



ENIGMASS

Higher-Education status report :

- ESIPAP
- GraSPA
- Subatomic lab pool

esi
European Scientific Institute



esipap...
European School of Instrumentation
in Particle & Astroparticle Physics



ESIPAP in a few words

THE reference school in HEP instrumentation in the vicinity of CERN, the world agora of the HEP community.

Training of the next generation of young physicists who will carry out HL-LHC upgrades, major experimental programs in neutrino physics, astroparticle physics, cosmology, gravitational wave astronomy, and later on new collider projects.

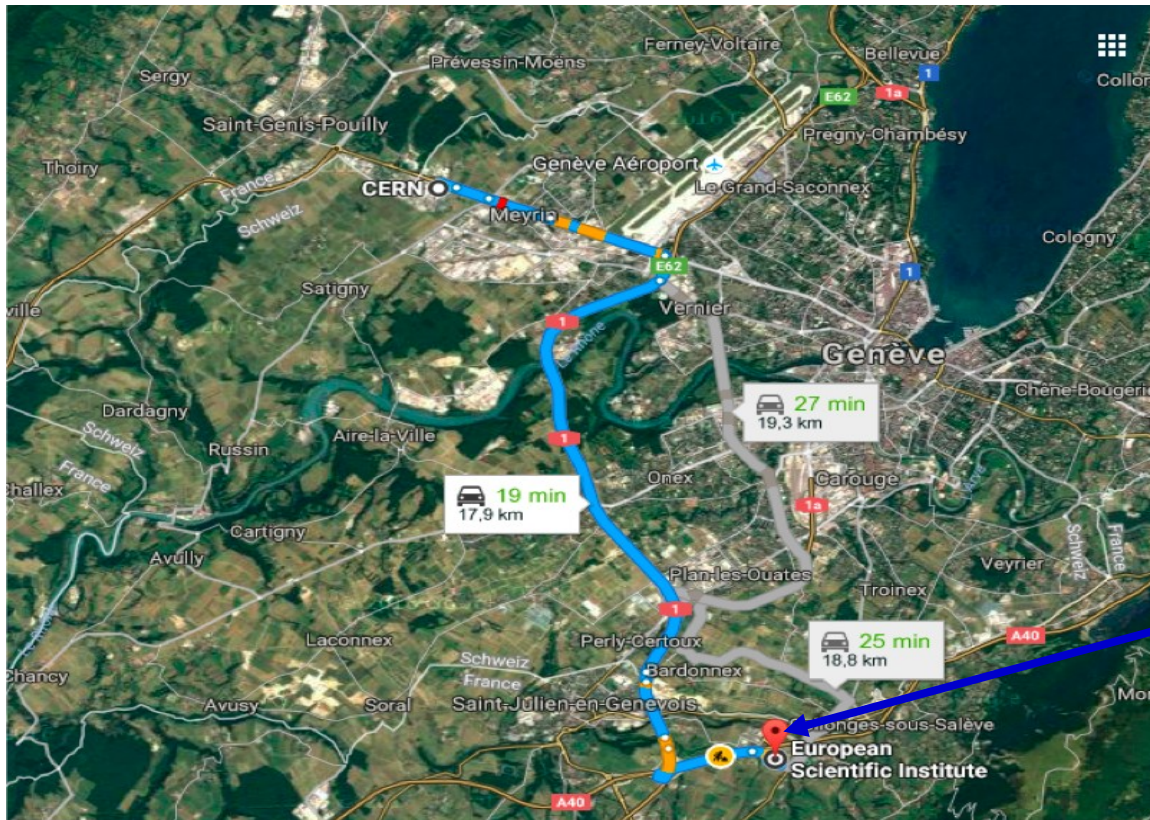
Very broad & intensive school with REAL exams : ECTS

