Enigmass

Education

Laurent DEROME, December 6, 2020

Enigmass/Education

Local ecosystem

- 2 Universities, very attractive at local and national level, ranked in the top international rankings :
  - Université Savoie Mont-Blanc (USMB), 15000 students (200 PhD)
  - Université Grenoble-Alpes (UGA), 55000 students (3000 PhD)
- Very diverse and rich research environment especially in Physics.
- Master's degree in Physics: joint program between USMB and UGA.
  - 1st year: ~50 students in Fundamental Physics
  - 2nd year: ~15 students in specialized program “Sub-atomic Physics and Cosmology”
  - Strong involvement of professors and researchers participating to Enigmass
- + School of engineering in Physic (Phelma), + Master in Nuclear Engineering

Enigmass/Education

Enigmass2 Project

- Designed to fit in the training local ecosystem by focusing on three main objectives:
  - Strengthen training in high-energy physics, astrophysics, cosmology;
  - Promote the internationalization of training and recruitment;
  - Set up training actions in support of the scientific project.
- The plan is to build on the successful developments undertaken during Enigmass1, and to strengthen and extend them:
  - GrasSPA (Graduate School of Particle physics in Annecy);
  - ESIPAP (European School of Instrumentation in Particle and Astroparticle Physics)
  - M2/PhD fellowships
- Graduate School UGA - PIA3 call for projects (SFRI).

