

Institute for the **Ph**ysics of the **U**niverse



Institut
Physique de
l'Univers
Aix*Marseille Université

*Strengthen and structure our synergies
to better teach, do research, and transfer*



A*Midex
Initiative d'excellence Aix-Marseille



Collaborative environment positioned at the best international level

- **Leverage** in excellence and synergies of its 3 constituent laboratories based on the success of the OCEVU Labex (2012-2019)
- **Encourage** and **support** ambitious joint actions and projects to:
 - Lift scientific and technological barriers
 - Push the limits in understanding the Physics of the Universe
- **Foster**
 - Training by and for Research
 - Innovation, Creativity, *Coopetition*
 - Open to the world
- **Promote and enforce**
 - Crossed fertilization between its 3 pillars
 - HRS4R Compliant Practices

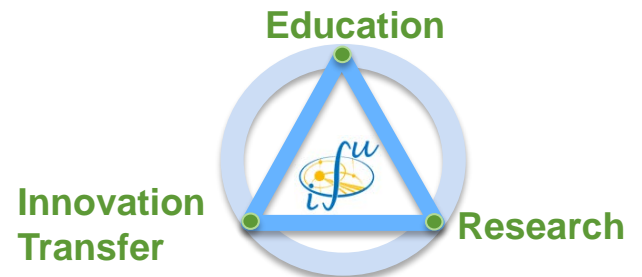
➔ **Research Groups**

➔ **Graduate School**

➔ **Innovation Cell**




➔ **Centre International de Rencontres de Physique**

Sustainability



**Ambitious project, with no real equivalent at national and international levels
created by AMU on 01/01/2020**

RESEARCH LABORATORIES (in alphabetic order)

- **CPPM** – UMR 7346 : Centre de Physique des Particules de Marseille 
- **CPT** – UMR 7332 : Centre de Physique Théorique 
- **LAM** – UMR 7326 : Laboratoire d'Astrophysique de Marseille 

COMPONENTS

- **Faculty of Sciences**
 - Physics Department
 - » Master Degree programme in Fundamental Physics (FunPhys)
- **OSU Pythéas** : OHP (Haute Provence Observatory)

DOCTORAL SCHOOL

- **ED 352** – Physics and Sciences of Matter

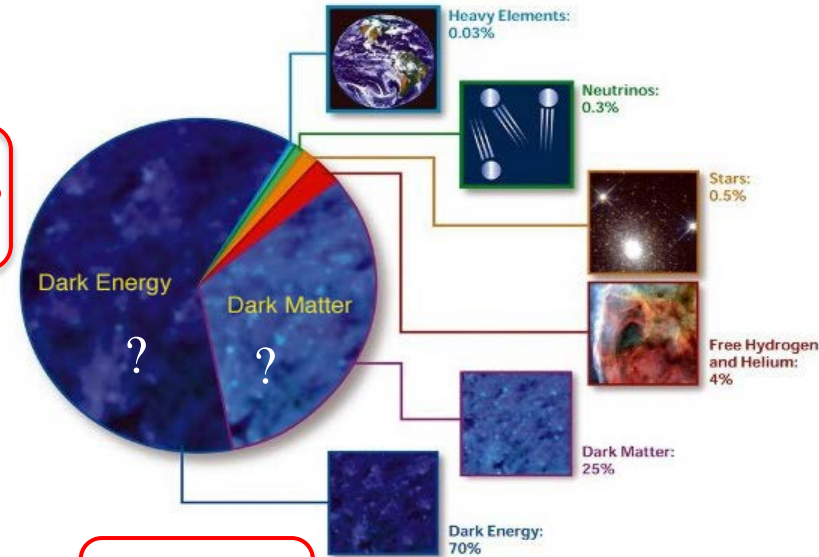
CNRS

- **3 Institutes** – IN2P3, INP, INSU

DRIVING FORCES

- **210 staff (110 HDR)**: 100 scientists, 110 engineers, techs and admins
note: 50 out of the 110 HDR currently supervise one (or 2) PhD student(s)
- **35 postdocs, 65 PhD and 70 Master students** on average

**What are the fundamental laws governing the Universe?
What is it made of? How did it form and how does it evolve?
Do we understand the Universe in its extreme states?**



Support for international projects

to ensure maximum scientific return

Support for original, innovative or risky ideas

- **Transversal projects:**
dark matter & energy, neutrinos, gravitational waves...
- **Big Scientific Data:**
data management, processing and analysis issues
- **Innovative or risky projects:**
incubation of potential future large projects

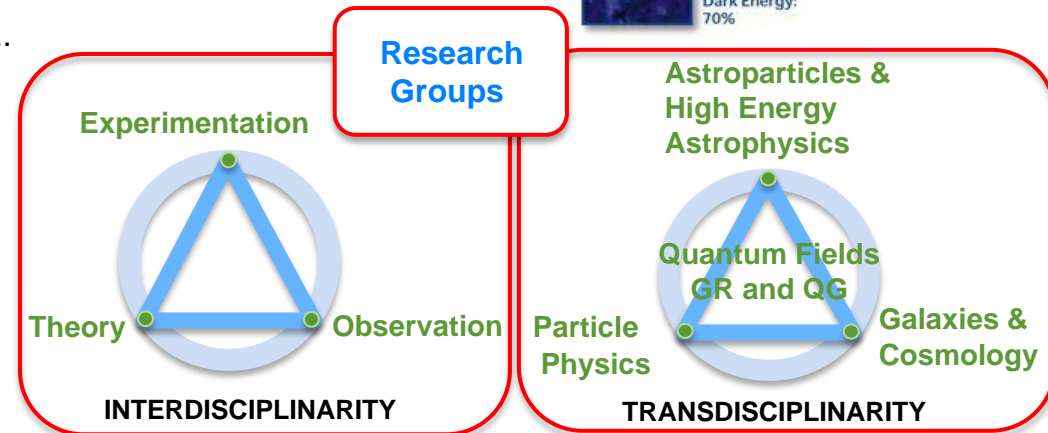
Priority to projects developing our synergies on international projects

International Hiring and Hosting Programs

- PhD students (*and no more Postdocs*)
- High-level guests from science/technology/education

Development of state-of-the-art equipment and platforms: KM3NeT/ORCA, GFT-Colibri; SPATIAL & POLARIS platforms and Instrumentation for the extreme; Radon and Infrared sensors technological platforms; CeSAM; Dark Energy Center; IRiS and ePERON platforms; Haute Provence Observatory (OHP) ...

Which will also be used as training platforms in the Institute Graduate School



Graduate School

Program of internationalized courses

4 flavors, including a new "instrument scientist",

Direct connection to the Research Groups of the Institute

Innovative educational offer

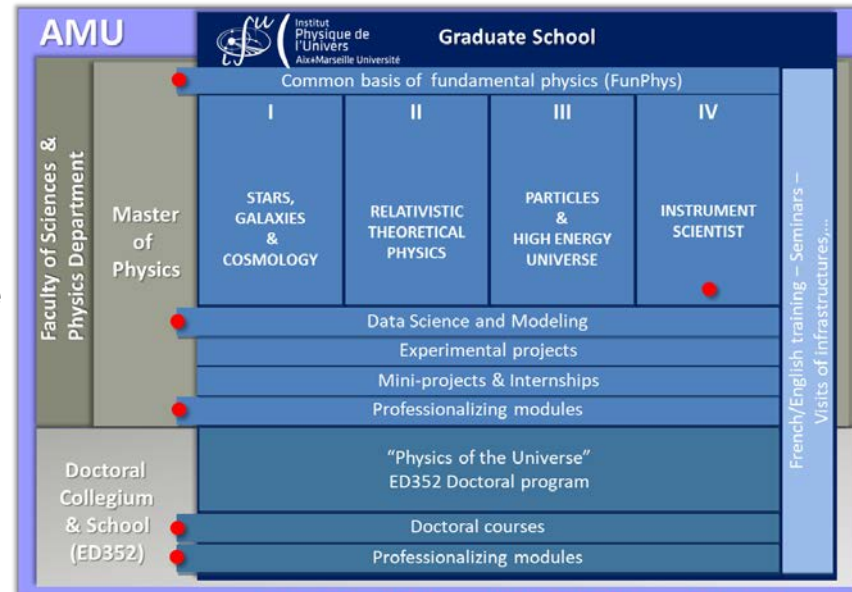
- Develop skills, autonomy and a sense of belonging
- Work in teams and learn by projects; access to research platforms
- Integrate into research teams, including abroad
- Participate in training and scientific dissemination actions

