Institute for the Physics of the Universe

Institut
Physique de
l'Univers
Aix*Marseille Université

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

Aix*Marseille université
Socialement engagée

A*Midex
Initiative d'excellence Aix-Marseille

FRANCE 2030

Aix*Marseille université
Initiative d'excellence

cnrs

Inserm
La science pour la santé
From science to health

cea

IRD Institut de Recherche pour le Développement FRANCE

CENTRALE MARSEILLE

sciencespo.aix

AP-HM
Assistance Publique Hôpitaux de Marseille

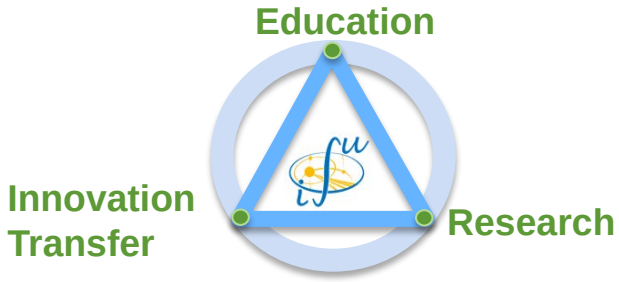
Goals and vision

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

  → **Research Groups**
- **Foster**
  - Training by and for Research → **Graduate School**
  - Innovation, Creativity, C*oopetition* → **Innovation Cell**
  - Open to the world → **Centre International de Rencontres de Physique**
- **Promote and enforce**
  - Crossed fertilization between its 3 pillars
  - HRS4R Compliant Practices