esipap

European School of Instrumentation
in Particle & Astroparticle Physics

Enigmass

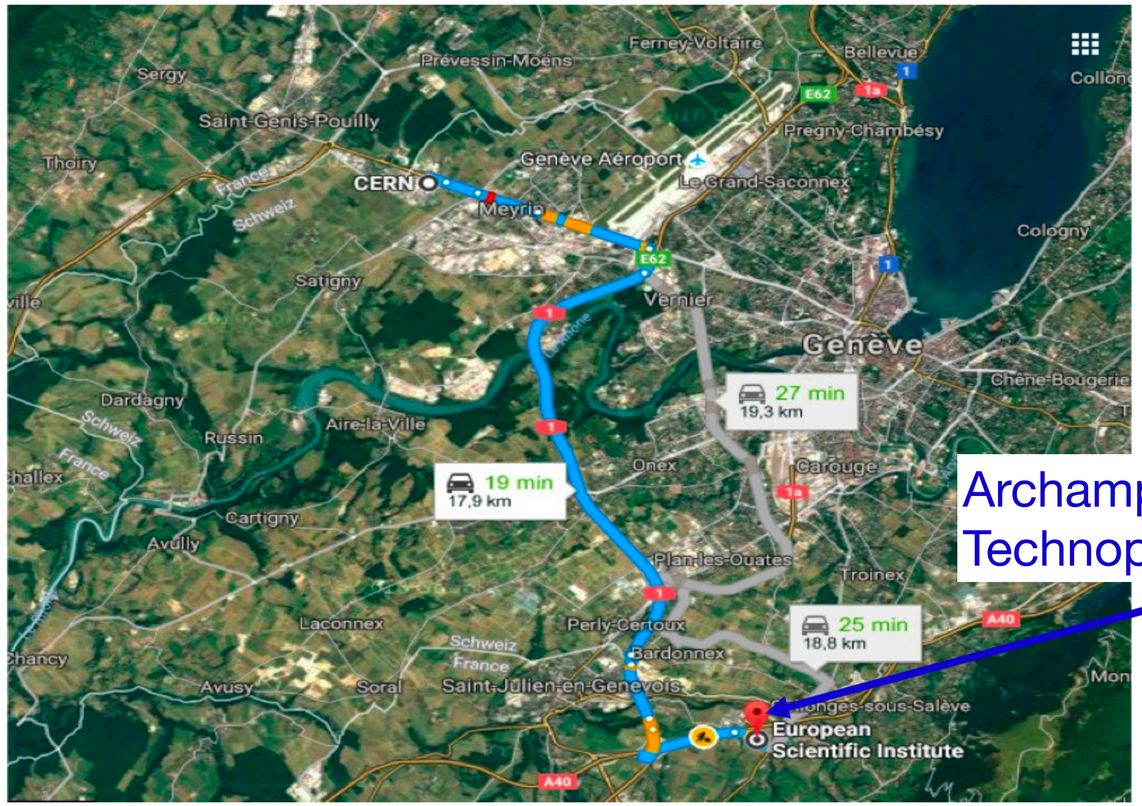
esi
European Scientific Institute

cnrs

Enigmass/Education

ESIPAP

- 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



ESIPAP

PROGRAMME CHARACTERISTICS

- Intensive study program over 2 x 4 weeks including exams
- Lectures, tutorials & computer sessions at ESI & practicals at CERN, LPSC and l'ESI (AHEAD detector)
- Objective to encourage a maximum of teacher-student and student-student interaction
- Limited number of places & selective recruitment to ensure educational quality and because of organizational issues regarding practicals at CERN

MODULE 1
PHYSICS OF PARTICLE & ASTROPARTICLE DETECTORS

Week 1
Experimental Subatomic Physics
Experimental Cosmology.
Experimental Astroparticle Physics

Week 2
Interaction Of Particles With Matter
Tracking
Radioprotection
Stochastic & Statistical Aspects 1

Week 3
Calorimetry
Stochastic & Statistical Aspects 2
Imaging & Cherenkov Detectors
Muon Detection

Week 4
Detector Simulation
Hands-on C++ Programming
Particle Identification

MODULE 2
TECHNOLOGIES & APPLICATIONS

Week 5
Detector Technologies & Electronics
Detector Technologies
Signal Processing & Electronics
Gravitational Wave Detection

Week 6
Real Time Computing & Data Handling
Ultra Cold Neutrons Production & Detection
Data Handling Technologies
Trigger & Data Acquisition
Project Management 1

Week 7
Mechanics & Medical Applications
Composite Materials
Medical Applications
Additive Printing
Project Management 2

Week 8
Offline Computing
Magnet For Particle Detectors
C++ Programming
Python Programming
Grid Computing

ESIPAP
FACULTY

- The outstanding quality (expertise & availability for students) has become a hallmark of ESIPAP.
- A quarter of faculty members are affiliated to an ENIGMASS laboratory and a third to CERN.

MODULE 1
PHYSICS OF PARTICLE & ASTROPARTICLE DETECTORS

17 SPEAKERS

10 SUPERVISERS OF PRACTICALS

MODULE 2
TECHNOLOGIES & APPLICATIONS

24 SPEAKERS

7 SUPERVISERS OF PRACTICALS

OPENING KEYNOTE TALK

Ultra-High Energy Cosmic Messengers

Prof. Antonnella Castellina, INA Turin

CLOSING SEMINAR

Space Projects – The Ariane Odyssey

Dr. Jan Droz, CNES **& Dr. Isabelle Rongier** Ariane Group

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ESIPAP

STUDENTS

- Recruitment to Course 1 surpassed expectations, attracting candidates from all over the world
- However, Course 2 fails to attract sufficient applications, particularly at the MSc level.

MODULE 1
PHYSICS OF PARTICLE & ASTROPARTICLE DETECTORS

23 PARTICIPANTS

16 MSc

Grenoble, Strasburg (France), Prague (Czech Rep.), St. Petersburg (Russia), Bejaia (Algeria), Rabat (Morocco), Beijing (China), Rio De Janeiro (Brazil), Kuala Lumpur (Malaysia)

7 PhD

Liverpool/Cockcroft Institute (UK), Zagreb/Ruder Boskovic Inst. (Croatia), St. Petersburg (Russia), Weizmann Inst./ Cern (Israel), Rabat / Cern, Casablanca (Morocco)

