



Ecole Doctorale 560
Sciences de la Terre et de l'Environnement
et Physique de l'Univers, Paris

(<https://ed560.ed.univ-paris-diderot.fr/>)

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Outline

- Organisation of STEP'UP
- Role of the Doctoral School
- Scientific landscape
- Some statistics on PhD candidates
- Training and professional follow-up
- The admission process **[→ take notes !]**



ED STEP'UP

- 3 universities/institutes - Paris intra muros



- 2 Labex (Laboratoires d'excellence)



- 6 Unités mixtes de Recherche (Research labs)





ED STEP'UP

6 Unités mixtes de Recherche (Research labs)

- AIM **(UMR 7158)** Astrophysique, Instrumentation et Modélisation
- APC **(UMR 7164)** AstroParticule et Cosmologie
- IPGP **(UMR 7154)** Institut de Physique du Globe de Paris
- Laboratoire de Géologie de l'ENS (**UMR 8538**)
- LPNHE **(UMR 7585)** Laboratoire de Physique Nucléaire et Hautes Energies
- LPTHE **(UMR 7569)** Laboratoire de Physique Théorique des Hautes Energies

~ 300 researchers (including CNRS and professors)
~ 200 PhD (50-60 PhD /year)



Organisation

**One doctoral school
two graduate sectors (composantes)**



Geographic landscape: Paris Centre – Paris intra-muros

Strategic goal: Create links with our institutes to create new research approaches and support established research.



Organisation

Director: **Yannick Giraud-Héraud**, Directeur de recherche CNRS, APC

Deputy Directors:

- **Alessandra Tonazzo**, Professeure, Université Paris-Diderot, APC (UP)
- **Hélène Lyon-Caen**, Directrice de recherche CNRS, ENS (PSL)
- **Clément Narteau**, Professeur, IPGP (UP/IPGP)
- **Christophe Baland**, Professeur, Université, LPNHE (SU, UP)

Board:

- Isabelle Grenier, Professeure, Université Paris Diderot, AIM

Administration: Alissa Marteau (Alissa.Marteau@u-paris.fr)

Academic council: 25 members (6 PhD + 8 external members).



Role of the doctoral school

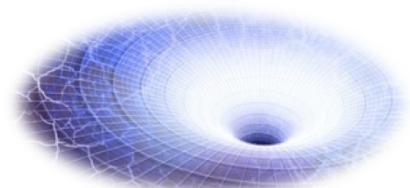
- Ensure the **quality of the scientific team**
- **Selection** of the PhD candidates
- **Monitoring the progress of the thesis:** “comité de suivi de thèse”
PhD + advisor(s) + 2 researchers (one outside the team) ; meet once per year
- Promote **exchanges between PhD** students
- Organization of doctoral training useful for the PhD project and his (her) **professional future**
- Follows and promotes the **employment of doctors**
- **International aspects**



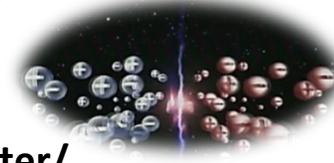
Scientific landscape : Themes

Experimental and theoretical studies.

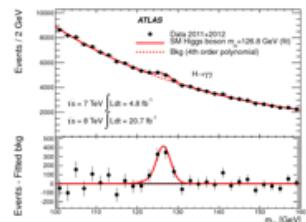
(Earth, environment, geophysics, geo-chemistry, geology, cosmo-chemistry)



Planetology, Cosmology (including dark matter searches), Astrophysics, Astroparticles, High energy astrophysics, Gravitational waves.



Particle and neutrino physics : mass and fundamental interactions, matter/ antimatter asymmetry.



Instrumentation :

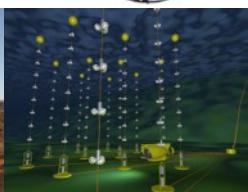
- PMTs, SiPM, Bolometers, CCD, KIDs, Silicium, Radio-detection, Interferometry, Spectrometry IR ...