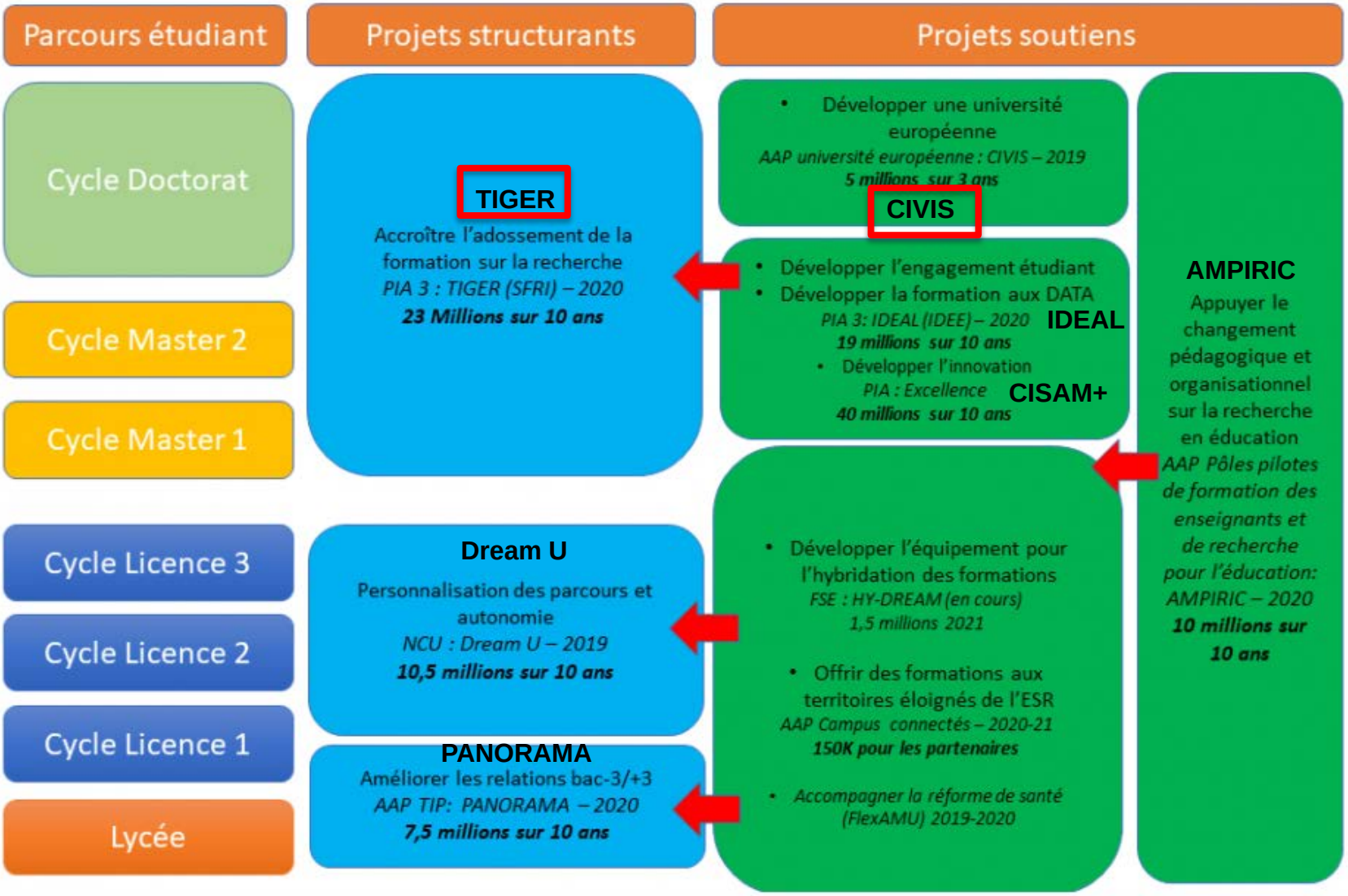
Sustainability



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

IPhU in the AMU PIA Context

A strategy based on the articulation of different structuring training projects



Perimeter

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

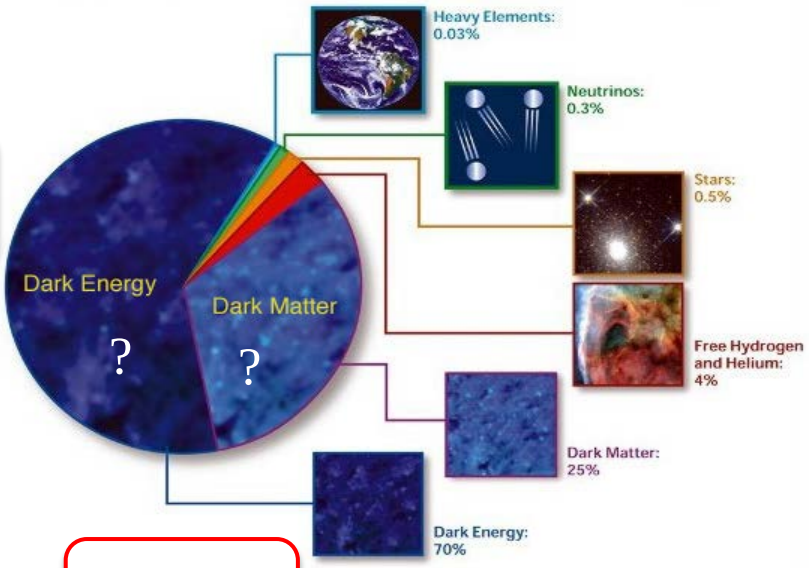
DRIVING FORCES

- **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*

Research

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

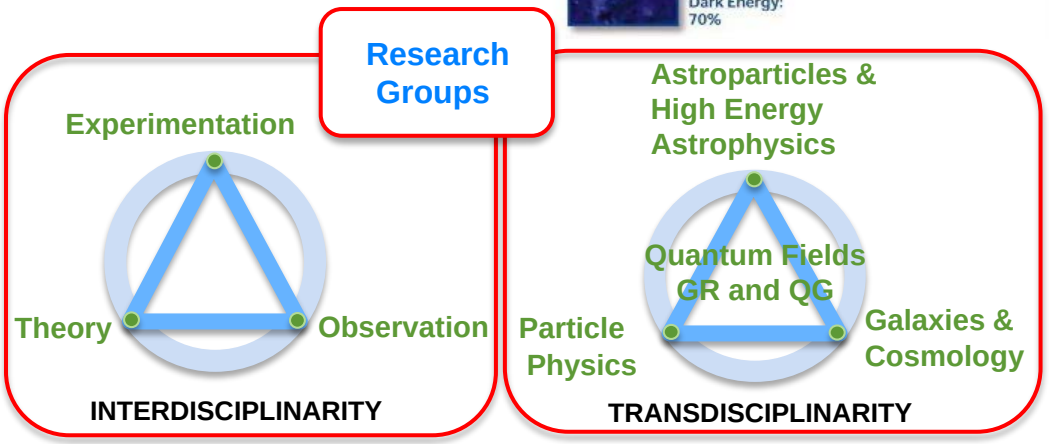
Support for original, innovative or risky ideas