2 courses of 4 weeks each, that can be followed entirely or selectively by weeks

Selective admission of up to 2 x 16 students per year at international level

Open to Master, PhD students and junior professionals

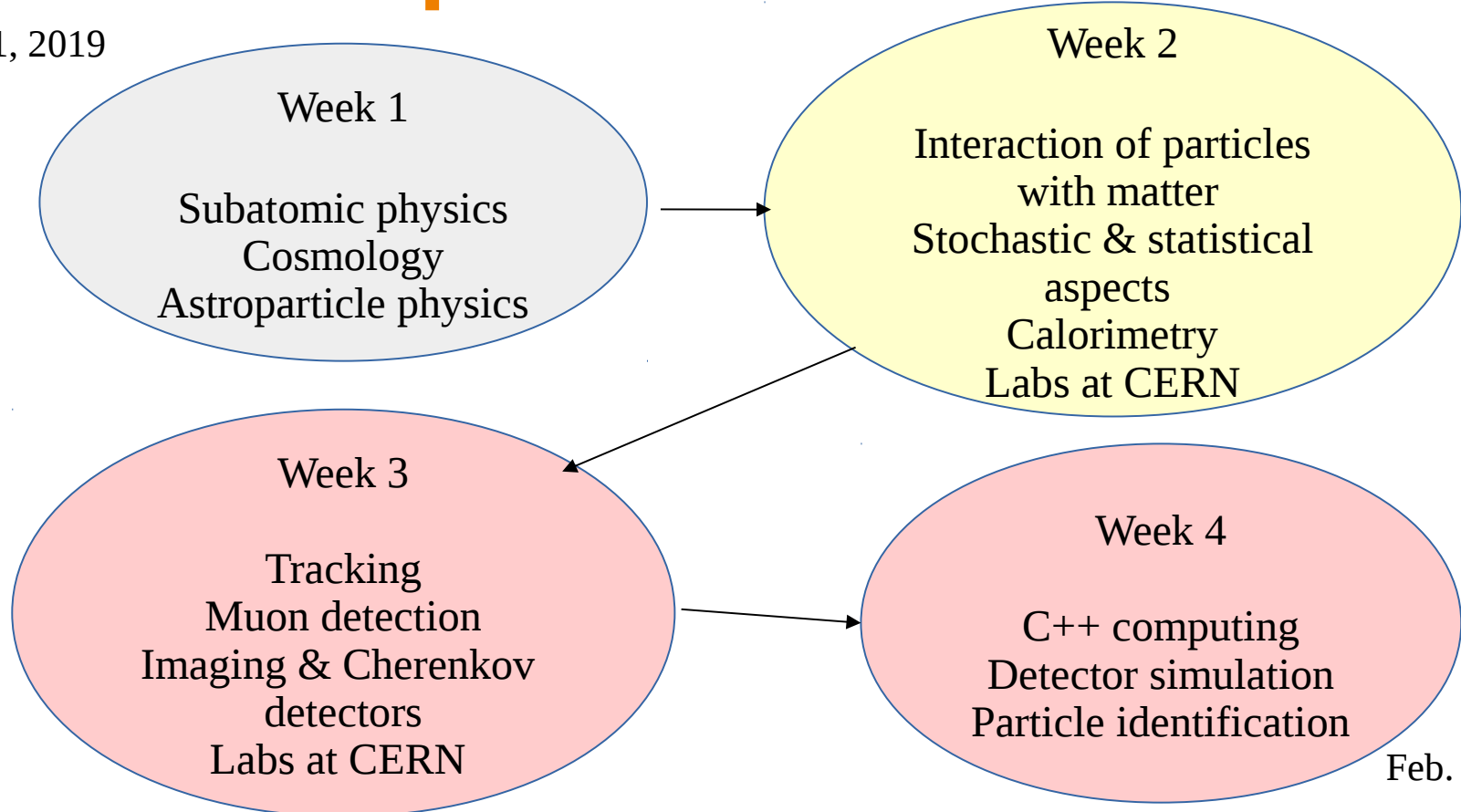
Location



Archamps Technopole

Course 1 : Physics of particle and astroparticle detectors

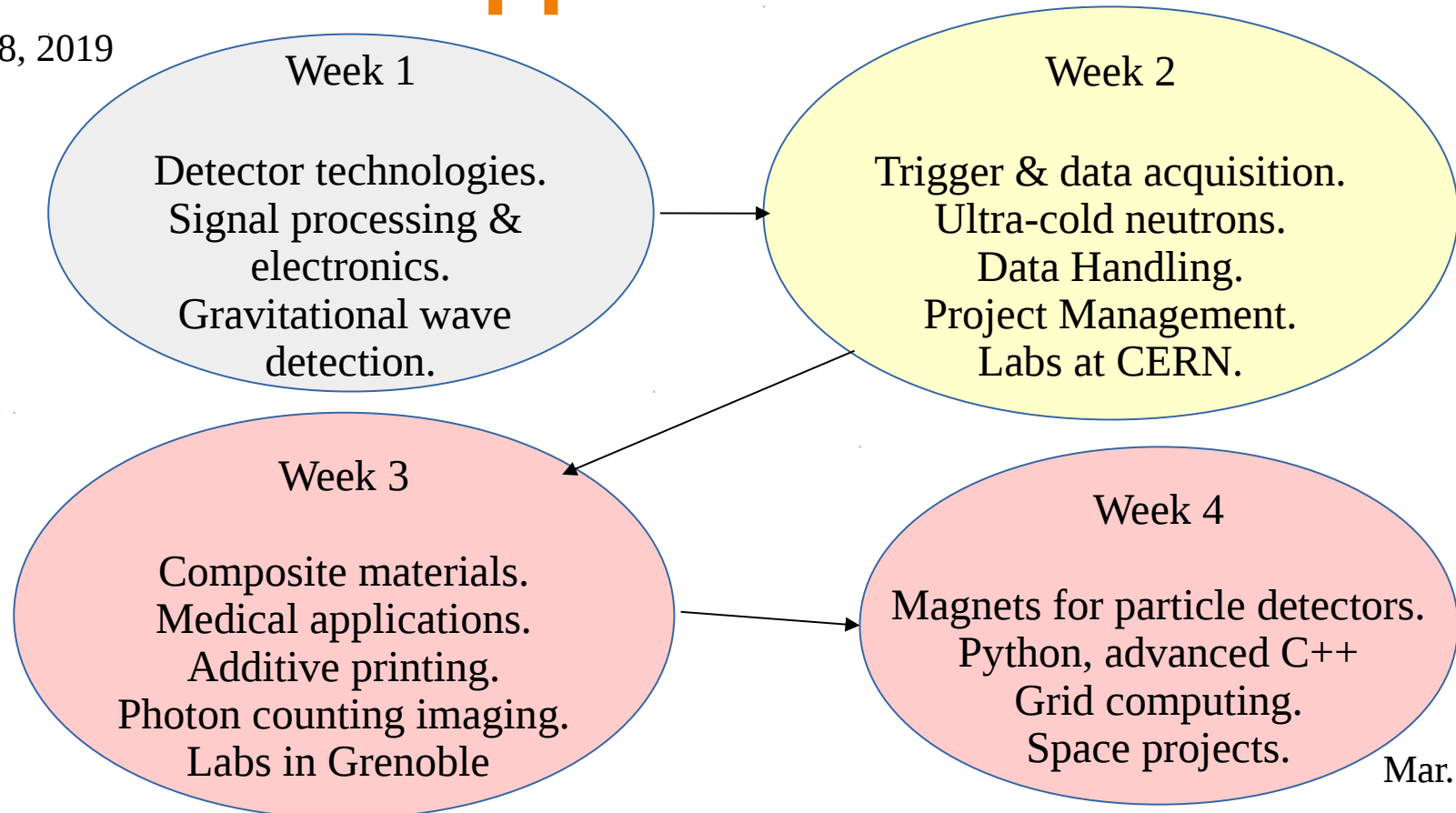
Jan. 21, 2019



Feb. 15, 2019

Course 2 : detector technologies and applications

Feb. 28, 2019

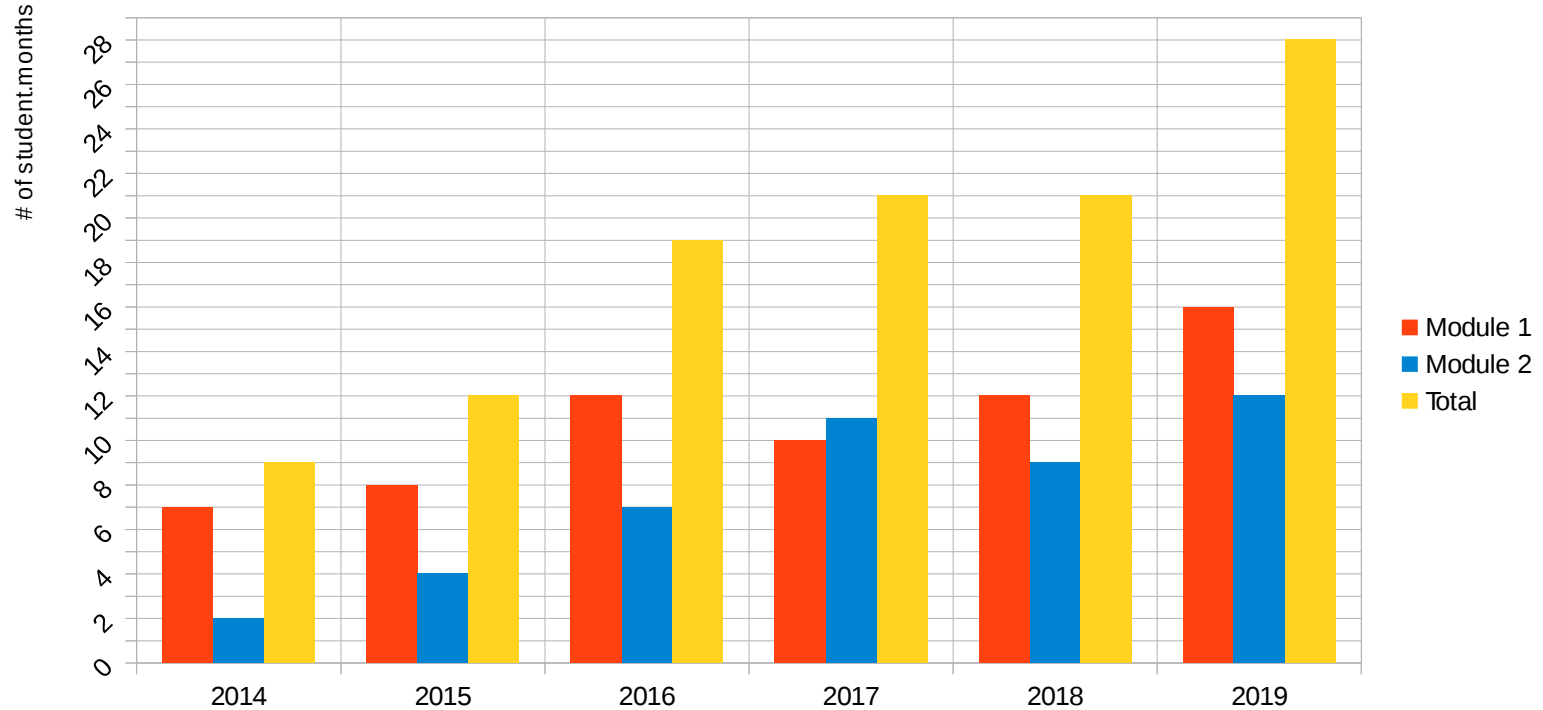


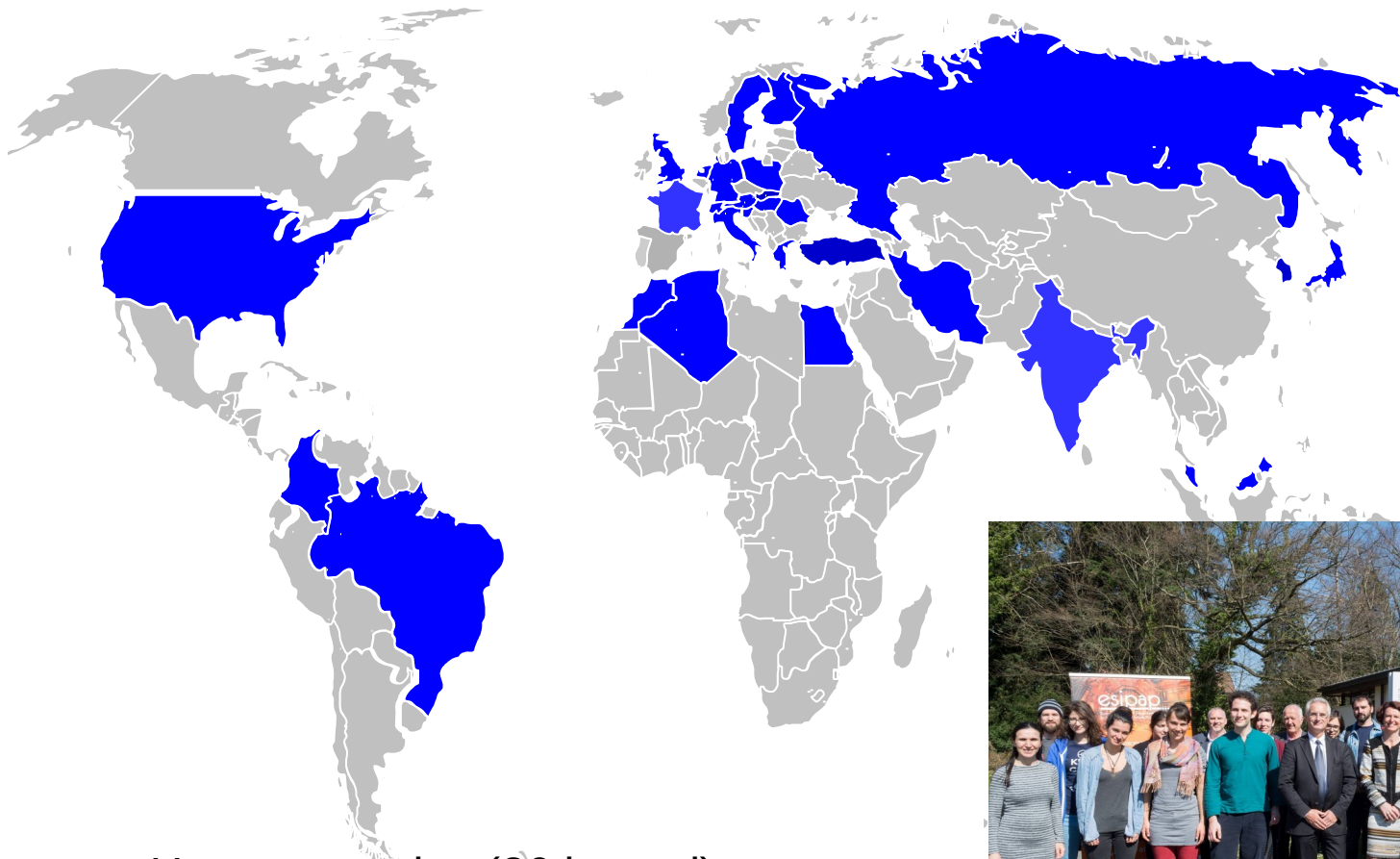
Mar. 15, 2019

We just celebrated our 5th anniversary (Feb 15th)



Growth of ESIPAP student attendance





Home countries (26 in total)
of ESIPAP alumni (66 till now)





A. Pingault PhD student in Gent

Testimony

I was one of the lucky few that participated in the first ESIPAP edition in 2014. I included both modules as part of my master's degree in nuclear engineering from Grenoble-INP PHELMA. At that time I was already aiming to work in detector instrumentation but still unsure whether in the industry or the academy. Being surrounded by experts in their respective field for these two months helped me make my choice. **Shortly after finishing the school I got accepted for a PhD position in detector R&D for particle physics.**

The first module provided me with the background necessary to start working in my field. During the second module, I was able to discover and discuss technology and techniques I didn't even hear about before. Some of them I would use in my work afterwards. For this, lab sessions (all at CERN this year) were a major opportunity to get hands-on experience on state of the art technology.

The schedule of the school is dense! But, from our fellow international students to the quality of the teaching materials and interesting topics, the environment we are studying in makes it worthwhile. Lecturers are all experts in their respective field. Being able to interact directly with them in such conditions is a rare opportunity.

All in all, it was a superb first work experience in such international context. I would gladly urge anyone interested in detector instrumentation to attend the ESIPAP school.

