on the Master Subatomic and Astroparticle Physics



english translation

Le parcours "Physique Subatomique et Astroparticules" de Strasbourg est une formation par et pour la recherche visant à former des spécialistes de l'infiniment petit, expérimentateurs et théoriciens en physique du noyau, des particules, astroparticules et cosmologie.

Présentation de la specialité PSA (pdf)

MASTERS SCHOLARSHIPS IN PHYSICS
UNIVERSITY OF STRASBOURG

Financed by

- **Labex** *(*)* **NIE** *(Nanostructure in Interaction with their Environment)*
- **Labex** *(*)* **IRON** *(Innovative Radiopharmaceuticals in Oncology and Neurology)*
- **Idex** *(**)* **EX²** *(Excellence by Experiments)*

Supporting grant for 2nd year Master students:

- Financial support for 10 months (5 by the host laboratory) ~ 5 000 €
- Student housing or accommodation support for 10 months ~ 2 400 €

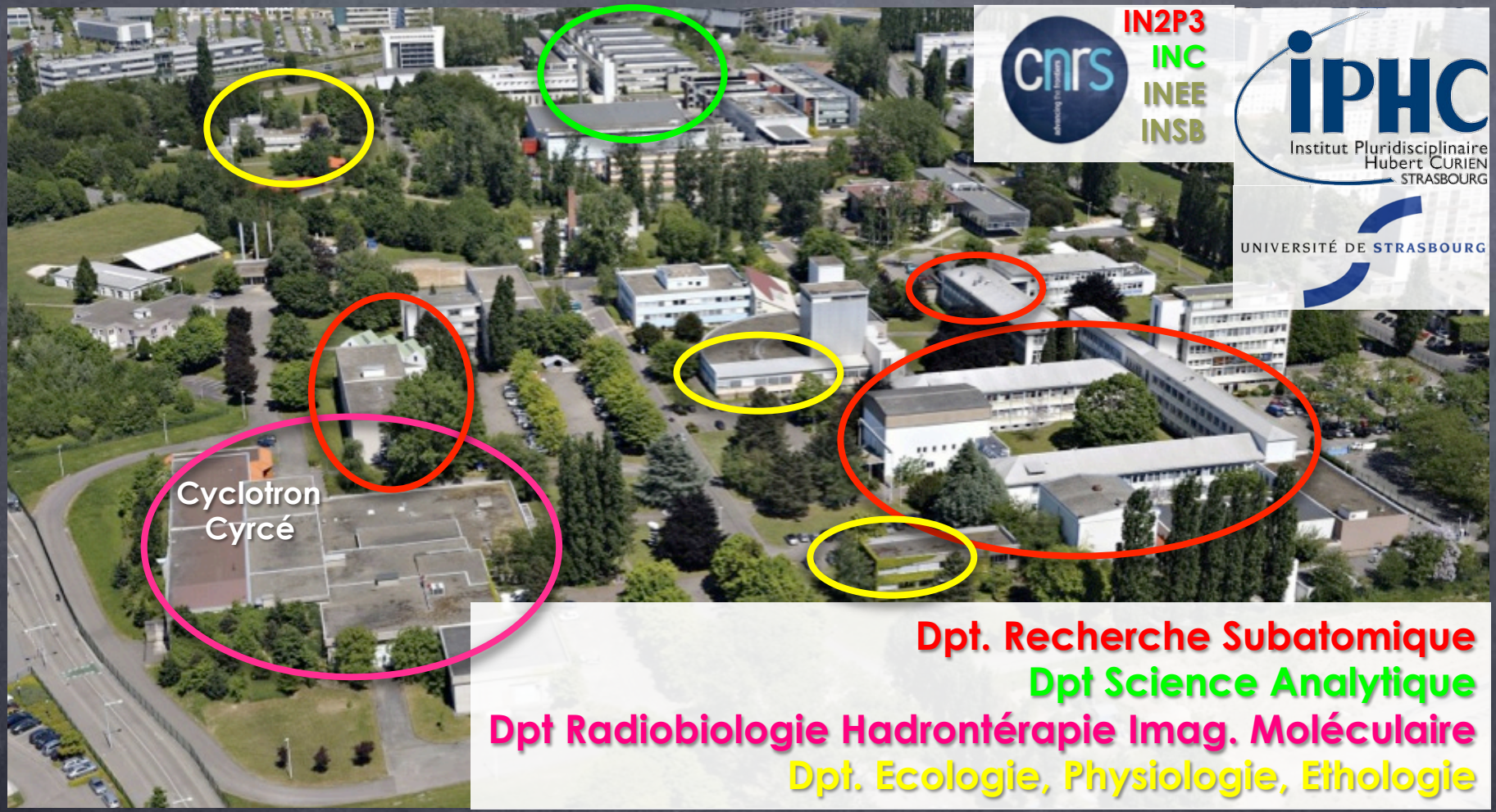
Criteria and application:

- All students in physics with an excellent academic background are eligible
- Application form to be send before June 19th 2015

Master's Programmes concerned:

- Condensed Matter and Nanophysics (MCN)
- Ingénierie des Matériaux
- Physique des Rayonnements, Détecteurs, Instrumentation et Imagerie (PRIDI)
- Subatomic and Astroparticle Physics (PSA)

Le laboratoire d'accueil: IPHC



IN2P3
INC
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STRASBOURG

UNIVERSITÉ DE STRASBOURG

Dpt. Recherche Subatomique
Dpt Science Analytique
Dpt Radiobiologie Hadrontérapie Imag. Moléculaire
Dpt. Ecologie, Physiologie, Ethologie

379 staff : 110 researchers,
150 ingeneers,
119 PhD students, post-doc fellows

General web site: iphc.cnrs.fr

Le laboratoire d'accueil: IPHC

- **DRS : expérience & théorie**
  - Physique théorique
    - Nucléaire
    - Particules
  - Du noyaux aux étoiles
    - Structure nucléaire
    - Réactions stellaires
    - Données réacteurs nucléaires
  - Du Big-Bang aux particules
    - Neutrinos
    - ALICE & CMS au LHC
    - Belle-II à SuperKEKB
  - Environnement et radioactivité
    - Radiochimie
    - RaMsES (radioprotection, mes. environnementales)

- **DRHIM : physque, chimie, biologie**
  - Imagerie moléculaire
  - Hadronthérapie
  - Radiobiologie
  - Platerformes
    - Cyclotron Cyrcée / PRECy
    - AMISSA (µCT, SPECT, PET)
    - Animalerie