- ***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) …

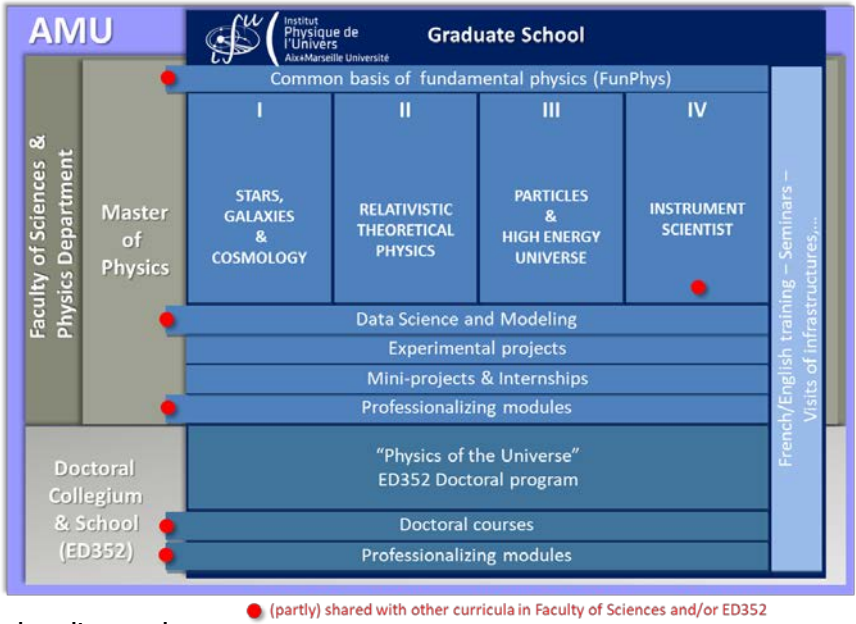
Which will also be used as training platforms in the Institute Graduate School

Education/Training

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**

Socio-economic links

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**

2020-2021 Budget
530 k€ total

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 REPORTIN	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**	

Institut Physique de l'Univers
Aix*Marseille Université

Budget 2022-2027
1.05 M€ (22-24) & 1.08 M€ (25-27)

Institut de Physique de l'Univers (IPhU)	2022	2023	2024	2025	2026	2027	
Grand Total	404 227	311 051	337 403	352 079	381 542	355 760	2 142 062
Total 2020+2021 (doit être < ou = à 2*400k€)							
	-47 217	45 959	19 607	4 931	-24 532	1 250	
						TOTAL PREVISONNEL 2022-2027	2 142 062
						buget total alloué =>	*2 142 062*
						difference =>	0

RECETTES

Institut de Physique de l'Univers (IPhU)	2022	2023	2024	2025	2026	2027	total
CNES - cofinancement thèse Buat/Dornic		16 896	16 896	16 896			50 688
ELIXIR - partie Région (déjà @AMU)		120 962					120 962
ELIXIR - partie CNRS (transfert par facturation interservice LAM->IPhU)		80 000					80 000
Radio@OHP - partie Région @CNRS (Fact interservice LAM -> IPhU)		34 000					34 000
Engagement Labex OCEVU - transport Colibri au Mexique	39 200						39 200
GRAND TOTAL RECETTES	**39 200**	**251 858**	**16 896**	**16 896**	**0**	**0**	**324 850**

Organization – Rules and Regulations

Institut Physique de l'Univers Aix*Marseille Université

Aix*Marseille université Socialement engagée

A*Midex Initiative d'excellence Aix-Marseille

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

The STAB recognizes the importance of the IPhU initiative which brings benefits not only in training students at the international level but also fosters research and innovation.