Link with related trainings - with strong involvement of the Grad School's students

- Physics Summer Camps/Schools
- IRiS and ePERON training platforms (radio@OHP ?)
- Research and Discovery Internships in IPhU labs and abroad
- Communication/information/support gateways between Bachelor, Master and PhD students

Development of teaching and research links with other Universities

- Innovative pedagogy - contacts with UCL (University College London)
- Contacts with **Barcelona** AU, **Bologna** Univ. and **Bucharest** Univ. (**CIVIS**) to structure a common Erasmus adventure (ERASMUS+, ERASMUS MUNDUS)
- But also with: Penn State (USA), **UNAM** (Mexico), **UCAS**(IHEP, NAOC), USTC, **THU**, **PKU**, SDU, **SJTU**, SYSU (China)
[IRL ERIDANUS] [IRL FCPPL]
- **Strengthen present collaborations, but open to develop new ones in accordance with AMU priorities**



● (partly) shared with other curricula in Faculty of Sciences and/or ED352

World of knowledge

Amplify the dynamics of scientific dissemination and mediation

- **Weave** multiple links between the places where science is produced and the various actors in society
- **Produce** multimedia resources and organize events and actions for these audiences
- **Foster *OHP, and IRiS, ePERON, and radio@OHP*** (new!)... educational platforms as training infrastructure
- **Create** a space for exhibition and exchange with secondary school teachers and the general public

World of technology

Amplify links with industry and the regional economic actors

The Innovation Cell - in connection with CISAM, SATT, Competitiveness Clusters, etc. - will offer to innovative project leaders: individualized coaching, advice by groups of industrial and academic experts, adapted training, seed and pre-maturation funding, etc.

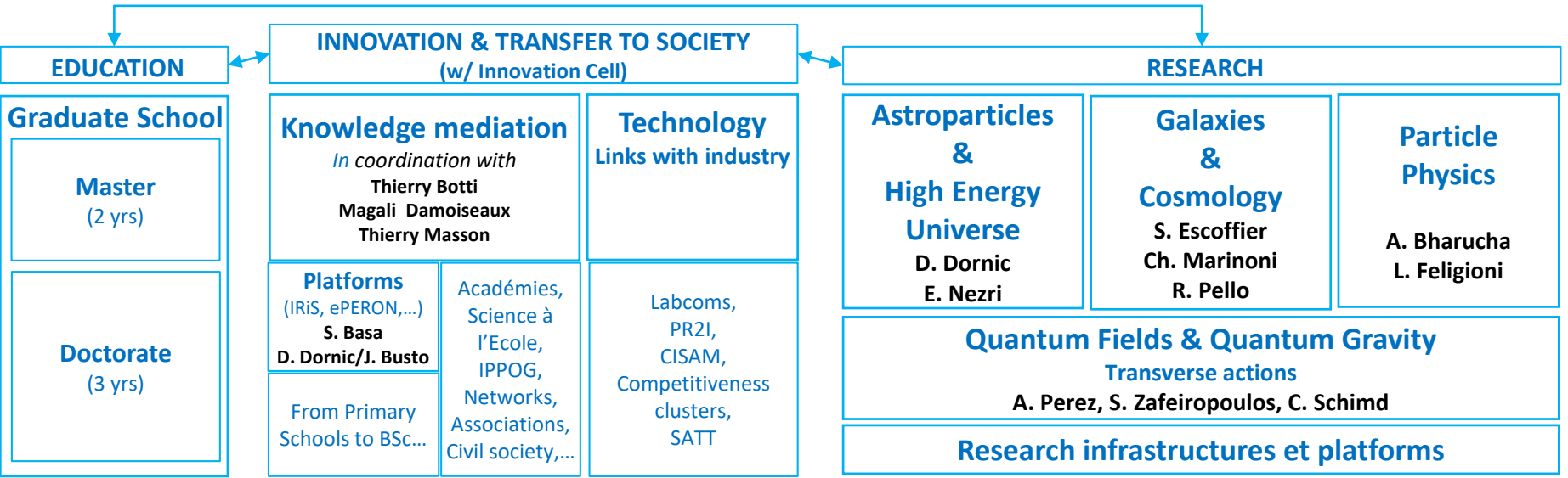
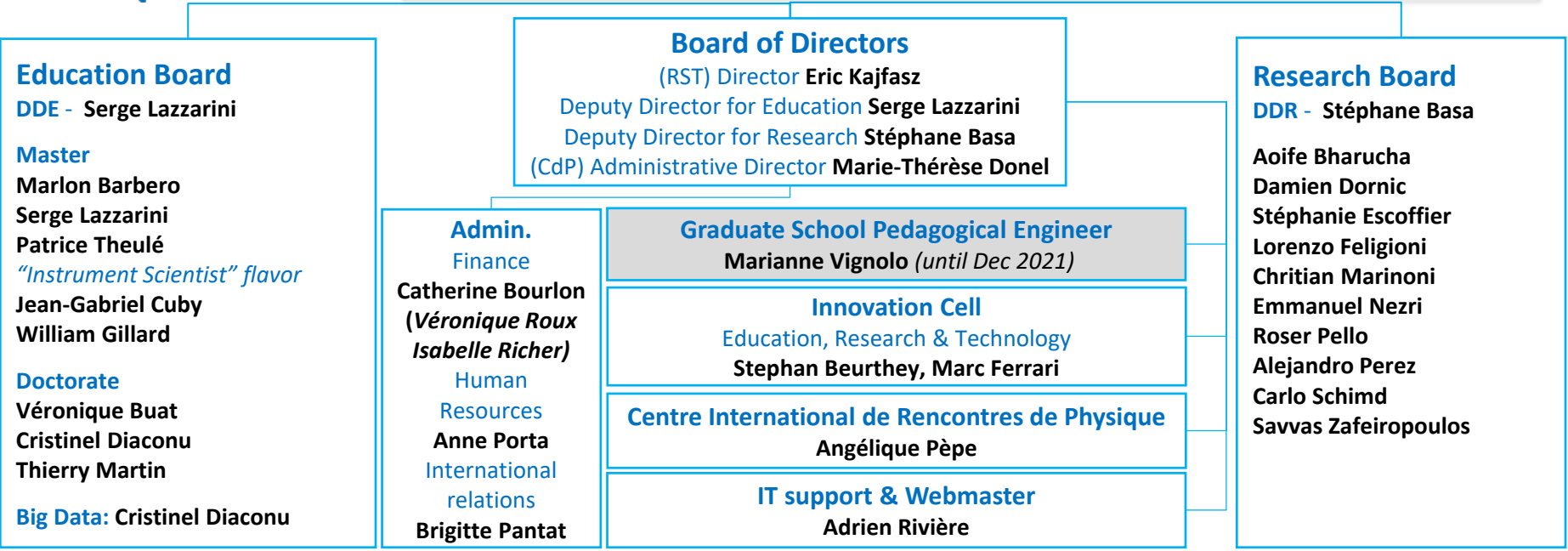
First concrete paths already being explored