MODULE 2
TECHNOLOGIES & APPLICATIONS

8 PARTICIPANTS

3 MSc

Grenoble (France), Rabat (Morocco)

5 PhD

Zagreb/Ruder Boskovic Institute (Croatia), Santander/CCern (Spain), Weizmann Inst./ Cern (Israël), Rabat/ Cern (Morocco),

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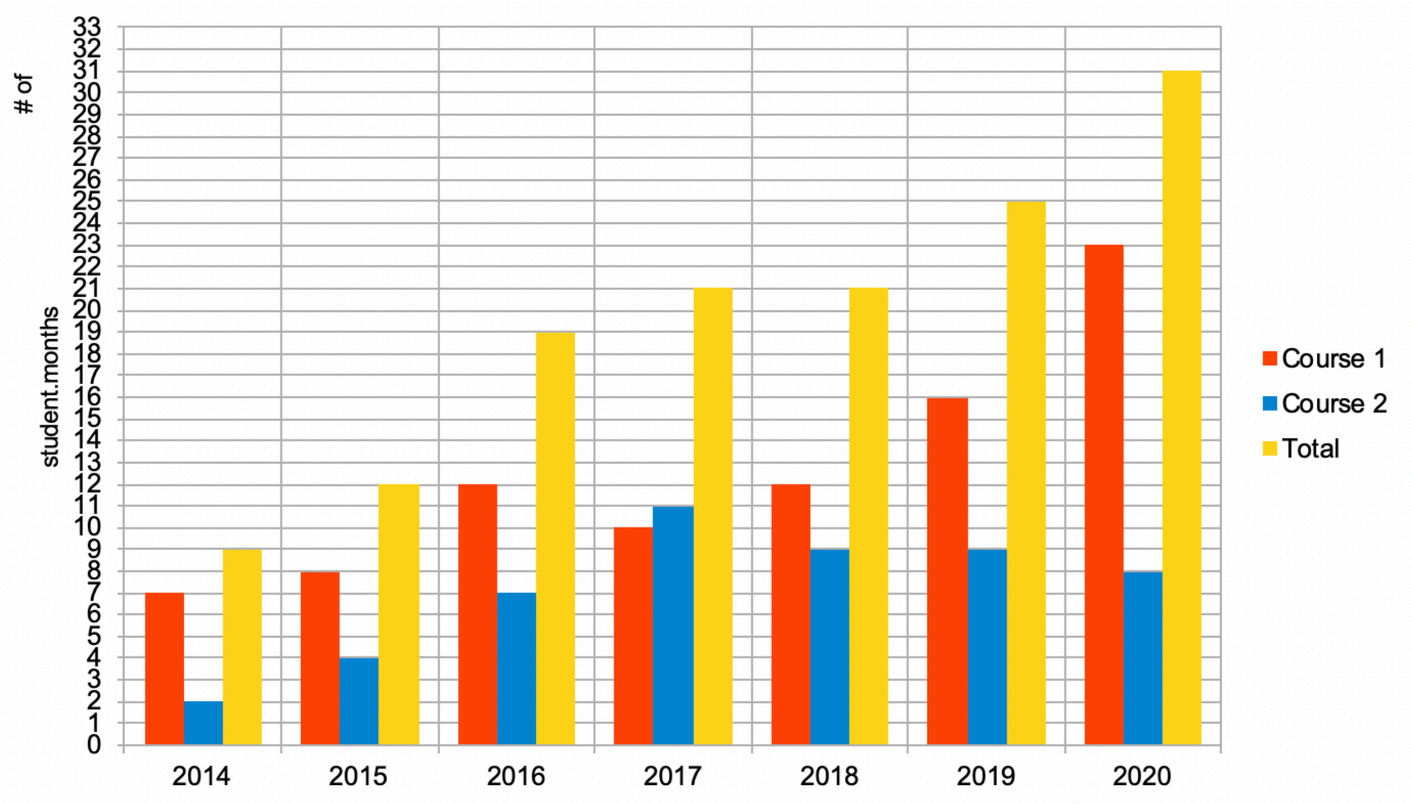
ESIPAP

STUDENTS



Stagnation of course 2 attendance !