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 Etienvre, 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.

Institut Physique de l'Univers
Aix*Marseille Université

Organizational chart

v20230101

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

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**

Education Board

DDE - Serge Lazzarini

Master
Marlon Barbero
Serge Lazzarini
Patrice Theulé
"Instrument Scientist" flavor
Jean-Gabriel Cuby
William Gillard

Doctorate
Véronique Buat
Cristinel Diaconu
Thierry Martin

Big Data: Cristinel Diaconu

Research Board

DDR - Stéphane Basa

Aoife Bharucha
Damien Dornic
Stéphanie Escoffier
Lorenzo Feligioni
Chritian Marinoni
Emmanuel Nezri
Roser Pello
Alejandro Perez
Carlo Schimd
Savvas Zafeiropoulos

Admin.

Finance
Catherine Bourlon
(Véronique Roux
Isabelle Richer)
Human Resources
Anne Porta
International relations
Brigitte Pantat

Graduate School Pedagogical Engineer

Marianne Vignolo *(until Dec 2021)*

Innovation Cell

Education, Research & Technology
Stephan Beurthey, Marc Ferrari

Centre International de Rencontres de Physique

Angélique Pèpe

IT support & Webmaster

Adrien Rivière

EDUCATION

Graduate School

Master
(2 yrs)

Doctorate
(3 yrs)

INNOVATION & TRANSFER TO SOCIETY

(w/ Innovation Cell)