- **LabCom and Partnerships with identified companies** to develop Design of spectrographs for large cosmological survey projects, Characterization of infrared sensors, Data acquisition and AI developments on FPGAs,... (Lynred, Thalès, Winlight, Intel/FPGA, Nexvision,...)
- **Seminars, Internships and PhD grants linked to the « Instrument scientist » flavor**

Organizational chart

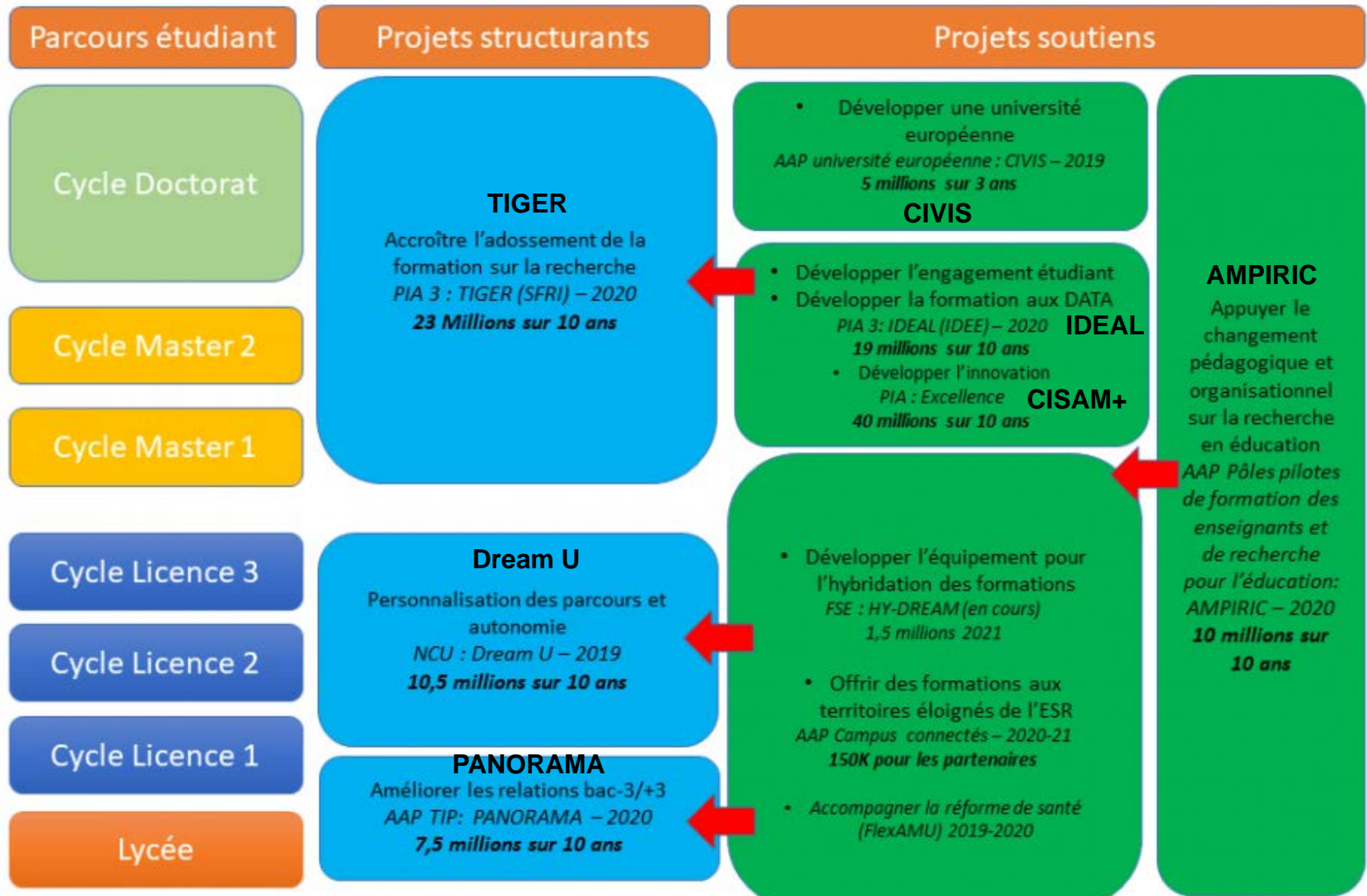
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Great thanks to our colleagues taking care of the administrative aspects !



IPhU in the AMU PIA Context

A strategy based on the articulation of different structuring training projects



2020-2021 Budget (detailed)

Institut de Physique de l'Univers (IPhU) budget initial de 800k€ pour 2020+21	2020	2021
PhD 1	3	12
PhD 2	3	12
PhD 3		3
PhD 4		3
# Nombre PhDs	4	6
# mths2020	6	24
# mths2021		6
cost	15 300	77 164
PhD IA-ANR 1 (co-financement à 50%)	3	12
PhD IA-ANR 2 (co-financement à 50%)	3	12
# mths	6	24
cost	7 650	30 600
cost RH PhDs	22 950	107 764
IGE (ingénieur pédagogique de la Graduate School)	7	12
# mths	7	12
cost	18 417	33 420
IGR (innovation IR/Radon)		12
# mths	0	12
cost	0	46 620
PCA	4 000	4 000
cost	4 000	4 000
cost RH Other	22 417	84 040
COST: Human resources	dans REPORTING	dans REPORTING
PhD operation (2k€/person per yr until 2021 and 1k€/person after)	8 000	12 000
Research projects operations engagées		59 000
COST: Research (hors ce qui est déjà inclus dans le REPORTING)	dans REPORTING	dans REPORTING
Incoming grant S2-2020	36 000	
Incoming grant S1-2021		8 000
Incoming grant S2-2021		72 000
Outgoing grants		4 000
Internships	18 373	47 447
Training @OHP	6 000	6 000
COST: Graduate School (hors ce qui est déjà inclus dans le REPORTING)	dans REPORTING	dans REPORTING
DEPENSES FF DANS REPORTING IPhU	75 039	194 670
DEPENSES FI DANS REPORTING IPhU	12 635	27 157
DEPENSES MS DANS REPORTING IPhU	28 459	136 862
DEPENSES FF DANS REPORTING AIDOC		0
DEPENSES MS DANS REPORTING AIDOC		59 326
Total sans MS	87 674	221 827
Grand Total	116 133	418 015
Total 2020+2021 (doit être < ou = à 2*400k€)	534 148	

Budget 2022-2027

~ 357 (320 + 37) k€/yr

Institut de Physique de l'Univers (IPhU) budget de 6*320k€=1920k€ pour 2022-2027 + 220 062 € de reliquat 2021-2022 = 2 142 062 €	2022	2023	2024	2025	2026	2027
PhD 1 - 2020	12	9				
PhD 2 - 2020	12	9				
PhD 5 - 2021	12	12	9			
PhD 6 - 2021	12	12	9			
PhD 7 Revers. de 50 688€ de IPhU en FCT au CNRS pour contrat CNRS	0	0	0	0		
PhD 8 1/2 PhD IPhU + Revers. 50 688€ du CNES à IPhU en MS	3	6	6	3		
PhD 9		3	12	12	9	
PhD 10		3	12	12	9	
PhD 11			3	12	12	9
PhD 12			3	12	12	9
PhD 13				3	12	12
PhD 14				2	6	6
PhD 15					3	12
PhD 16					2	6
PhD 17						3
PhD 18						2
# Nombre PhDs	6	8	8	8	8	8
cost	133 506	144 476	154 828	169 504	202 267	189 084
PhD IA-ANR 1 (co-financement à 50%) - PhD 3 - 2020						
PhD IA-ANR 2 (co-financement à 50%) - PhD 4 - 2020						
# mths	0	0	0	0	0	0
cost	0	0	0	0	0	0
cost RH PhDs	133 506	144 476	154 828	169 504	202 267	189 084