ESIPAP

MAIN POINTS 2020-2021 / PERSPECTIVES

- 2020 Course 2 schedule disrupted due to lecturers self-isolating
- 2021 to be hold fully remotely, including labs/tutorials and exams.
- Rethink Course 2 as Advanced lectures on detectors and applications.
- Deployment of a platform to support the alumni network (32 alumni and 10 faculty registered in the first 2 weeks)
- J. Collot nominated co-chair of the training project of the ECFA detector panel
- Work on sustainability by diversifying financial resources: creating a “sponsorship package” for industrial partners
- Continue working on the alumni network and development of the ESIPAP community
- Improve pre-school marketing and communication (new flyer, social networks, community ...)


GraSPA2020
Summer School in
Particle and Astroparticle physics
16 July
23 2020
ANNECY
FRANCE
Registration deadline : MAY 1st
https://lapp.in2p3.fr/graspa2020
LAPP LAPTh


GraSPA2020
Summer School in
Particle and Astroparticle physics
Lucia DI CIACCIO,
Pablo DEL AMO SANCHEZ,
Loïc ROLLAND,
Emanuele RE,
Pasquale SERPICO,
Ingo SCHIENBEIN
LAPP LAPTh
UGA

ESIPAP

WHY GraSPA?

- Decrease in number of students enrolling in Physics at university ⇒ 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 ⇒ Summer School!
- Limited offer of schools addressing this audience (CERN, DESY, GSI…)

GraSPA

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

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GraSPA

2019 LECTURERs

- 2 LPSC + 1 LSM + 6 LAPP + 2 LAPTh lecturers
- 2 external lecturers

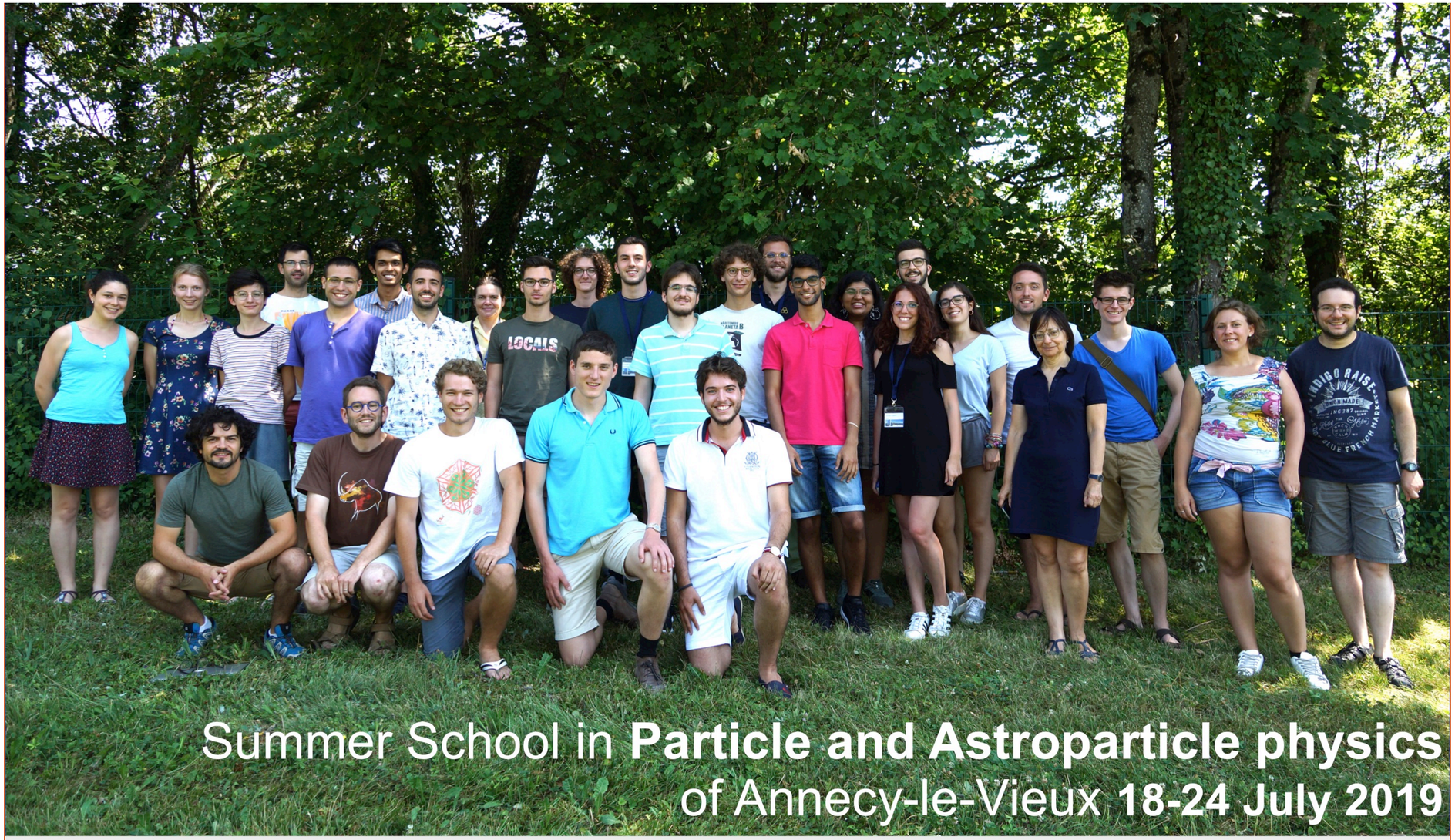
Lecturers :