Knowledge mediation

In coordination with
Thierry Botti
Magali Damoiseaux
Thierry Masson

Platforms
(IRiS, ePERON,…)
S. Basa
D. Dornic/J. Busto

From Primary Schools to BSc…

Académies, Science à l'Ecole, IPPOG, Networks, Associations, Civil society,…

Technology

Links with industry

Labcoms, PR2I, CISAM, Competitiveness clusters, SATT

RESEARCH

Astroparticles & High Energy Universe

D. Dornic
E. Nezri

Galaxies & Cosmology

S. Escoffier
Ch. Marinoni
R. Pello

Particle Physics

A. Bharucha
L. Feligioni

Quantum Fields & Quantum Gravity

Transverse actions
A. Perez, S. Zafeiropoulos, C. Schimd

Research infrastructures et platforms

Some IPhU Actions – Education/training

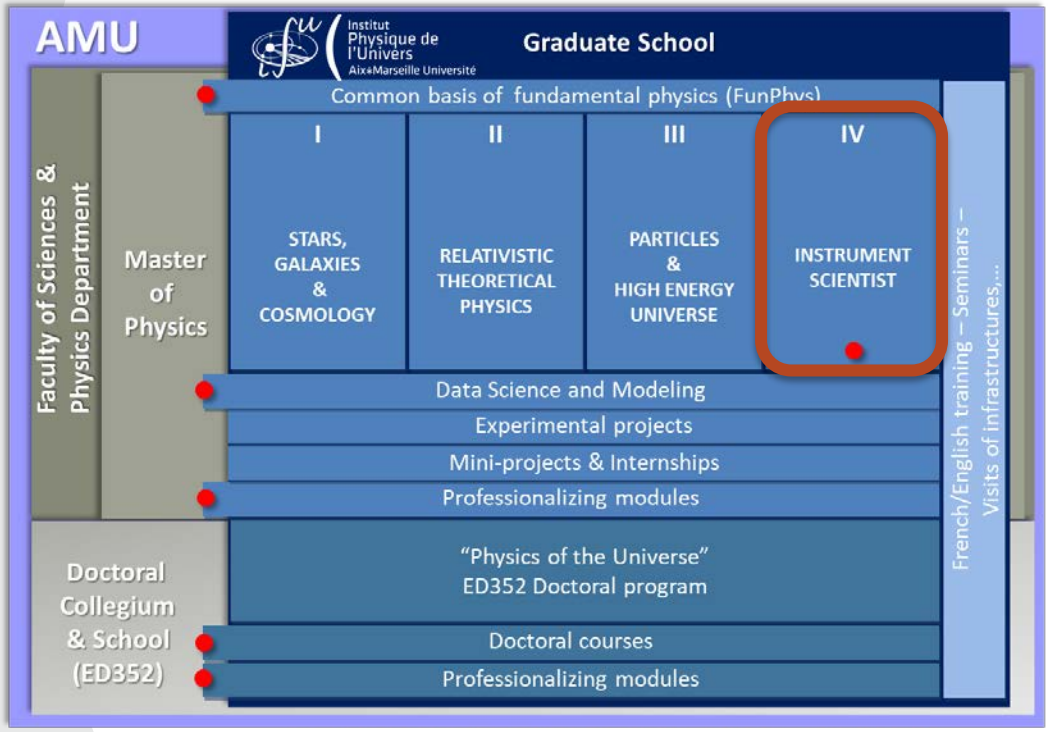
- **Education at the Master level** (Master **Fun**damental **Phys**ics)
  - **Funding of**
    - ***Incoming grants***
      - full (8000€/yr/student) - 10
        - M1: 2 (2020); 4 (2021); 2 (2023) over 2 years
        - M2: 1 (2022); 1 (2023)
      - half (4000€/yr/student) - 24
        - M1: 3 (2020); 3 (2021)
        - M2: 4 (2020); 6 (2021); 5 (2022); 3 (2023)
    - ***Outgoing grants***
      - 2 per year (1 M1 and 1 M2)
    - ***Research internships*** - 43
      - 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
- **ED352/IPhU Doctoral « Physics of the Universe » Programme** 2022/2023/2024 ~ 12 Doctoral Courses

AAP AMIDEX/TIGER

Education
Innovation Transfer
Research

Transformation of the Master Programme

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



Socio-economic Sector

International

Research

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

We were not able to go as far as we wanted!

Some IPhU Actions - training

TIGER Experimentation phase

impact on IPhU 2022-2025 Bugdet

- **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 "évènements"	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

Some IPhU Actions – Education/training

- **Creation of an annual summer school on Gravitational Waves**
  with OCA/Nice & L2IT+IRAP/Toulouse - Master-PhD Level
  In 2022 : @Marseille/Luminy ; 4-8 July 2022 (5 days)
  In 2023 : @Nice ; 3-8 July 2023 (6 days);
  in 2024: @Toulouse 1-6 July 2024 (with label « Ecole Thématique CNRS »)
  in 2025: Back @Marseille/Luminy 30 juin – 5 juillet (with label « Ecole Thématique CNRS »)