Institut de Physique de l'Univers (IPhU)	2022	2023	2024	2025	2026	2027
IGE (ingénieur pédagogique de la Graduate School) puis gestionnaire	0	0	0	0	0	0
# mths	0	0	0	0	0	0
cost	0	0	0	0	0	0
IGR (innovation IR/Radon)	8	0	0			
# mths	8	0	0	0	0	0
cost	33 160	0	0	0	0	0
Wages for PhDs teaching/outreach (2+2 and 1+1 or 1+2 in descoped)	0	0	0	0	0	0
PCA Directeurs adjoints	3 000	3 000	3 000	3 000		
Provision						
cost	3 000	3 000	3 000	3 000	0	0
cost RH Other	36 160	3 000	3 000	3 000	0	0
COST: Human resources	169 666	147 476	157 828	172 504	202 267	189 084
PhD operation (2k€/person per yr until 2021 and 1.2k€/person after)	7 200	12 800	12 800	12 800	12 800	12 800
Research projects operations engagées						
Research projects operations	80 000	80 000	80 000	80 000	80 000	80 000
Research platforms consolidation (COLIBRI, SPACE, IR, and ELIXIR)						
COST: Research (hors ce qui est déjà inclus dans le REPORTING)	87 200	92 800	92 800	92 800	92 800	92 800
IPhU Operations	1 800	2 000	2 000	2 000	1 700	1 101
Innovation (incentive money)	2 000	2 000	2 000	2 000	2 000	2 000
Frais de gestion CNRS (cofinance thèse IPhU-ANR Fouchez/Arnouts)	4 055					
Versement au CNRS (cofinance thèse IPhU-ANR Fouchez/Arnouts)	50 688					
Outreach						
Education platforms consolidation (IRiS@OHP, ePERON @OHP&OPM)	4 500	4 500	4 500	4 500	4 500	4 500
COST: Innovation, Outreach and operations	63 043	8 500	8 500	8 500	8 200	7 601

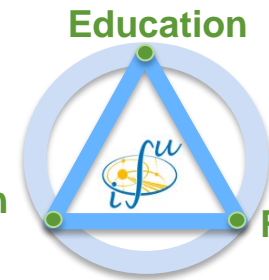
Institut de Physique de l'Univers (IPhU)	2022	2023	2024	2025	2026	2027
Incoming grants engagées						
S1-2022 (engagé sur budget 2021)						
S2-2022 (engagé sur budget 2022)	16 000					
S1-2023 (engagé sur budget 2022)	8 000					
Incoming grants à partir rentrée 2022						
M1 Full	0	8 000	16 000	16 000	16 000	8 000
M1 Half	0	8 000	16 000	16 000	16 000	16 000
M2 Full	8 000	8 000	8 000	8 000	8 000	4 000
M2 Half	20 000	8 000	8 000	8 000	8 000	8 000
Outgoing grants engagées						
Outgoing M1	2 500	2 500	2 500	2 500	2 500	2 500
Outgoing M2	4 500	4 500	4 500	4 500	4 500	4 500
Internships engagés						
Internships M1	4 950	4 950	4 950	4 950	4 950	4 950
Internships M2	6 600	6 600	6 600	6 600	6 600	6 600
Training @OHP	7 000	7 000	7 000	7 000	7 000	7 000
Facturation interne par l'UFR (pour cours master)	2 043					
Cours doctoraux (105h à 45€/h)	4 725	4 725	4 725	4 725	4 725	4 725
Intervenants externes pour "Instrument Scientist" (0h à 60€/h)						
COST: Graduate School (hors ce qui est déjà inclus dans le REPORTIN)	84 318	62 275	78 275	78 275	78 275	66 275

- **GS Master: ~ 80 k€/yr**
 - Incoming grants: M1 (1 Full + 2 Half); M2 (1 F + 2 H) /yr
 - Outgoing grants: 1 M1; 1 M2 /yr
 - Including PhD courses: ~ 5 k€ /yr
- **PhD students: ~ 8 over 2022-2027**
- **PhD salaries: 150-200 k€ /yr**
- **Research: ~ 90 k€ /yr**
 - including ~ 10 k€ PhD operations /yr
- **Innovation, Outreach & IPhU Operations: ~8 k€ /yr**

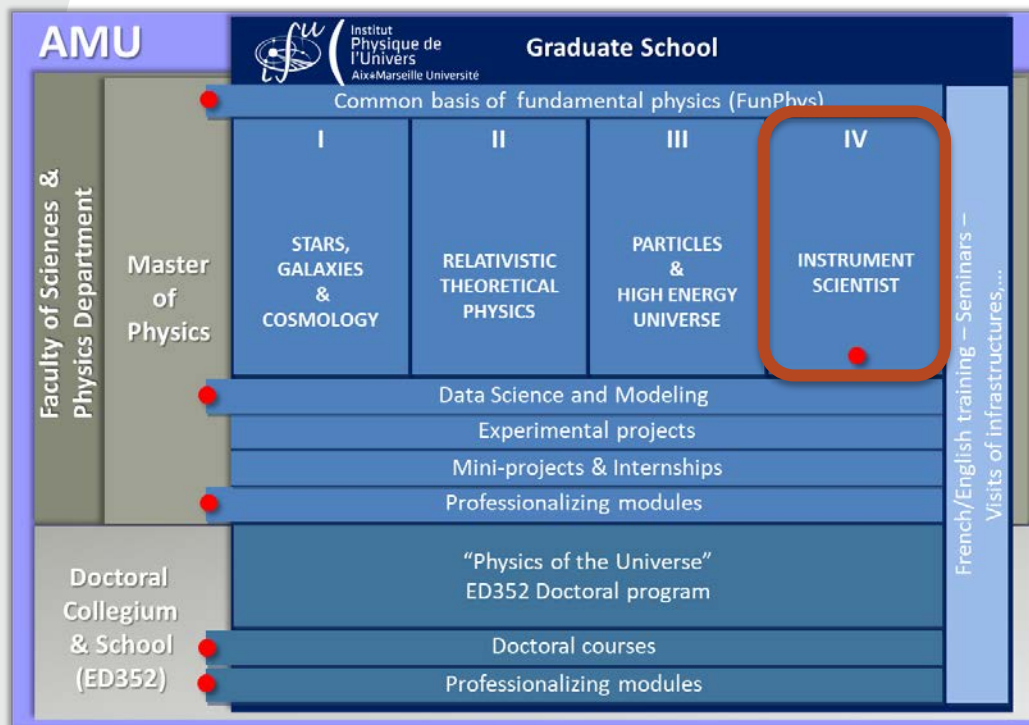
Transformation of the Master Programme

involves: UFR – Physics Department
 Master « Mention Physique » and « Parcours FunPhys »
 IPhU and ISFIN (essentially)

Innovation
Transfer



Research



● (partly) shared with other curricula in Faculty of Sciences and/or ED352

Creation of an "Instrument Scientist" flavor
Integration of the TRIPS platform MULTIVERSE

Education at the Master level (Master Fundamental Physics)