Scientific landscape : Projects

Projects :

- Cosmology (QUBIC, POLARBEAR/SA, Euclid, LSST, DESI, LiteBIRD, DarkSide, DAMIC, Xenon)
- Neutrinos (DUNE/WA105, KM3NeT/ORCA, T2K/HyperK)
- Particle physics (LHC: ATLAS, LHCb)
- Astroparticle (HESS, Auger, CTA)
- Gravitational waves (Virgo, LISA)



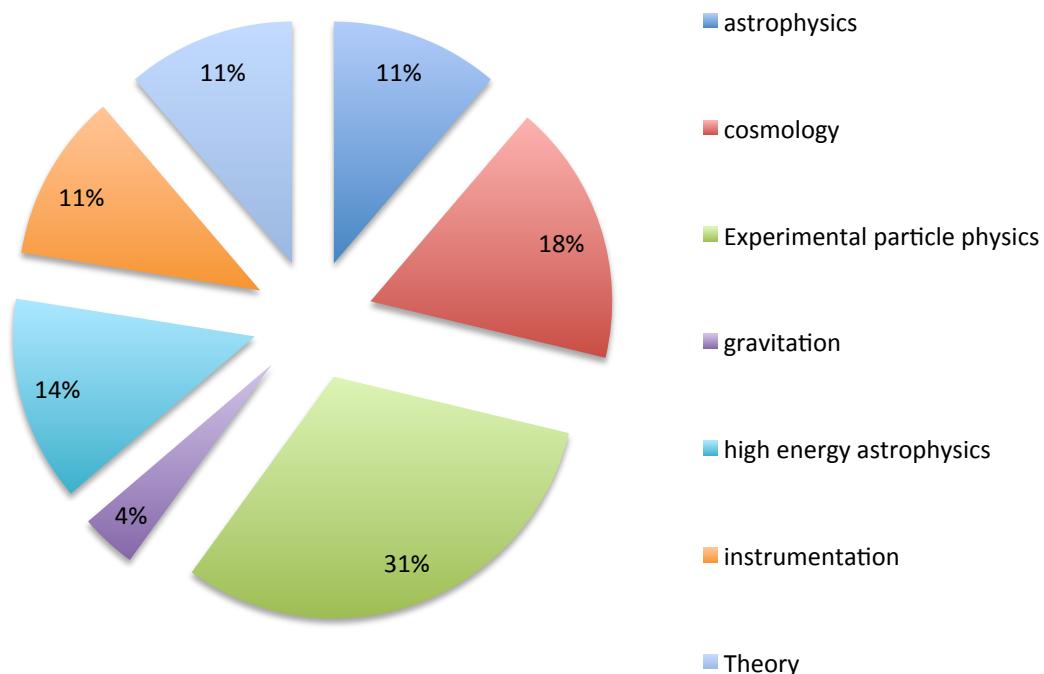
04/12/2019 NPAC

ED STEP'UP (A. Tonazzo / Y. Giraud-Héraud)



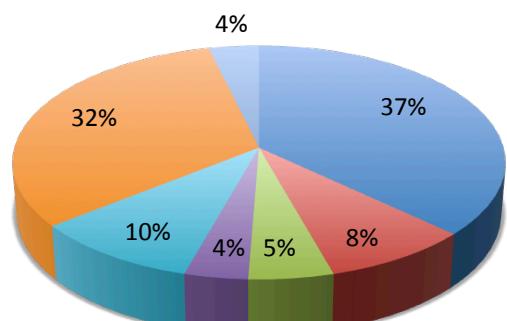
Scientific themes: statistics (2013-2016)

Physics of the Universe component

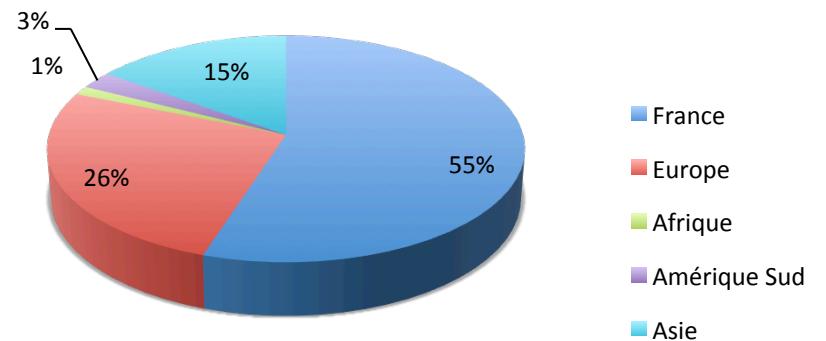




Origin of the students : statistics (2013-2016)



- NPAC
- AAIS
- CFP
- PHE
- other French masters
- masters abroad
- Engineering school





NPAC students from 2017-2018

Bastien ARCELIN, "Weak lensing with multi-surveys joint analyses for dark energy studies" with E. Aubourg and C. Roucelle at APC

Makarim BOUYAHIAOUI, "Models of multi-messenger sources of cosmic-rays, gamma-rays and neutrinos" with D. Semikoz at APC

Etienne CHARDONNET, "The DUNE long-baseline neutrino experiment" with T. Patzak at APC

