

FINAL RESUME ON THE RESEARCH UNIT
SUBATECH - Laboratoire de physique subatomique et
des technologies associées

UNDER THE SUPERVISION OF THE
FOLLOWING INSTITUTIONS AND RESEARCH
BODIES:

IMT Atlantique Bretagne - Pays de la Loire

Université de Nantes

Centre national de la recherche scientifique - CNRS

EVALUATION CAMPAIGN 2020-2021
GROUP B



In the name of Hcéres¹:

Mr Thierry Coulhon, President

In the name of the experts committee²:

Mr Philippe Bloch, Chairman of the committee

Under the decree No.2014-1365 dated 14 November 2014,

¹ The president of Hcéres "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5);

² The evaluation reports "are signed by the chairman of the experts committee". (Article 11, paragraph 2).

Tables in this document were filled with certified data submitted by the supervising body on behalf of the unit.

UNIT PRESENTATION

Unit name:

Laboratoire de physique subatomique et des technologies associées

Unit acronym:

SUBATECH

Current label and N°:

UMR 6457

ID RNSR:

199612295L

Application type:

Renewal

Head of the unit (2020-2021):

Mr Gines Martinez

Project leader (2021-2025):

Mr Gines Martinez

Number of teams and/or themes:

8 teams

EXPERTS COMMITTEE MEMBERS

Chair:

Mr Philippe Bloch, Imperial College London United Kingdom, retired from CERN Geneva, Switzerland

Experts:

Ms Florence Ardellier, Laboratoire APC Paris (supporting personnel)
 Mr Dany Davesne, Université Claude Bernard Lyon 1 (representative of CoNRS)
 Mr Christophe Den Auwer, Université Côte d'Azur
 Mr Jean Yannis Karyotakis, CNRS Annecy Le Vieux
 Mr Ulli Koester, Institut Laue-Langevin Grenoble
 Ms Nadine Redon, CNRS Villeurbanne (representative of CNU)
 Mr Fabrice Retiere, TRIUMF Vancouver, Canada

HCÉRES REPRESENTATIVE

Mr Guy Chanfray

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Ms Anne Beauval, IMT Atlantique
 Mr Olivier Chauvet, Université de Nantes
 Mr Olivier Grasset, Université de Nantes
 Ms Laurence Le Coq, IMT Atlantique
 Ms Lydia Roos, IN2P3/CNRS

INTRODUCTION

HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The Laboratory of SUBAtomic Physics and Associated TECHnologies (Subatech) is a joint research unit (UMR 6457) under the triple supervision of: IMT through its school IMT Atlantique, the University of Nantes and the CNRS with the "Institut National de Physique Nucléaire et de Physique des Particules (IN2P3)" as the main connecting institute and "Institut National de Chimie" as the secondary connecting institute.

The creation of the laboratory under the name Laboratoire de Physique Nucléaire (LPN) dates back to 1988. In 1994 and from the LPN, a joint research unit was created and named Subatech. The idea was to create, from the LPN, a centre for research and training of excellence, coupled with an interdisciplinary meeting place between researchers working at CERN in Geneva and researchers interested in applications for society.

Subatech is located on the Nantes campus of "IMT Atlantique" and more precisely on Chantrerie site.

RESEARCH ECOSYSTEM

The interactions of Subatech with the local and regional ecosystem take place mainly in the areas of nuclear energy (Orano, EDF, CEA, LEMNA), environment (ANDRA, IRSN, OSUNA, ZATU, TRISKEM, LPG) and health applications (ARRONAX, CRCINA, ICO, IRON, CEISAM), while the "two infinite" and "associated technologies" areas rely mainly on major infrastructures and national and international collaborations (ALICE, CERN, JUNO, XENON, KM3NeT, Double Chooz), although they have a strong impact on the visibility and local attractiveness of Subatech.

HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

ST Sciences et technologies

ST2 Physique

Fully integrated into major global scientific collaborations, Subatech's research activities revolve around the fields of nuclear, particle and astroparticle physics, and radiochemistry. Subatech carries out fundamental and applied research in the fields of energy, environment and health. The mastery of the technologies associated with these fields is a key factor for the success of the laboratory's projects.

The unit includes eight research teams: Radiochemistry, Plasma, Theory, Prisma, Structure and nuclear energy, Neutrino, Xenon, Astro and Scenarios (Objectives of the unit).