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

Jérémie QUEVILLON	quevillon+lpsc in2p3 fr	Intro to the Standard Model physics (Th.)
Marco DELMASTRO	delmastro+lapp in2p3 fr	LHC Physics (Exp.)
Sacha DAVIDSON	sacha.davidson+lupm in2p3 fr	Neutrinos (Th.)
Pablo DEL AMO SANCHEZ	delamo+lapp in2p3 fr	Neutrinos (Oscilations Exp.)
Fabrice PIQUEMAL	piquemal+cenbg in2p3 fr	Neutrinos (Double Beta Decay Exp.)
Diego GUADAGNOLI	guadagnoli+lapth in2p3 fr	Flavour Physics
Francesca CALORE	calore +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
Carole PERIGOIS	perigois+lapp in2p3 fr	Hands-on Gravitational Waves
Lucia DI CIACCIO	di-ciaccio+lapp in2p3 fr	Hands-on ATLAS

GraSPA

2019 Students



GraSPA

2018 Students

GraSPA

NEW in 2020 → 2021

More emphasis on hands-on/ practical sessions

	Thursday 16	Friday 17	Saturday 18	Sunday 19	Monday 20	Tuesday 21	Wednesday 22	Thursday 23
8h30-9h30	**Welcome to the labs (30')** intro to PP (30')	(B)SM/LHC TH		Free	Astro TH	Gravitational Waves	----	Hands-on Astroparticle / Cosmology [2h00 + 1h30]
9h30-10h30	Intro to PP	Flavour	Hands-on [2h] Gravitational Waves / Particle Physics		Astro TH	Gravitational Waves	Gravitational Waves	
10h30-11h00	coffee	coffee			coffee	coffee	coffee	
11h00-12h00	(B)SM/LHC TH	LHC EX			Cosmology	departure for CERN	Neutrino EX	
12h00-14h00	lunch	lunch	lunch		lunch	12h00-13h00: lunch/sandwiches	lunch	
14h00-15h00	(B)SM/LHC TH	DM direct detection	Hands-on [1h30] Gravitational Waves / Particle Physics		Astro EX	CERN visit	Neutrino TH	
15h00-16h00	LHC EX	Flavour			Astro EX		Neutrino TH	
16h00-16h30	coffee	coffee			coffee		coffee	
16h30-17h30	Flavour	Gravitational Waves			**Q/A session**		Neutrino EX	
	18h00: Eutopia/reception							
					Dinner			