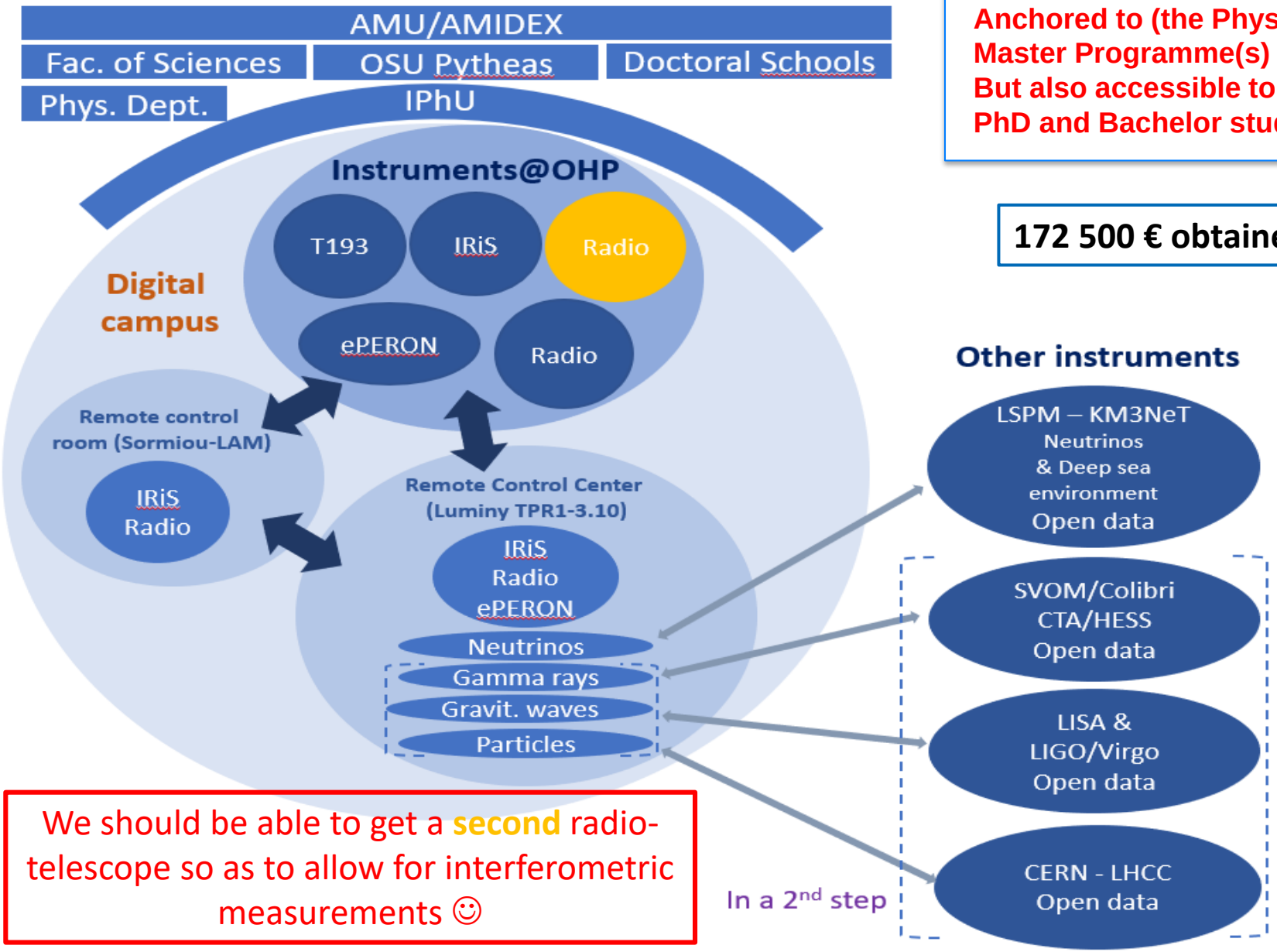
- **In 2023 rebirth of Summer Camps @OHP** (a week of immersion in the scientific process; 4-9 June 2023) for end of 10th grade students, in partnership with Aix-Marseille Rectorate.
  In 2024: 2nd edition funded by IPhU
  In 2025: 3rd edition NOT funded by IPhU anymore

- **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**

TIGER/TRIPS MULTIVERSE

Carlo Schimd, José Busto, Damien Dornic; EK



Anchored to (the Physics) Master Programme(s)
But also accessible to PhD and Bachelor students

172 500 € obtained

We should be able to get a second radio-telescope so as to allow for interferometric measurements ☺

