A complete training program dedicated to nuclear Instrumentation at Aix-Marseille University

Christelle REYNARD-CARETTE¹,
Michel CARETTE¹, Adrien VOLTE¹, Abdallah LYOUSSI², Gordon KOHSE³,
Patrick LE DU⁴

¹Aix Marseille Univ, Filière Instrumentation, Physics department, Faculty of Sciences, Marseille, France
²CEA/DES/IRENE/DER, Section of Experimental Physics, Safety Tests and Instrumentation, Cadarache, F-13108, Saint Paul-lez-Durance, France
³Massachusetts Institute of Technology, Nuclear Reactor Laboratory, Cambridge, Massachusetts, USA
⁴IEEE NPSS

christelle.carette@univ-amu.fr
Summary

I) Aix-Marseille University

II) Instrumentation Unit of the Faculty of Sciences

III) Actions for the nuclear field

IV) Conclusions
From the end of the XIXth century to 1968:
The faculties are merged into Aix-Marseille University, chaired by the Rector of the Academy

1970-1973: Aix-Marseille Universities I, II and III are created

2007-2009: The merger of the three universities is thought through and Aix-Marseille University’s founding principles are adopted

December 10th, 2010: The university’s legal status are voted

November 28th and 29th, 2011: The three councils are elected

January 1st, 2012: Aix-Marseille University is created

In the South of France, AMU headquarters, Marseille

80 km from CEA, ITER org and IRSN (JHR, CABRI, WEST, ITER...)
Aix-Marseille University in a nutshell

- More than **80,000 students**, including 10,000 international students
- Over **3,000 doctoral students** 39.5% of whom are from abroad (from 105 countries)
- A staff of **8,000**, including 4,400 senior lecturers, professors, teachers
- **17 faculties**, schools or institutes
- **18 Aix-Marseille University institutes**
- **122 research structures** including **113 research units and 9 federative research structures**
- 12 doctoral schools
- **1 long-term Initiative of Excellence** (IDEX) project (€26 Million per year)
- 1 City of Innovation and Knowledge (CISAM)
- 1 European Civic University (CIVIS) in cooperation with 9 universities
- **820,000 m² net floor area** for 5 campuses
- A budget of **€720 Millions**
Aix-Marseille University in a nutshell

- 6 education and research fields
  - Arts, humanities, languages and social sciences
  - Law and political science
  - Economics and management
  - Health
  - **Science and technology**
  - Multidisciplinary sector (technological institute and education department)

- 5 interdisciplinary research interests
  - **Energy**
    - The environment
    - Health and life sciences
    - Advanced sciences and technologies
    - The humanities

- Nuclear fusion and fission
- Bioenergy
- Energy storage
- Energy efficiency
- Energy transition
- Climatology
- Man/Environment interactions
- Resources
- Oceanology
- Oncology
- Immunology
- Neurosciences
- Microbiology and infectious diseases
- Imaging
- Genetics
- Nutrition/Cardiovascular
- Optics/Photonics
- Microelectronics
- Aeronautics/Spatial domain
- Mathematics
- Particle physics
- Astronomy/Cosmology
- Mediterranean studies
- Digital humanities
- Migrations
- Archeology
- Brain/Languages
- Globalization
- Economics/Public policies
- Law
II) Instrumentation Unit of the Faculty of Sciences

- Unit of the department of physics in the faculty of Sciences
- Filière Instrumentation created in 1985
- ISO 9001 certificated since 2003
- Different training programs: apprentices and block-release training programs or Initial training program or Prior experimental learning and continuing education
- Vocational Bachelor’s Degree: Professions in Instrumentation, Measurement, Quality Control
- **Master’s Degree: Instrumentation, Measurement, Metrology**
- 200 students
- 110 lecturers, professors, industrial trainers
- > 100 companies for student internships and apprenticeship
- Several research structures involved
- Industrial steering committee and agreements with various companies

www.filiere-instrumentation.com
Main objectives

- **Promote** nuclear field and its various applications
- **Attract** new talents and **develop** these attracted talents
- **Increase** engagement of attracted talents and alumni in nuclear careers
  - Positions in research activities (R&D, PhD)
  - Positions in industry

Thanks to several actions based on:

- High level training programs involving many partners
- Important links between education and research
- A strong research activity developed since 2009 in collaboration with the CEA (in-pile calorimetry, nuclear measurements)
- Recognized research structures such as research units, joint Lab., Institutes (**IM2NP**, **LIMMEX**, **ISFIN**)
- An international network of partners (some of whom are involved in ANIMMA)
- An important network of companies
- An alumni directory
III) Actions for the nuclear field