Testimony

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« ESIPAP was a great opportunity to improve my professional skills. There you can meet people working in the particle detection field coming from several countries, academic levels and knowledge branches. This mixture makes ESIPAP a wonderful place for sharing experiences, learning from the best lecturers and practicing with computer sessions and labs supported by the most important institutes in particles physics like CERN and LPSC. This school drew a beautiful line in life. »

JESUS RODRIGUEZ, 22, COLOMBIAN

PhD student, School of Physics of
Bucaramanga



Testimony

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« For me, ESIPAP is one from the best schools in the world in particle detectors : 8 weeks of intensive lectures which contain physics, engineering and programming. It was very useful for me, I survived with a huge amount of experience and information about particle & astroparticle detectors. »

MAHMOUD, 21, EGYPTIAN,

Master student at the University of
Alexandria



Budget

- 16 master students = $10 \text{ k€} \times 16 = 160 \text{ k€}$ for 600 training hours per year
- ESIPAP = 200 h , budget would be 53 k€ for 16 students
- ENIGMASS contribution = 40 k€
- Technopole + ESI = 40 k€ (mostly secretariat + premises)
- Total = 80 k€

For further information

Video of presentation : <https://youtu.be/f2ggf4P36cc>

Contact : esipap@esi-archamps.eu

Next session : course 1 , 21 Jan. - 15 Feb. 2019
course 2 , 18 Feb. - 15 Mar. 2019

Registration : www.esipap.eu

Twitter : [ESIArchamps](#)

Facebook : www.facebook.com/ESIArchamps



GraSPA 2017

- Huge success in applications (97 from 16 countries in 2017), very good feedback from students.
- budget : 15000 € , 7000 € from ENIGMASS
- 2018 session in preparation

Summer School in **Particle and Astroparticle physics**
of Annecy-le-Vieux

19-25 July 2018

GRASPA 2018



Lucia DI CIACCIO, Pablo DEL AMO
SANCHEZ,
Loïc ROLLAND, Emanuele RE,
Pasquale SERPICO, Ingo
SCHIENBEIN

Registration
deadline: May 7th

<http://lapp.in2p3.fr/GraSPA2018>

Introductory courses aimed at
advanced 3rd year and 4th year physics students

Topics: LHC Physics, Neutrinos, Flavour Physics, Astroparticle Physics,
Gravitational Waves and Computational Tools



WHY GRASPA?

- **Decrease in number of students** enrolling in Physics at university \Rightarrow less and less students dream of doing a career in Physics!
- **Inspire and help 3rd and 4th year physics students** (before they choose a field) to pursue a career in Particle Physics/Astro/Cosmo \Rightarrow **Summer School!**
- Limited offer of schools addressing this audience (CERN, DESY, GSI...)

HOW?

- **1 week-long School**, 4h (theoretical & experimental) **introductory courses** on few topics: LHC physics, neutrinos, heavy flavours, astroparticles, gravitational waves, cosmology, computational tools (ROOT)
- **Highly subsidised: accommodation and lunches paid by School**, travel funded by students or their institutions (travel grants for few students, a few paid by IDPASC institutes).
- Mostly local lecturers (see below), a few high profile externals

BUDGET

INCOME	
ENIGMASS Excellence Lab	8000
LAPP / UniSavoie	3000
IN2P3	1000
UGA Idex	4000
TOTAL	16 000 €

EXPENSES	
Student accommodation	6720
Lunches, social dinner, coffee breaks	4506
CERN visit	480
Travel grants	1000
Other	2000
TOTAL	14 706 €

- **Need to diversify sources!!! 490 €/student**

APPLICATIONS

- 91 candidates (-6%)
from 27 countries
- 30 students kept
(33%) (budget, but
good size for informal
discussions)

LECTURERS

- 2 LPSC + 1 LSM lecturers

- 1 external lecturer

Lecturers :

(email addresses in second column, replace the "+" by a "@", and the blanks by ".", e.g. "+lapp in2p3 fr" -> "@lapp.in2p3.fr")

J�r�mie QUEVILLON	quevillon+lpsc in2p3 fr	Intro to the Standard Model physics (Th.)
Marco DELMASTRO	delmastro+lapp in2p3 fr	LHC Physics (Exp.)
Pasquale SERPICO	serpico+lapth cnrs fr	Neutrinos (Th.)
Pablo DEL AMO SANCHEZ	delamo+lapp in2p3 fr	Neutrinos (Oscillations Exp.)
Fabrice PIQUEMAL	piquemal+cenbg in2p3 fr	Neutrinos (Double Beta Decay Exp.)
Diego GUADAGNOLI	guadagnoli+lapth in2p3 fr	Flavour Physics
Pasquale SERPICO	serpico+lapth cnrs fr	Astroparticle Physics (Th.)
David MAURIN	maurin+lpsc in2p3 fr	Astroparticle Physics (Exp.)
Julien MASBOU	masbou+subatech in2p3 fr	Direct Dark Matter Detection (Exp.)
Romain GOUATY	gouaty+lapp in2p3 fr	Gravitational Waves
Michal WAS	was+lapp in2p3 fr	Gravitational Waves
Lucia DI CIACCIO	di-ciaccio+lapp in2p3 fr	Computational Tools