- 1 extra school day allocated to hands-on sessions (1.5 days vs 0.5 days in 2019)
- More variety: Virgo-like interferometers, ATLAS data analysis, Cosmo numerical exercice, Th exercices, others in preparation
- All students to do 2 hands-on sessions: 1 TH + 1 EXP
- **Q&A session**: discussion about PhD and Master (includes presentation of PSC Master2)

GraSPA

CONCLUSIONS

- Highly successful summer school for 3rd, 4th year undergrads

  ✓ ~3x more applications than places, excellent feedback from students

- Keep improving the School, more hands-on sessions
- Very much appreciated: direct access to lecturers, mixing for informal discussions

Great visibility for our labs & universities!

Enigmass/Education

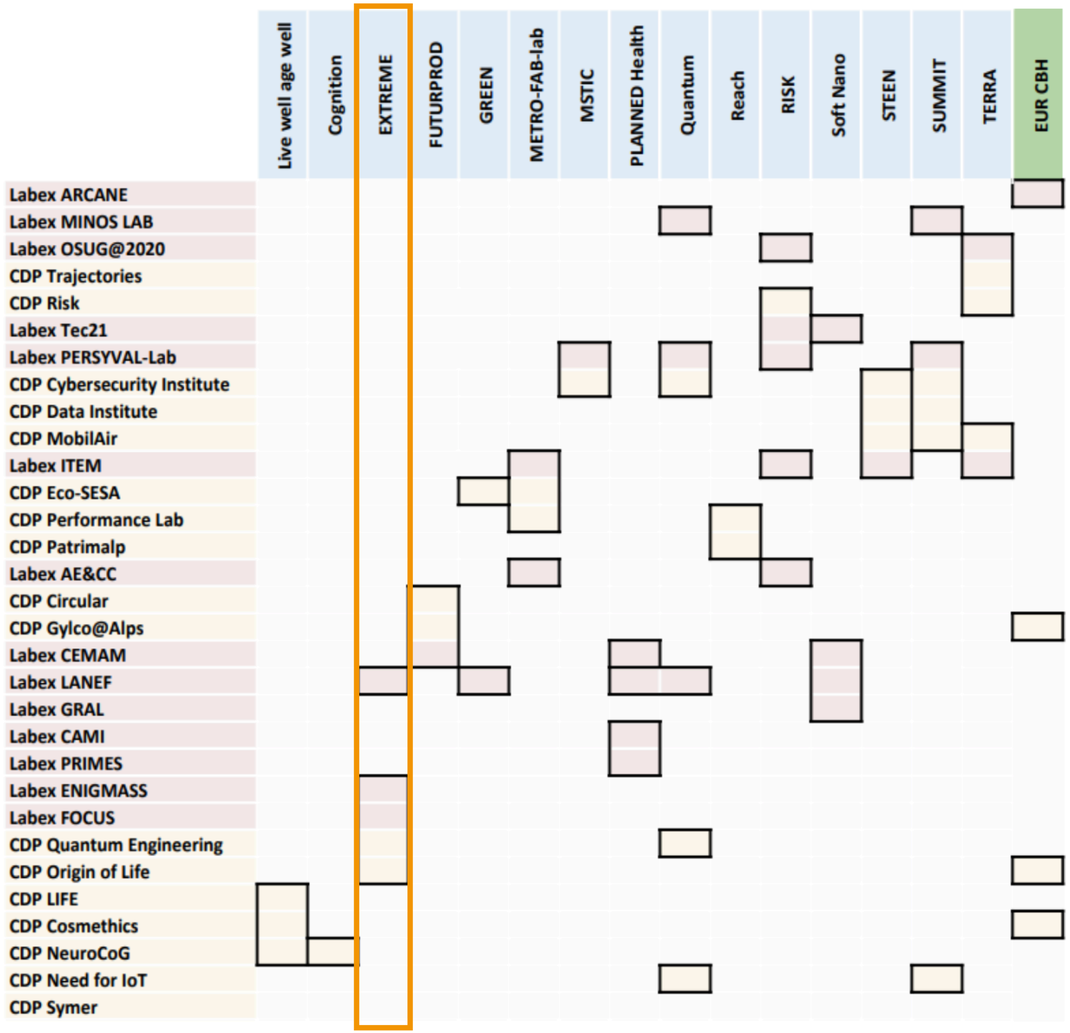
Fellowships

- To ensure the success of the Enigmass, a key point is to attract students to contribute on the Enigmass project and to work in our laboratories:
  - Master: 12/yr 4-month M2 internships.
  - Doctoral level, 4 Enigmass PhD fellowships, complement the support provided by universities (USMB, UGA) and CNRS (IN2P3, INP).

ENIGMASS/Education

UGA response to the PIA3 / Graduate schools Call

- Main objectives:
  - Profiting from the exceptional research environment to develop cutting-edge contents, supporting innovative approaches.
  - Improve the visibility and overall coherence of the research-based teaching offer
  - Strengthening the tools to attract students (both national and international) towards research-based programs.
- Double approach proposed:
  - Create the Graduate School of Université Grenoble Alpes
  - 15 thematics research-based teaching & learning programs in our areas of established strengths or in emergent areas that are of strong relevance to tackle interdisciplinary / socio-economic challenges



ENIGMASS/Education

EXTREME Programme

- From the infinitely small (the elementary constituents and their interactions, the quantum world and the properties of matter) to the infinitely large (from the origin of the universe, the stars, the planets at the origin of life)
- The ambition is to place the dynamics and attractiveness of this research at the heart of our training courses.