- Funding of
 - Incoming grants
 - full (8000€/yr/student)
 - M1: 2 (2020); 4 (2021); 2 (2023) over 2 years
 - M2: 1 (2022); 1 (2023)
 - half (4000€/yr/student)
 - M1: 3 (2020); 3 (2021)
 - M2: 4 (2020); 6 (2021); 5 (2022); 3 (2023)
 - and Outgoing grants:
 - 2 per year (1 M1 and 1 M2)
- Funding of Research internships
 - 8 (2020-2021); 23 (2021-2022); 6 (2022-2023); 6 (2023-2024)
- Participation to the modification of the programme of the AMU Master of Physics (new Instrument Scientist flavor) for its new accreditation

Some IPhU Actions

TIGER Experimentation phase impact on IPhU 2022-2025 Budget

- Allocated budget to FunPhys selected in the EoI TIGER **2021-2022** experimentation Call
Shared between IPhU and ISFIN institutes => for IPhU: **2400€ (~ 1 internship M2) et 4000€ (outgoing grant)**

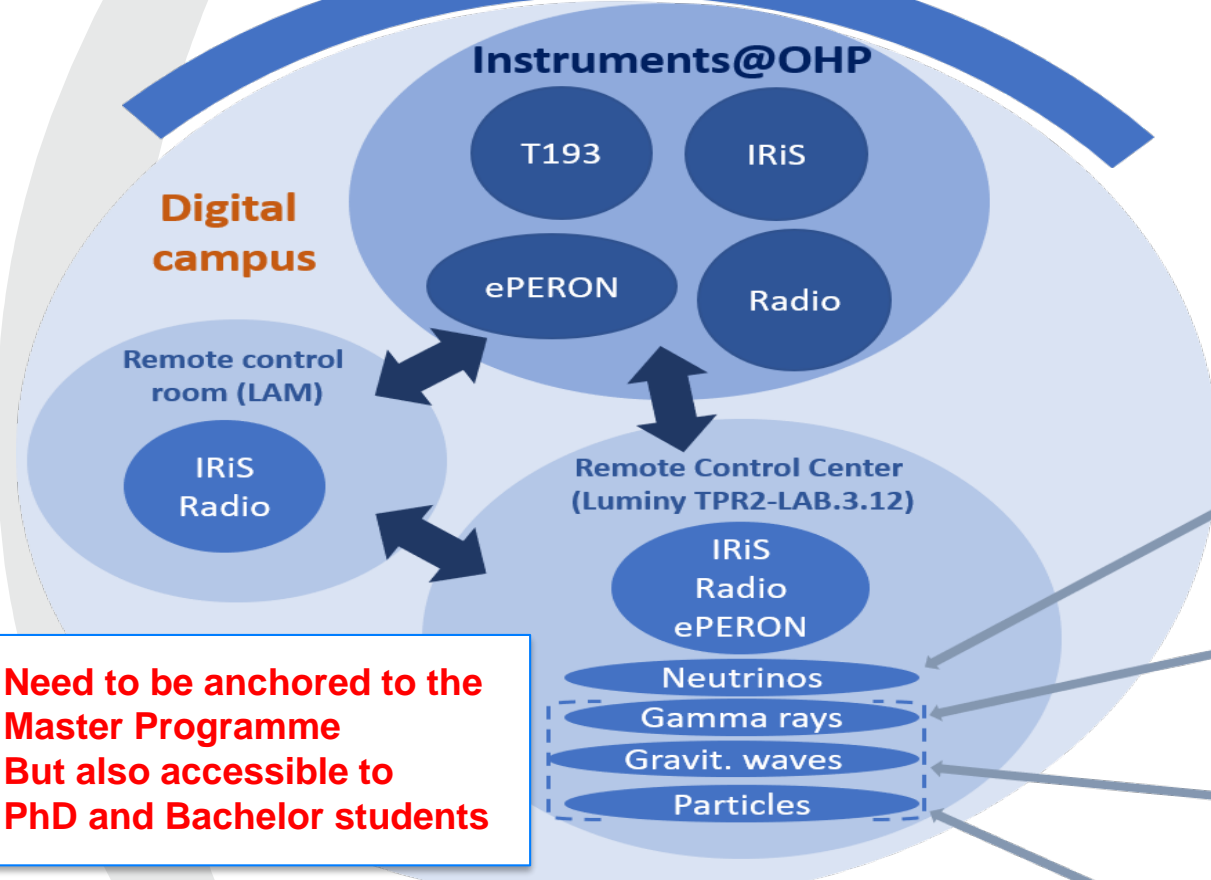
Mention de master	Parcours	Composante(s)	Budget total	Dispositif "stages"	Dispositif "mobilités"	Dispositif "colloques"	Dispositif "événements"	Dispositif "extérieurs"	Institut(s) associé(s)...
Physique	Physique (acronyme FunPhys)	Faculté Des Sciences (FDS)	12 800 €	4 800 €	8 000 €	0 €	0 €	0 €	IPhU+ISFIN
Somme totale à répartir			12 800 €	4 800 €	8 000 €	0 €	0 €	0 €	

- 17/11/2021: FunPhys is eligible for a few incoming grants for M1 and/or M2 students**
 - Un montant de 80 000 euros vous sera donc octroyé pour 8 bourses de mobilité entrante (de 10 000 euros chacune), à répartir sur les trois prochaines années universitaires, et entre IPhU et ISFIN.*
 - Exemple d'allocation des ressources :*
 - Rentrée 2022 : 2 bourses de M1*
 - Rentrée 2023 : 2 bourses de M1 + 2 bourses de M2 (M1 2022 terminant leur master)*
 - Rentrée 2024 : 2 bourses de M2 (M1 2023 terminant leur master)*
 - => for IPhU 1 M1 full-grant in 2022 and 1 M1 full-grant in 2023 (40k€ over 3 years)**
- Allocated budget to FunPhys 01/09/22 - 31/08/24 (2 yrs): 14 400 € to share btw IPhU/ISFIN**
 - Outgoing grants: 4000 + 4000
 - Internship: 2400 (4*600)
 - Event MSE: 4000

- **Creation of an annual summer school on Gravitational Waves**
with OCA/Nice & L2IT+IRAP/Toulouse - Master-PhD Level
In 2022 : amphis Hexagone et CPPM @Luminy ; 4-8 July 2022 (5 days)
<https://indico.in2p3.fr/event/25990/>
In 2023 : @Nice ; 3-8 July 2023 (6 days);
in 2024: @Toulouse 1-6 July 2024;
in 2025: it will be back @Marseille
- **In 2023 rebirth of Summer Camps @OHP** (a week of immersion in the scientific process; 4-9 June 2023)
for end of 10th grade students, en partnership with Aix-Marseille Rectorate.
In 2024 organization of the 2nd edition of the Summer Camp@OHP
- **Funding and organization of Observation internships/projects at OHP** for AMU Master students
- **Teaching/training Platforms**
 - **Astronomy** - <http://iris.lam.fr/>
 - IRiS (@ OHP) – has worked really well for some years already; involvement of a school teacher
 - Region co-funded project of an antenna @ OHP for radio-astronomy
 - **Cosmic Rays** - <https://eperon.omp.eu/>
 - ePERON – @ OPM in collaboration with OMP; new complementary deployment @ OHP
 - **A new radiotelescope installed in 2024 @OHP**
 - **Being integrated in a more general “TRIPS” platform MULTIVERSE**

Possible connections with other institutes
Origins (for what concerns astrophysics, exo-planets,...),
OCEANS (on Deep sea environment) and **AMI** (on signal processing, and Machine and Deep learning,...)