MANAGEMENT TEAM

Director: Mr Gines Martinez

Deputy director: Mr Pol Gossiaux

UNIT WORKFORCE

Active staff	Number 06/01/2020	Number 01/01/2022
Full professors and similar positions	13	9
Assistant professors and similar positions	23	21
Full time research directors (Directeurs de recherche) and similar positions	5	5
Full time research associates (Chargés de recherche) and similar positions	17	19
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	0	
High school teachers	0	

Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	72	71
Permanent staff	130	125
Non-permanent professors and associate professors, including emeritus		
Non-permanent full time scientists, including emeritus, post-docs (except PhD students)	11	
PhD Students	37	
Non-permanent supporting personnel	8	
Non-permanent staff	56	
Total	186	125

GLOBAL ASSESSMENT OF THE UNIT

Subatech is one of the large laboratories of IN2P3. It covers a wide spectrum of research topics, ranging from fundamental particle and nuclear physics (in both experiments and theory) to radio-chemistry (for the fuel cycle and related environmental studies) and more applied research in the fields of nuclear energy (nuclear reactors) and medical applications.

Subatech researchers carry important responsibilities in large international collaborations: the ALICE experiment at the CERN LHC, studying a state of matter in the early universe; the XENON experiment at Gran Sasso (Italy) searching for Dark Matter; several experiments studying the properties of neutrinos (Double Chooz, Juno, SoLid and KM3NeT); nuclear physics experiments for example at Jyväskylä (Finland); European projects for radio-chemistry. In all cases, Subatech is bringing a strong contribution to the detector construction, operation and exploitation. This is also made possible thanks to excellent technical services in the fields of mechanics, electronics and computing.

The expertise of the theory team encompasses most of the subjects studied by the experimental teams. The possible synergy with the experimental work carried in the experiments is actually excellent.

Beyond the research on societal issues mentioned above, Subatech stands out by its large platform (SMART) for measurements of radioactivity, accredited by national authorities.

The researchers are strongly involved in the local environment, first through a large participation to education via an association with IMT (Institut Mines Telecom) and the Nantes University, but also through numerous collaborations with research centers located in the vicinity, for example GIP ARRONAX (Accelerator for Research in Radiochemistry and Oncology in Nantes-Atlantique) or CRCINA (Center for Research in Cancerology and Immunology Nantes-Angers) or ICO (Institut de Cancérologie de L'Ouest).

The committee considers that all the reviewed teams are at the best scientific level, with a strong national and/or international reputation. The only downside is that three of the teams (Neutrino, Xenon, Scenario) seem understaffed for the large number of projects/responsibilities they have subscribed to, with the extreme case of the Scenario team which consists essentially of a single, rather isolated researcher.

A short summary of the assessment for each team is now given.

The research production of the Radiochemistry team is excellent quantitatively and qualitatively, with scientific production at a very good international level in general chemistry as well as in more specialized journals of the field. Implication in national and European projects is also at a very good level and should ensure continuity and perspectives in research activities.

The Plasma team continues to have a very strong and visible role in the ALICE experiment at the CERN LHC. The team has successfully achieved construction of a new, advanced detector and continues to have an excellent contribution to the data analysis and the scientific output of the ALICE experiment. The reflection for the future has to be specified soon in relation with the involvement of the technical services.

The Theory team continues to have a highly international recognized expertise in all the domains represented in the group. A special attention should be paid to the replacement of forthcoming retirements of senior physicists.

Via its strong implication at ARRONAX, the Prisma team has become the leading group in France in the field of emerging radionuclides for nuclear medicine and one of the leading groups in Europe with multiple collaborations with public and private partners. An effort should be done to attract more PhD students.

The SEN team has a unique combination of experimental and simulation capacities dealing with fundamental and applied aspects. The team has excellent visibility in its field via important publications and by providing essential input for major reactor neutrino experiments and decay heat calculations.

The Neutrino team created in 2016 has significantly grown during the past five years and, through its contribution to international collaborations, managed to build a very good national and international reputation of this rather specialized domain. The team should clearly define his priorities within the available resources.

The Xenon team has an excellent track record of delivering technical solutions to experiments that are highly competitive, such as the XENON experiment suite. The team has also made major progress with the XEMIS2 project nearing completion, which promises to deliver a new capability for pre-clinical nuclear imaging. The group's technological reputation relies strongly on the success of XEMIS2.

The Scenario Team, multidisciplinary research on the energy transition and the future of nuclear energy is an important topic for society. The sole researcher of the team is both very competent and well recognized. However, the fact that he is essentially alone on this research at Subatech is a strong limitation.

Finally, the unit is well-organized, with a direction team paying full attention to a careful planning of the human and technical resources, but also to other important aspects such as safety, health, equal opportunity or training. The five-year project and strategy are rich and well defined.

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