TIMETABLE

Time	Thu 19 th July	Fri 20 th July	Sat 21 st July	Sun 22 nd July	Mon 23 rd July	Tue 24 th July	Wed 25 th July	
8h30-9h30	<i>Welcome & Introduction</i>	(B)SM and the LHC [Quevillon]	Gravitational Waves [Gouaty]	Free	Astroparticle Physics TH [Serpico]	Neutrino Physics TH [Serpico]	Neutrino Physics EXP [del Amo Sanchez]	
9h30-10h00 [break]								
10h00-11h00	Intro to Particle Physics [del Amo Sanchez]	LHC EXP [del Mastro]	Gravitational Waves [Gouaty]		DM direct detection [Masbou]	Neutrino Physics TH [Serpico]	Computing [di Ciaccio]	
11h00-12h00	(B)SM and the LHC [Quevillon]	Flavour Physics [Guadagnoli]			Astroparticle Physics EXP [Maurin]	Gravitational Waves [Was]		
Lunch			CERN visit					
14h00-15h00	(B)SM and the LHC [Quevillon]	Neutrino Physics EXP [Piquemal]				Astroparticle Physics TH [Serpico]	Gravitational Waves [Was]	
15h00-16h00	Flavour Physics [Guadagnoli]	LHC EXP [del Mastro]				Astroparticle Physics EXP [Maurin]	Computing [di Ciaccio]	
16h00-16h30 [break]								
16h30-17h30	Flavour Physics [Guadagnoli]					Q/A session		
17h30-18h30						Visit to LAPP		
19h00								
20h00			Social Dinner		Reception			

- 4h (theoretical & experimental) **introductory courses** on few topics: LHC physics, neutrinos, heavy flavours, astroparticles, gravitational waves, cosmology, computational tools (ROOT)
- CERN visit

THE RESULT...



GrASPA2018

Summer School in **Particle and Astroparticle physics**
of Annecy-le-Vieux **19-25 July 2018**



Réflexion sur le futur à moyen terme de GRASPA

- Améliorer la visibilité internationale de nos labos et du Master de Grenoble.
- **40 étudiants** au maximum : L3-M1 (~ 30/40% - 70%/60%) en gardant le **caractère international**, et en assurant en même temps un petit nombre de postes pour les "internes » (USMB et UGA),
- école plurithématique (théorie - expérience, physique des particules et astro), avec une identité **d'école d'été et de découverte** de la durée de 10 jours au maximum (pour ne pas impacter sur les vacances)
- apprécié par les étudiants : la proximité avec les professeurs
- 8000€ ENIGMASS + 4000€ UGA Idex = $\frac{3}{4}$ du budget : piste de financement pour le futur ?

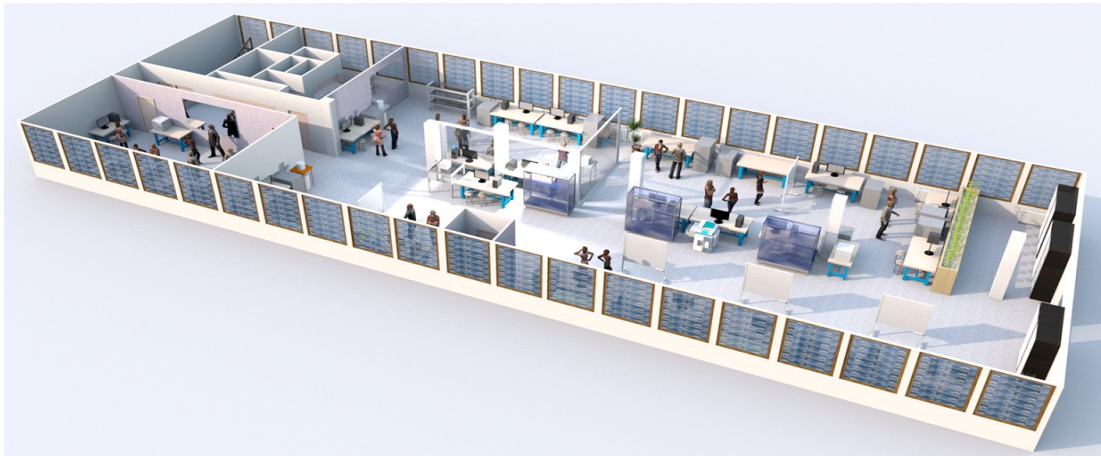
Building restoration & refurbishing (in 2016)