AMU/AMIDEX
 Fac. of Sciences OSU Pytheas Doctoral Schools
 Phys. Dept. IPhU



Other instruments

- LSPM – KM3NeT
Neutrinos & Deep sea environment
Open data
- SVOM/Colibri
CTA/HESS
Open data
- LISA & LIGO/Virgo
Open data
- CERN - LHCC
Open data

In a 2nd step

**Need to be anchored to the Master Programme
 But also accessible to PhD and Bachelor students**

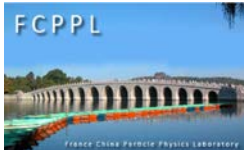
The evaluation date of the applications has been shifted and the selected projects will be announced in late March 2023

- **International – existing structures we can rely on**

- LIA/IRL ERIDANUS with Mexico



- LIA/IRL FCPPL with China



- *Ongoing discussions with AMU and DERCI to have a specific action on immunology (CIML and its IRL) and Physics of the Universe with SJTU – SII + TDLI*

- **International Partnerships in Research and Training**

- Shanghai Jiao Tong (上海交通大学) & T.D. Lee Institute – cooperation agreement AMU-SJTU signed in 2019, and renewed in 2024
- CIVIS partnerships to develop – the IPhU internal call AAP#4 was open to CIVIS teams

From 2020 to 2023 (4 calls for proposals internal to IPhU)

Support for collaborative scientific projects, including PhD students who have helped ensure the Marseilles community's impact in international collaborations:

- Major cosmological surveys: DESI, LSST, EUCLID (detectors+docs)
- Establishment of a Dark Matter research axis (detectors+doctoral fellows) on its Particle Physics, Astroparticles and cosmology aspects.
- In Astroparticles, with KM3NeT on multi-messenger aspects and on SVOM (PhD students), construction and implementation in Mexico of the Colibri robotized telescope for ground-based monitoring of SVOM and multi-messenger alerts.
- In Particle Physics, in the search for new physics, testing new theoretical models with data from the LHC (PhD students) 2 co-funded theses on AI applied to cosmo and CP.
- Set up 3 interdisciplinary A*MIDEX projects with post-docs in cosmology, multi-messenger astrophysics and Particle Physics.
- Hosting high-level colleagues from foreign universities, including ULB (Civis) and Bucharest (Civis)
- Support for the organization of international conferences, workshops and schools
- Numerous publications

Scientific Production: 149 papers

are associated to IPhU in Web of Science
Including 3 in NATURE

As of 17 Jan 2025



Query used on Web of Science Core Collection:
(((OG=(IPhU)) OR FO=(IPhU)) OR FG=(AMX-19-IET-008))

- **(7+2) PhD students have been funded by IPhU** (end of last contract: Oct 2026) :
 - Reda AIT OUAMED – cofinancement AIDOC2AMU – oct 2020
 - Lauri LAATU – cofinancement AIDOC2AMU – oct 2020
 - Renan BOSCHETTI – oct 2020
 - Vlad DEDU – oct 2020
 - Martin KARCHER – nov 2021 => oct 2024
 - Marie Van UFFELEN – oct 2021 => sep 2024
 - Ny Avo RAKOTONDRAINIBE – cofinancement CNES - oct 2022 => sep 2025
 - Damiano ROSSELLI – cofinancement ANR CNRS - oct 2022 => sep 2025
(géré par CNRS – convention de versement associée)
 - Sarah FERRAIUOLO – nov 2023 => oct 2026
- **IPhU Doctoral Programme with ED352**
 - ✓ 12 courses of 12-16 hours offered

Some IPhU Actions

ED352/IPhU Doctoral Programme

2022/2023/2024 Doctoral Courses of the Physics of the Universe Programme

	Titre	Financement	Intervenant(s)	Durée (h)	Répartition (h)
ASTROPHYS. HAUTE ENERGIE					
	Advanced neutrino physics	ED352	José Busto, Juergen Brunner, Damien Dornic, Mathieu Perrin-Terrin	15	4, 4, 4, 3
	Dark matter from phenomenological perspectives	IPhU	Julien Lavalley (LUPM - Montpellier)	15	
GALAXIES ET COSMOLOGIE					
	Observational cosmology	ED352	Denis Burgarella, Veronique Buat, Olivier Ilbert, Eric Jullo	15	
	Bridging cosmology and galaxy formation	ED352	Carlo Schimd, Katarina Kraljic, Simona Gallerani (Scuola Normale Superiore, Pisa)	16	
PHYSIQUE DES PARTICULES					
	Standard Model	IPhU	Aoife Bharucha	15	
	Introduction to theories beyond the Standard Model of particle physics	IPhU	Michele Frigerio (L2C - Montpellier)	15	
	Introduction to Quantum Chromodynamics	IPhU	Antoine Gérardin	12	
TRANSVERSE - THEORIE					
	Field theoretical aspects of general relativity	ED352	Simone Speziale	15	
	Renormalisation and Effective Theories	IPhU	Thomas Krajewski	12	
TRANSVERSE - EXPERIMENTAL					
	The Large Research Astrophysics and Particle Physics Instruments of the coming decades	IPhU	Jean-Gabriel Cuby, William Gillard	15	
	Advanced statistical methods for HEP	ED352	Yann Coadou, Lorenzo Feligioni	15	
	Introduction to Large Surveys, Big Data, and Generous Statistics	IPhU	Matthew Pieri	15	

- **Creation of a scientific program on gravitational waves (GW).**
 - Creation of a MaNiTou (Marseille-Nice-Toulouse) Master's/Doctoral summer school on GW open to the international community.
This will be its 4th edition in 2025, back to Marseille 😊
 - Involvement of the CPT through fresh recruitment in the field of GW.
 - Involvement of CPPM and LAM in the ESA LISA space mission.
 - A joint AMU/CPPM-Sapienza Roma (Civis) thesis (Sarah Ferraiuolo) start in Nov 2023 to use GWs for cosmology:
1st paper on “Inferring astrophysics and cosmology with individual compact binary coalescences and their gravitational-wave stochastic background” ready for submission...
next step: cosmology using LVK GW data and DESI and Euclid catalogues.
- **We have just renewed and extended our cooperation agreements with Shanghai Jiao Tong University**, and more specifically with the Department of Physics and Astronomy and the TD Lee Institute, including training and exchanges of teaching and research staff, student exchanges at L2, M1, M2 and PhD levels (also with co-tutelles).
- **Several cofounding efforts** and related agreements to be put in place

Some IPhU Actions

diversification of funding (cont'd)

- **Chaires AMIDEX :**
 - Spontaneous application on Gravitational Waves – not selected by AMIDEX
 - **Application by CPT on Gravitational Waves – SELECTED by AMIDEX – to be hired in 2023!**
- **Call AMIDEX Interdisciplinarité :** 3 projects submitted (postdocs) – All 3 selected in the end! 😊

PI	Title	Labs	Status	Requested
Aoife Bharucha	Low@LHC - Low mass resonances at the LHC	CPT, CPPM; L2C, LUPM	OK	2-yr Postdoc + TBD
Damien Dornic	NEXCOS - NEutrinos and X-ray follow-up for Cosmic-ray Source studies	CPPM, LAM	OK	2-yr Postdoc + TBD
Eric Jullo	DC2DM - Direct and Cosmological characterization of dark matter	LAM, CPPM	OK	2-yr Postdoc + TBD

- **Other Calls (Région, CNRS, ANR, CIVIS3i)**
 - 2 projects co-funded by Région SUD - **selected**
 - ELIXIR - robotic telescope @OHP for follow-up for multi-messenger astronomy and for NEOs (near Earth objects)
 - radio@OHP
 - 2 projects MITI (CNRS) 2022 « Rare Events » - **selected**
 - 1 postdoc project CIVIS3i on HE Astrophysics in the framework of the « The CIVIS Alliance Programme for International, Interdisciplinary, Intersectoral Research and Training for Experienced Researchers » – **selected**
but results came too late ☹ - postdoc found another place to go in the meantime!