Some IPhU Actions - Research

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

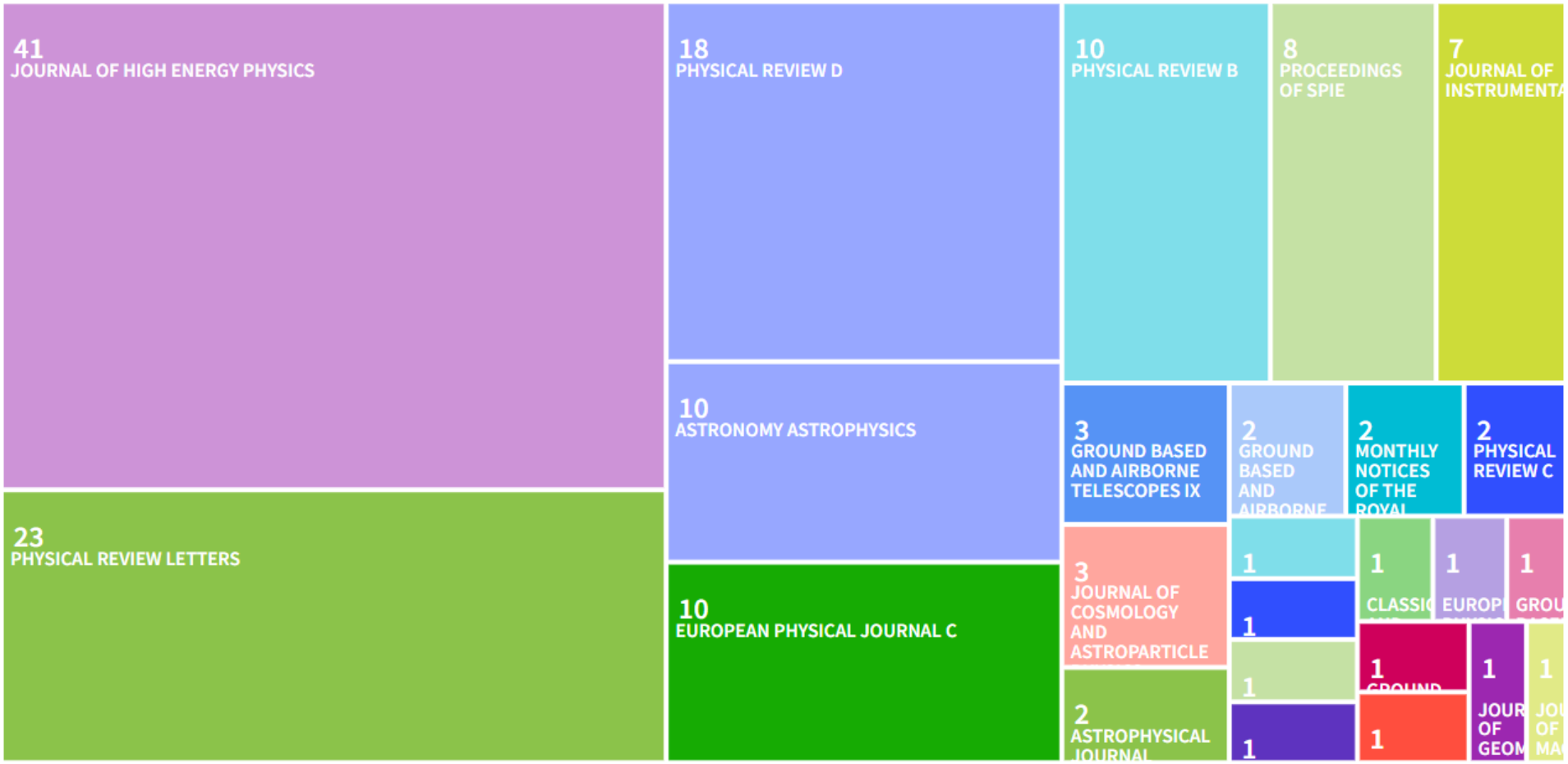
Support for collaborative scientific projects, including PhD students who have helped ensure the Marseilles community's impact in international collaborations:

- Major cosmological surveys: DESI, LSST, EUCLID (analyses, detectors, PhD students)
- Establishment of a Dark Matter research axis (analyses, detectors, PhD students) 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 Cosmology and Particle Physics.
- 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) to progress on collaborations and writing papers.
- 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))

Some IPhU Actions for PhD students

- **(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

- **Creation of a scientific animation 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.

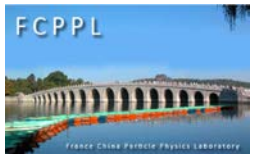
- **In 2024 renewal and extension of our cooperation agreements with Shanghai Jiao Tong University**, and more specifically with the Department of Physics and Astronomy and the TD Lee Institute, including training and exchanges of teaching and research staff, student exchanges at L2, M1, M2 and PhD levels (also with co-tutelles).