20 dispositifs expérimentaux + 2 salles info sur 240 m²

Budget de 305 k€ dont 150 k€ du LABEX ENIGMASS

Inaugurée le 14/11/2016

L'une des plus importantes plate-formes de TP subatomiques de France



TP Activation neutronique – Plateforme LPSC

Objectifs de TP

- mesurer le flux de neutron d'une source
- mesurer une section efficace de capture $^AX + n \rightarrow ^{A+1}X$
- mise en évidence par mesure de temps de vie (comptage) et spectrométrie gamma

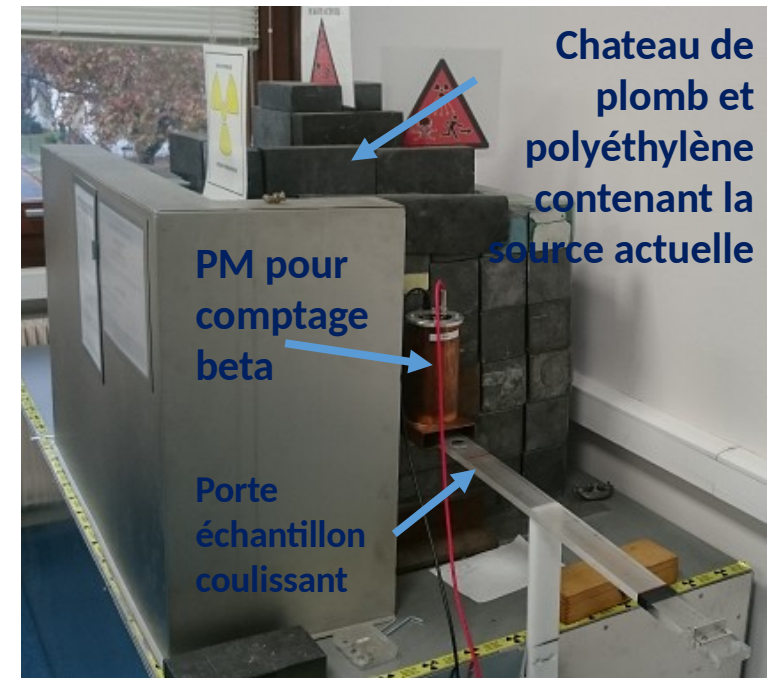
Formation concernées : environ **200 étudiants/ans** sur ce poste de TP

- UGA : Master ingénierie nucléaire, Master radioprotection
- G-INP : Coursus ingénieurs des écoles Phelma et ENSE³

Matériel spécifique : source de neutron de haute activité ($\sim 10^6$ n/s)

les sources radioactives ont une durée de vie légale de 10 ans, prolongeable 10 ans supplémentaire.

source actuelle Am/Be, 111 GBq **achetée en 1998**



Remplacement de la source de neutrons

cout de l'opération : 25k€ reprise de l'ancienne source, 35k€ achat de la nouvelle source

Statut de l'opération

- juin 2018 : financement obtenu 30k€ Phema + 25k€ Phitem + 5k€ ENIGMAS
- novembre 2018 : autorisation ASN obtenue
- ... commande en cours pour une **réception début 2019**

Conclusion and outlook

- ESIPAP : objective of 32 student.months almost met (28)
- GrasPa : visibility maintained : 91 applications in 2018
- Subatomic lab pool : refurbishing/modernization has open a new era in lab practice
- All these actions are co-funded !
- Need to evolve all these actions to boost international visibility and to include them in Univ. Grenoble Alpes physics and engineering masters (preparation of next 5-year program starting soon)