- Convention de mise en œuvre de l'IPHU (03/12/20) et avenant (20/09/22)
- Convention attributive 2022-2024 TIGER – TRF pour le parcours FunPhys (11/10/22)
NB: pas de signature de la Faculté des Sciences
- Convention de versement AMU/AMIDEX → CNRS pour co-financement doctorant AAP#3 IPhU (OK)
- Convention de délégation de gestion CNRS-→ AMU du cofinancement CNES d'un doctorant recruté sur l'AAP#3 de l'IPhU (en cours)
- Convention de versement CNRS -> AMU/AMIDEX pour co-financement du projet Région ELIXIR @OHP (en cours)
- Convention AMU/AMIDEX-CNRS pour Summer Camp à l'OHP (en cours)
- Convention à discuter entre AMU/AMIDEX/TIGER, le CNRS et la Région pour cofinancement d'un radiotélescope @OHP dans le cadre du TRIPS MULTIVERSE (en cours)

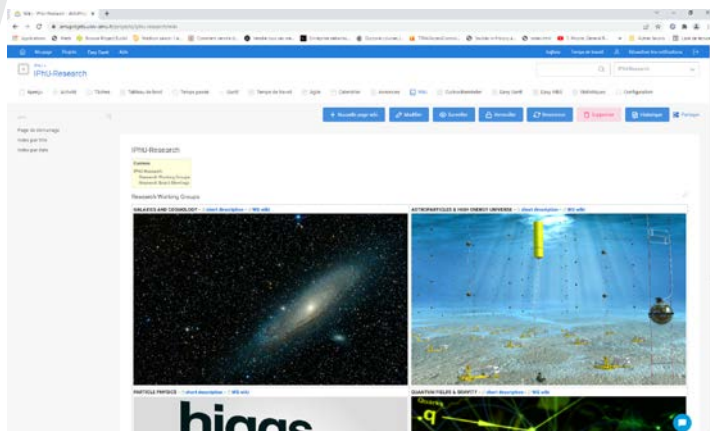
Some IPhU Actions

We have developed web pages: <https://www.univ-amu.fr/iphu>

- Some pages are still under construction, though

Collaborative tools:

- AMUbox + AMUprojets (Redmine based)



- Indico to manage all our meetings: <https://indico.in2p3.fr/category/873/>

- A electronic newsletter



INSTITUT PHYSIQUE DE L'UNIVERS - IPhU (SITE EN CONSTRUCTION)



We organize IPhU days to gather the IPhU community

- In **2022 IPhU Day**: 10 Feb
- In **2022 IPhU Days**: 2 half days on 10-11 Feb, on Zoom
- in **2023 IPhU Day**: 20 Jan, hybrid mode (CPPM & Zoom)
<https://indico.in2p3.fr/event/28790/>

Actions (cont'd)

- Implementation of a monthly Newsletter.
AMU did not want to share its tools, so we had to manage on our own (topol.io) ...

NEWSLETTER



Institut
Physique de
l'Univers
Aix-Marseille Université

January 2021

To you, your loved ones, and your colleagues...



Happy
New Year
2021

Previous issues of the newsletter



NEWSLETTER

Where can I find them? [HERE](#)

General Event - Please join...

IPhU Days

A year after the creation of the Institute for the Physics of the Universe (IPhU) by AMU, this event aims at bringing together the IPhU community to assess the status of its beginning, its present and of its future that we need to build together in all its entangled aspects: Research, Education, Innovation and Transfer.

NEWSLETTER



Institut
Physique de
l'Univers
Aix-Marseille Université

January 2022

To you, your loved ones, and your colleagues...



2022
HAPPY NEW YEAR

IPhU Days - 10-11 Feb 2022 - Please join...



NEWSLETTER

This event aims at bringing together the IPhU community to assess the status of its beginning, its present and of its future that we need to build together in all its entangled aspects: Research, Education, Innovation and Transfer.

The IPhU days also stand as an opportunity to share our expectations and discuss them among ourselves.

Please mark the dates in your calendars.

More information will be provided in January once the programme is finalized.

Hope you will be numerous to join and take part in the videoconferencing meeting!

Organized by IPhU
10-11 February 2022

[IPhU/INDICO](#)

NEWSLETTER



Institut
Physique de
l'Univers
Aix-Marseille Université

February 2022

IPhU Days - 10-11 Feb 2022



Please join us on Zoom...
It is **Free of Charge and No Vaccination Pass is required!**;-)
The IPhU Days aim at bringing together the IPhU community to assess the status of its beginning, its present and of its future that we need to build together in all its entangled aspects: Research, Education, Innovation and Transfer.

The programme has been finalized and is available on the Indico web site you can reach just below.

This event also stands as an opportunity to share our expectations and discuss them among ourselves.

We hope you will be numerous to join and take part in the videoconferencing meeting!

Organized by IPhU
10-11 February 2022
Via Zoom

[INDICO WEB SITE](#)

A*Midex Call for Proposals "interdisciplinarité"
3 projects preselected by the Institute Council



Actions (cont'd) : AMU News on achievements of projects supported by IPhU

NEWS FROM AIX-MARSEILLE UNIVERSITY

April 2021

INSTITUT-IphU

BY THEMATIC

RESEARCH

INSTITUT-IPHU

NEW RESULTS IN THE SEARCH FOR PAIRS OF HIGGS BOSONS

Updated the: 04/07/2021 - 13:05

The Standard Model of particle physics describes the elementary bricks of matter, as well as their interaction. In this Model the particles get their masses through the Higgs mechanism.

The discovery the Higgs boson in 2012 proved that this mechanism exists but we still have to figure out its details, in particular how the Higgs boson interacts with itself.

READ MORE

TRAINING

INSTITUT-IPHU

RESEARCH SCHOOL: THEORY OF GRAVITATION AND VARIATION IN COSMOLOGY

Updated the: 04/01/2021 - 18:14

Overview of current theories and tests of gravitation in different regimes, ranging from the scale of the solar system to the large structures of the Universe

RESEARCH

INSTITUT-IPHU

LEPTON FLAVOUR UNIVERSALITY QUESTIONED?

Updated the: 04/01/2021 - 18:13

Intriguing new result from the LHCb experiment at CERN

READ MORE

START OF THE 1% SURVEY OF THE DESI EXPERIMENT

UPDATED BY ERIC KAJFASZ ON SAT, 04/24/2021 - 12:05 | INSTITUT-IPHU | THEME : RESEARCH | 

AMU, with significant support from AMIDEX, Labex OCEVU and IPhU, has been involved since 2014 in the design, validation and implementation of the 10 spectrographs of the DESI experiment. The DESI 1% survey, which started on April 6, 2021 for a duration of 6 weeks, marks the beginning of the scientific exploitation of this investment.

One of the biggest questions in contemporary physics is to understand the cause of the accelerating expansion of the Universe. The expansion of the Universe has been known since the first half of the 20th century, but its acceleration was only discovered in 1998 by S. Perlmutter (Doctor Honoris Causa of AMU), A. Riess and B. Schmidt, winners of the 2011 Nobel Prize in Physics. This acceleration of the expansion of the Universe is the subject of numerous theoretical and observational studies by physicists and astrophysicists around the world.