- Benefit from the presence of “large instruments” such as IRAM, CERN, ESRF, ILL, EMFL,... and tighten the links between the university and the partner institutions in charge of such instruments and the research institutes.
- Promote training & research by attracting the best students (nationally and internationally) and by placing research at the heart of our training offer.
- The program EXTREME will offer students:
  - M1 and M2 scholarships
  - Research-intensive tracks, especially for international students, enabling the student to spend half of their time within a dedicated research institution;
  - The opportunity to take part, during both years of the Mater, in large research projects hosted by laboratories, large instruments, or CSUG;
  - Thematic weeks, on a summer school model, organised in collaboration with the relevant Labex;
  - The possibility to take part in European schools such as ERCA, JUAS, ESIPAP;
  - Specific doctoral lectures

Enigmass

VISITING SCIENTIST

- The LabEx Enigmass2 runs a visitor program for scientists of all levels (students, postdocs, professors) to spend time at LAPP, LAPTh and/or LPSC.
- The typical length of visits is one week, for collaborative work with local people, giving courses, etc... The main condition is that the topic falls within the Enigmass research activities and that a strong contact is established with a member of the LabEx. Longer visits can be considered providing that costs are shared with the visitor home institute or another funding source.
- The funding generally includes the accommodation costs and a per-diem of about 35 euros/day for meals. If needed, the covering of travel expenses can be asked for as well, within typical travel costs inside Europe.
- The dedicated form available on http://enigmass.in2p3.fr
- Decisions about funding are usually taken once per month, so please submit demands with a sufficient time margin (best more than two months before the beginning of the visit).

Enigmass/Education

Conclusions

- Rich and diverse local ecosystem (CERN, Large instruments, one of the first reseach side in France outside IDF, wold-class universities)
- Successful developments undertaken during Enigmass1
- Enigmass2 project:
  - to strengthen and extend them,
  - to work on their sustainability,
  - and to strengthen the integration with the local training ecosystem (Graduate School, …)