Thien Nhan CHAU, "Study of atmospheric neutrinos with the deep-sea Cherenkov detector KM3NeT/ORCA" with A. Kouchner at APC

Thomas GRAMMATICO, "Recherche de nouvelle physique dans des désintégrations de mésons beaux en trois corps sans particule charmée avec l'expérience LHCb" with M. Charles and E. Ben Haim at LPNHE

Christelle LEVY, "HESS/CTA : Tests de l'invariance de Lorentz et effets temporels intrinsèques dans les noyaux actifs de galaxies : de H.E.S.S. à CTA" with J. Bolmont and H. Sol at LPNHE

Thomas MONTANDON, "Inflationary Non-Gaussianities", with G. Patanchon at APC

Theodoros PAPANIKOLAU, "Constraining the early Universe with primordial black holes", with D. Langloit and V. Vennin at APC

Julianna STERMER, "Contraintes sur l'énergie sombre à partir des données Lyman-alpha des relevés", with C. Balland and N. Busca at LPNHE

Alexandre TOUBIANA, "Bayesian population study and testing General Relativity with gravitational waves from coalescing binaries" with S. Babak at APC and E. Barausse at IAP



NPAC students from 2018-2019

Yajun HE, " *Weak lensing with multi-surveys joint analyses for dark energy studies*" with G. Calderini and R. Camacho Toro at LPNHE

Baptiste JOST, " *Probing the Universe's beginning and testing fundamental physics with Simons Array and Simons Observatory cosmic microwave background polarization data sets*" with R. Stompor at APC

Guy AUGARDE, " *La caractérisation de l'énergie noire avec les télescopes Subaru et Hubble*" with N. Regnault at LPNHE

Romain BOUQUET, " *Mesure de propriétés du boson de Higgs (H) et de ses couplages au quark bottom et aux bosons W/Z dans l'état final W/Z(->leptons)+H(->bb)+X dans l'expérience ATLAS*" with G. Marchiori at LPNHE

DAM Quang Nam, " *Simulations and associated data analysis for realistic LISA configuration / Simulations et analyses de données pour une configuration réaliste de LISA*" with C. Caprini et A. Petiteau at APC

NGUYEN Quoc Viet, " *Search for CP violation in the T2K long baseline accelerator neutrino experiment*" with B. Popov at LPNHE

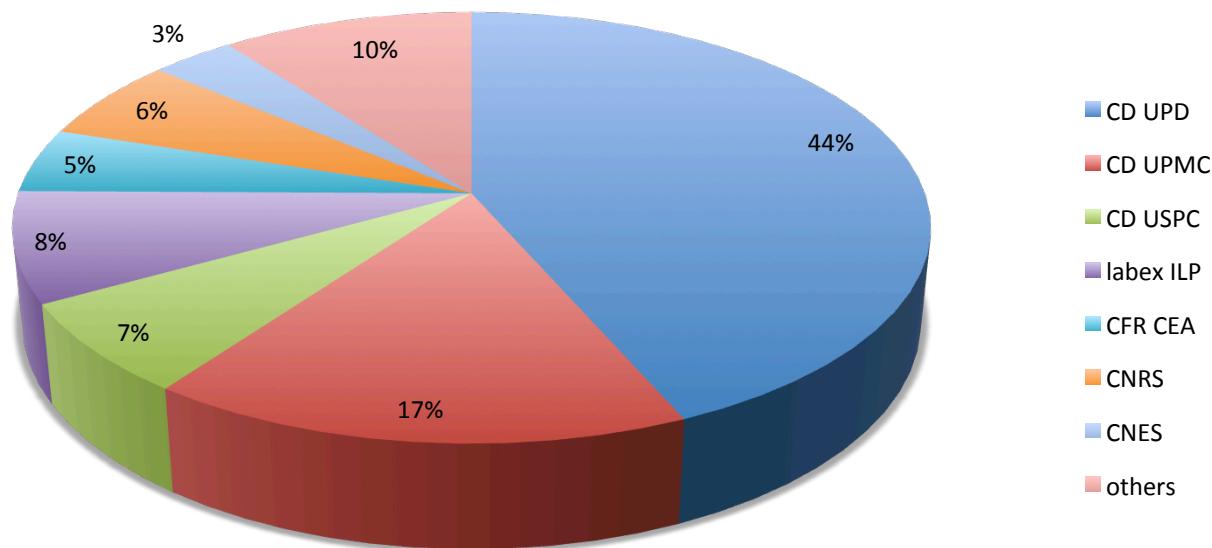
Julie RODE, " *DarkSide : à la recherche de matière sombre avec l'Argon Liquide*" with C. Giganti et D. Franco at LPNHE and APC