Several large-scale ground-based and space-based projects for observing the Universe have been developed in recent years and will begin to accumulate observations in the coming months and years. Among these large international projects are the European Space Agency Euclid space mission which will be launched between late 2022 and mid-2023, the Large Synoptic Survey Telescope (LSST - Vera C. Rubin Observatory) which will become fully operational in 2022, and the Dark Energy Spectroscopic Instrument (DESI) project, led by the Department of Energy (DOE) in the USA.

Some IPhU Actions

Actions (cont'd) : AMU News on achievements of projects supported by IPhU

ANDREEV REFLECTION OF FRACTIONAL QUASIPARTICLES IN THE QUANTUM HALL EFFECT **May 2021**


UPDATED BY ERIC KAJFASZ ON FRI, 05/28/2021 - 08:57 | INSTITUT-IPHU | THEME : RESEARCH | 

At the interface between a normal metal and a superconductor, an incoming electron can be transmitted in the superconductor as two electrons forming a Cooper pair, while a hole is reflected back in the normal metal. This is known as Andreev reflection. Researchers from the Nanophysics team of the CPT (CNRS-AMU), in collaboration with an experimental team at NTT Research Labs (Atsugi - Japan), have demonstrated that a similar behavior can be observed for fractional quasiparticles existing in the Quantum Hall effect in 2d electronic gas. This study is an important step towards the understanding and the manipulation of these fractional quasiparticles.

In semiconductor structures, electrons can be confined at the interface between two layers, forming a 2d electron gas. Applying a strong magnetic field, and working at very low temperature, the system reaches a state known as Integer Quantum Hall Effect. There, the conductance (the inverse of the resistance) can only reach very precise quantized values. This quantization can be explained by the topological properties of the system: the electronic current is fully carried by unidimensional electronic edge states along the boundaries of the system, and the value of the conductance is directly related to the number of these edge states. If the magnetic field is increased further, one then reaches the Fractional Quantum Hall Effect. There, electronic interactions play an essential role: the current is still carried by 1d edge states, but the fundamental excitations are not electrons, but quasiparticles having a fractional charge (for example $e/3$, where e is the electron charge), which are due to the collective behavior of interacting electrons.

Jun 2021

ECOLE DE GIF ON " BEYOND THE STANDARD MODEL OF COSMOLOG

UPDATED BY ERIC KAJFASZ ON FRI, 06/11/2021 - 15:54 | INSTITUT-IPHU | THEME : TRAINING | 

The 52nd edition of the Ecole de Gif will focus on "Beyond the Standard Model of Cosmology". This edition is organized in Marseille by the IPhU laboratories (CPPM, CPT and LAM) on 13-17 September

The Ecole de Gif is the oldest of the IN2P3 thematic schools. Mainly French-speaking, it is intended primarily for doctoral and post-doctoral students. However, as its objective is to treat the theme of the session in its most delicate and actual developments, it is open to any interested researcher, experimentalist or theorist

L'École de Gif présente sa 52ème édition

Au-delà du Modèle Standard de la Cosmologie

Du 13 au 17 septembre 2021
Station Marine d'Endoume, Marseille, France

BY THEMATIC

RESEARCH

Jan 2022

INSTITUT-IPHU

DESI CREATES LARGEST 3D MAP OF THE COSMOS

Updated the: 01/31/2022 - 16:30

The Dark Energy Spectroscopic Instrument (DESI) has capped off the first seven months of its survey run by smashing through all previous records for three-dimensional galaxy surveys, creating the largest and most detailed map of the universe ever. Yet it's only about 10% of the way through its five-year mission.

Outstanding DESI 1st results in which teams from OHP, CPPM and LAM (IPHU Galaxies and Cosmology WG) have been strongly involved

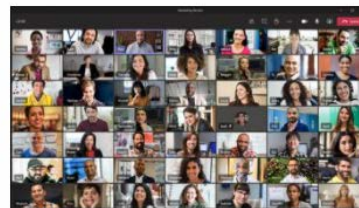
INSTITUT-IphU

EVENT

INSTITUT-IPHU

2ND EDITION OF THE IPHU DAYS

Updated the: 02/08/2022 - 10:42



The second edition of the IPhU Days will be held via Zoom on February 10th and 11th, 2022

Feb 2022

READ MORE 

University Academic Council
(Conseil Académique) - AMU

Management Council
(Conseil de gestion) - A*MIDEX

Stakeholders Steering Committee
(Comité de pilotage des tutelles)

Scientific and Training Advisory Board

AMU	Stefan ENOCH
CNRS	Lydia ROOS -> Laurent VACAVANT

Institute Council

Members with deciding vote

Faculty of Sciences (2 votes), OSU Pythéas (1)
CPPM (1), CPT (1), LAM (1)

Board of Directors

(RST) Director **Eric Kajfasz**

Deputy Director for Education **Serge Lazzarini**

Deputy Director for Research **Stéphane Basa**

(CdP) Administrative Director **Marie-Thérèse Donel**

IPhU Management

**Conseil stratégique en formation
et recherche / Scientific and
training advisory board**

Fabienne Casoli, President of the Paris-PSL Observatory, Former Deputy Director of the Innovation, Applications and Science Division at CNES.

Françoise Combes, "Galaxies and Cosmology" Full Professor at Collège de France, Member of the French Academy of Sciences, Honorary Fellow of the Royal Astronomical Society - UK.

Eckard Elsen, Director for Research and Computing at CERN - Switzerland. Professor at Hamburg University - Germany.

Anne-Isabelle Etievre, Director of the Institute of research into the fundamental laws of the Universe (Irfu) at CEA, and with University Paris-Saclay.

Guido Martinelli, Professor of Theoretical Physics at La Sapienza University Roma - Italy. Member of the CERN Scientific Policy Committee - Switzerland and of the Accademia Nazionale dei Lincei - Italy.

Teresa Montaruli, Full Professor at University of Geneva - Switzerland. Chair of the European APPEC Consortium.

Joseph Silk, Professor of Physics at Sorbonne University, Homewood Professor of Physics and Astronomy at Johns Hopkins University - USA. Fellow of the Royal Society - UK.

Christian Stegmann, Director in charge of Astroparticle Physics at DESY - Germany. Deputy-Chair of the European APPEC Consortium.

- **STAB**

- Convened on March 23rd, 2022
- Minutes are available – Conclusions :
 - After an extended programme start-up phase (forced by COVID) IPhU is now ready for a living implementation; first and foremost the three laboratories are now in a position to organise joint teaching programmes that are in earnest attended between the two sites. While virtual meetings have become a common tool the actual bonding experience requires meetings in physical presence.
 - The changing prospects for funding have had detrimental effects. While the now anticipated funding allows only for a reduced engagement in education and PhD positions the IPhU idea of fostering interdisciplinary can only be maintained by co-funding through external sources which are uncertain. IPhU has taken the necessary steps to maximise the overall outcome in education and outreach.
 - IPhU has submitted a proposal for a Junior Professor position in Astrophysics. The STAB wholeheartedly supports this application which is vital for the future visibility. Likewise, IPhU is encouraged to apply elsewhere in novel funding calls emphasising its interdisciplinary capabilities.
 - **The STAB recognises the importance of the IPhU initiative which brings benefits not only in training students at the international level but also fosters research and innovation.**

- **Steering Committee:** Convened on April 13th, 2022

- **Institute Council**

- Convened on Dec 8th, 2022
- **Request from the Fresnel "CONCEPT" team to be associated to IPhU.**
IPhU Management, Board of Research and Institute Council agreed to have the CONCEPT team associated with IPhU, with a possible later transition to full member (with Fresnel integrated into the Institute Council) in a second stage, depending upon actual collaborative work put in place

31 December 2024 – OFFICIAL END OF IPhU