- **Several cofounding efforts** and related agreements to be put in place…

Some IPhU Actions - International

- **International – existing structures we can rely on**
  - LIA/IRP ERIDANUS with Mexico

  - LIA/IRN FCPPL/N with China



- **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

Some IPhU Actions
diversification of funding (cont'd)

- **Chaires AMIDEX** :
  - **Application by CPT on Gravitational Waves – SELECTED by AMIDEX – Michele Mancarella 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 Astophysics
    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!

Several agreements put in place

- 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)

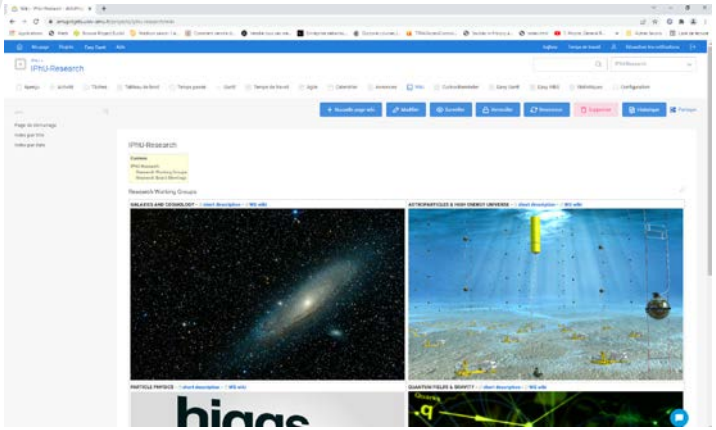
Some IPhU Actions - Communication

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

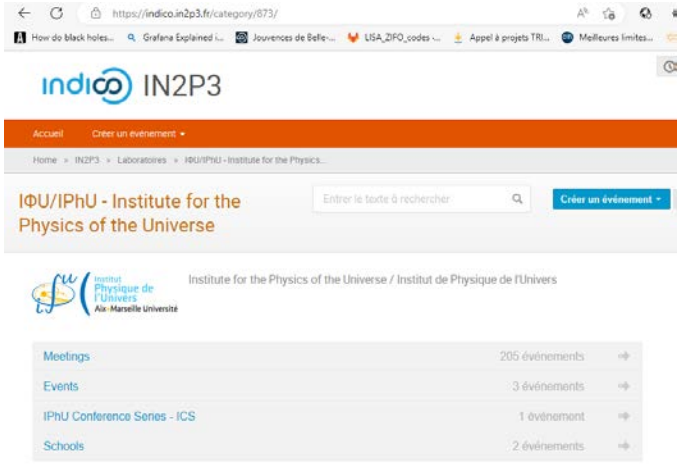
- Some pages are still under construction, though

Collaborative tools:

- **AMUbox + AMUprojets (Redmine based)**



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



- **A electronic newsletter**

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/

Some IPhU Actions - Communication

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) ...

• • •

Some IPhU Actions - Communication

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

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

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

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 - Communication

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.

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

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

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

READ MORE

Feb 2022

31 Dec 2024 – OFFICIAL END OF IPhU!

- **It was a great and enthusiastic adventure ☺ that unfortunately stopped quite abruptly ☹**
- **I've been privileged to work and interact with all of you! ☺**
- **Many thanks to all of you who took a very active or less active part in the diverse actions of IPhU!**
- **Many huge thanks to all the people, specially @CPPM (Marie; Catherine, Isabelle, Véronique; Anne, Brigitte; Angélique; Magalie; Aurélien), @LAM (Nataly; Anne-Marie, Lilia), and more recently Valérie @AMU/Luminy, for having gone through the arcane and troubles of the administrative management of this project!!!**
- **Many thanks to Serge L. and Stéphane B. for having been so helpful and invested in managing the institute and for having coped with me for so long!**
- **But like the song says… "it's a new day, it's a new life"… it is time to turn the page, look towards the future and build a new collaborative project between our laboratories! ☺**