Raphaël BAJOU, " *A Dual-Phase detector for the long baseline neutrino experiment DUNE*" with A. Tonazzo et J. Dawson at APC

Yoann GATELET, " *Astronomie Multi-Messager*" with A. Nerovov at APC



Funding source : statistics (2013-2016) Physics of the Universe



"Funding from MESRI (Doctoral School)" 2019 : 10 UP/UPD + 3 SU + 7 IPGP + 1 ENS



PhD follow-up

Comité de suivi individuel:

- 2 members, at least one not belonging to the research team
- meet once per year
- monitor scientific evolution, possible problems

Start-of-year meetings

October, 1st and 2nd year

Individual interviews

with the coordinators of the graduate sectors (components)

Life of the Doctoral School:

"Congrès des Doctorants" 23-27 mars 2020

Seminars + cocktails



Training

Courses ("Formation") :

- Geophysics and non-linear dynamics
- Probability and statistics
- Flavor physics: origins, the LHC era and beyond
- Different aspects of the LIGO-Virgo gravitational-wave direct detections
- Python for Impatients
- Git: Contrôle de version et Editing Collaboratif
- Formation au calcul intensif : Introduction à l'utilisation de la plateforme S-CAPAD
- Selected topics in quantum field theory
- Ethics and sci. integrity (compulsory)
- + Master courses

Professional outlook

«*Formation par la recherche*»

Tous les doctorants de l'ED ont accès à toutes les formations du CFDIP-Collège UP, CFD-Collège SU, Collège doctoral de PSL

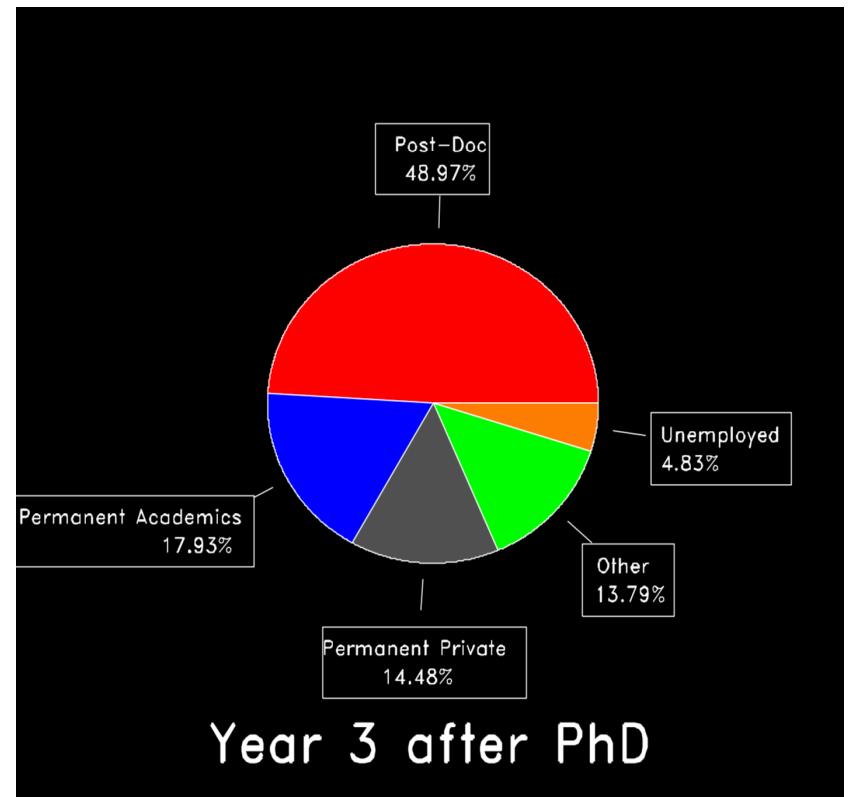
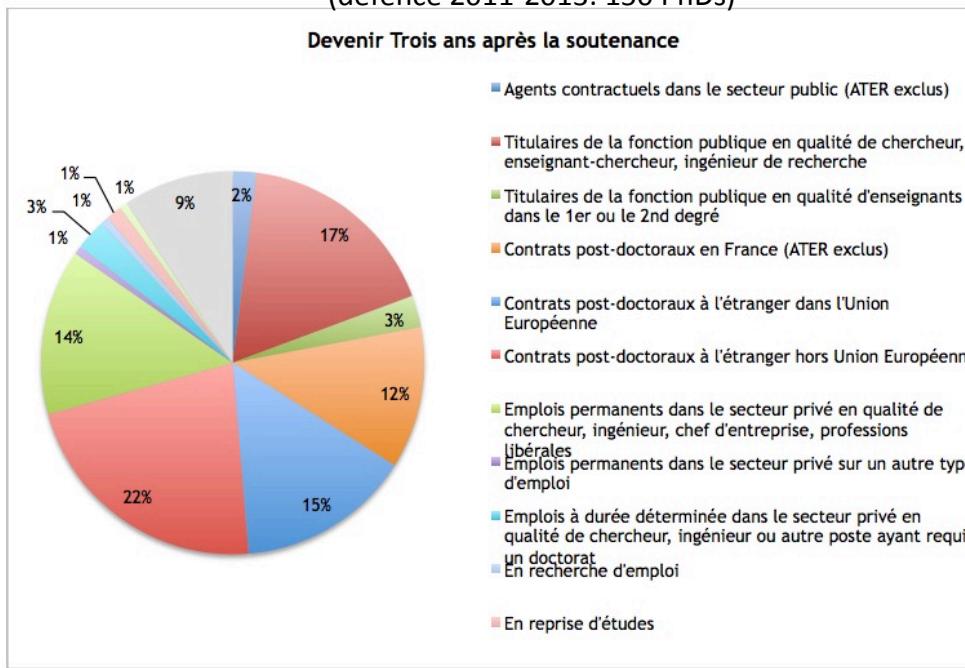
+ active thesis work, papers, participation to conferences, etc.

→ "Projet Personnel de Formation"

Contact PU : Irena Nikolic (Irena.Nikolic@lpnhe.in2p3.fr)

Professional follow-up of PhD's

Earth Science + Physics of the Universe,
3 years after the thesis
(defence 2011-2013: 150 PhDs)





Admission

Admission: ~20 PhD candidates per year (on average, ~7-9 coming from NPAC)

- **all candidates must pass an interview for admission**
- **a selection process** is organised for PhD fellowships from the universities (CD: Contrats doctoraux), which are about 50% of all PhD contracts
 - **Publications of PhD propositions from the 4 research labs (→ « Offres de Thèse ») :**
(possible HDR advisors : 15 at AIM – 38 at APC – 29 at LPNHE)



Web

<https://ed560.ed.univ-paris-diderot.fr/offres-de-theses/>

today, 21 subjects : 3 AIM + 9 APC + 9 LPNHE + more coming

You have to contact the proponents

see also the websites of the labs

AIM, APC, LPNHE

Liste des sujets en Physique de l'Univers				
Masquer				
Afficher	20	éléments	Rechercher:	
Sujet n.	Labo (équipe)	Directeur (co-encadrant)	Titre	Financement
U17	AIM	Isabelle Grenier	Interactions entre rayons cosmiques et milieu interstellaire / The interplay between cosmic rays and the interstellar medium	50% LabEx + 50% CFR ou Contrat Doctoral UP
U01	AIM (LEPCHE), APC (Gravitation)	Sylvain Chaty, Ed Porter	L'Univers gravitationnel : à la recherche des progéniteurs d'ondes gravitationnelles / The gravitational universe: searching for progenitors of gravitational waves	Contrat Doctoral UP
U09	APC (Astrophysique à Haute Énergie)	Fabien Casse (Alexis Coleiro)	Prediction of X-ray counterparts to supermassive black-hole mergers	Contrat Doctoral UP
U10	APC (Cosmologie)	Michel Piat	Détecteurs multi-fréquences pour l'observation de la polarisation du rayonnement fossile	Contrat Doctoral UP
U11	APC (Cosmologie)	Guillaume Patanchon	Evaluation of the impact of systematic effect on the future	Contrat Doctoral UP



Admission

Physics of the Universe component:

~20 PhD students per year (on average, ~7-9 coming from NPAC)

Selection procedure for standard MESRI-Doctoral school funding

- Interviews: 20 mn – independent committee

Selection criteria will include :

- Quality of the candidate
- Adequacy between the candidate and the subject
- Quality of the subject/team

For funded subjects, no "competition", but interview for admission validation



Calendrier du recrutement / Dates and procedures

Selection procedure for 2020-2021

Two « sessions » :

- ***Early session (international + "excellence")***

deadline for application : 14/02/2020 [student+advisor] (interviews: 27/02/2020)

- ***Main session***

deadline for application : mid-June 2020 [student+advisor] (interviews: end of June 2020)

<https://ed560.ed.univ-paris-diderot.fr/candidature/>