What are the main current actions?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

  Master’s Degree: Instrumentation, Measurement, Metrology

  Level M1
  60 students
  - First year in common core

  Level M2
  80 students
  - 3I course: Engineering in Industrial Instrumentation
  - CIS course: Commercialization of Scientific Instrumentation
  - MSD course: Microsensors and Detection Systems
  - IME course: Test Facilities Instrumentation Agreement with CEA/INSTN

  Action#1: IME course created in 2004 with CEA
  - 750 h
  - AMU and CEA lecturers
  - CEA visit
  - 30 students (50% apprentices)
  - High professional integration rate
  - A job in the nuclear field for ¼ of alumni
What are the main current actions?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

  - Action#2: EFMMIN school (Franco-Moroccan school on Nuclear Measurement and Instrumentation)
    - For ~10 students selected in level M2 (IME course)
    - Created in 2010 by CEA, AMU, CNESTEN and the Faculty of Sciences (UM5), involving IEEE NPSS and AMSNUR (Moroccan Agency for Nuclear and Radiological Safety and Security) more recently
    - 45 participants + 15 speakers
    - Several activities (keynote lectures, courses, workshop, posters, reactor visit)
    - A selected topic per event:

- Research Reactors in 2010 (Rabat)
- Nuclear Fuel Cycle and Characterization in 2011 (Marseille)
- Medical and Environmental Sciences in 2014 (Rabat)
- Decommissioning, Dismantling, Radioactive Wastes in 2016 (Marseille)
- Nuclear and Radiological Safety and Security in 2018 (Rabat)
- Innovative detectors and sensors in 2022 (Marseille)
What are the main current actions?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- Action#3: MOBIL-APP project
  - For students in level M1
  - Founded by AMIDEX Foundation (Excellence Academy, 2018-2022)
  - Involving several partners
    - In France: CEA, EDF, CFA Epure Méditerranée,
    - International countries: MIT NRL, SCK-CEN, JSI, NCBJ, CNESTEN
  - Aim: International mobility for apprentices who meet difficulties to take advantage of usual international-mobility schemes for long periods due to alternation periods between university and workplace 15 days/15 days
III) Actions for the nuclear field

What are the main current actions?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- Action#3: MOBIL-APP project
  - Mobility field: Instrumentation for research reactors in nuclear fission
  - Number of students: from 10 to 20 selected and prepared students per edition
  - Phase#1: selection and preparation
    - Academic results, Covering letter, Questionnaire, Interview
    - Courses
    - Seminars
    - Visits (LIMMEX laboratory, CEA (Cadarache center), EDF (Nuclear power plant))

2019, in France
What are the main current actions?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- **Action#3: MOBIL-APP project**
  - Intensive study stay from 1 to 2 weeks, thanks to different learning activities
    - Scientific and Interculturality seminars, Workshops
    - Practical works, Courses, Exercises
    - Reactor and nuclear facilities visit
    - Company visits and Cultural visits
  - 4 events
    - In 2018: 1 group at MIT NRL
    - In 2019: 2 groups at NCBJ and MIT NRL respectively
    - In 2020: 2 groups at SCK-CEN and MIT NRL respectively → cancelled due to COVID pandemic
  - In 2021: 1 group → virtual mobility, involving MIT NRL, Univ. of Michigan, JSI, CAEN and CEA
What are the main current actions?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- Action#4: Agreement with EDF company
  - Signature in 2019
  - For students in level M1 and level M2
  - Various activities
    - Company introduction
    - Seminars on specific topics
    - Visits of sites
    - Mentoring for apprentices and students during internships
    - Grants for internships (social or excellence criteria)
    - Sponsoring for different actions
    - Joint proposals at different calls

III) Actions for the nuclear field

What are the main current actions?
What are the main actions under finalization?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- Action#5: **Creation of a new international course** in the master’s degree in Instrumentation, Measurement, Metrology

  - Within the frameworks of the new ISFIN institute and its graduate school
  - For fission and fusion facilities
  - Start in September 202
What are the main actions under finalization?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- **Action#5:** Creation of a new international course in the master’s degree in Instrumentation, Measurement, Metrology
  - Letters of interest of 20 partners
  - Course in English: 350 h
  - A comprehensive academic program linked to research with
    - **Scientific seminars from international partners**
    - Courses from lecturers, researchers, partners
    - **Research project unit** with experimental or modelling activities
    - **Practical activities on nuclear facilities**
    - Visit of major facilities (in-person and in-distance)
    - Interculturality and international communication training course (MITR GLS)
    - Participation to summer schools, conferences, short-courses
    - Internship topic associated to international facilities (up to 6 months)
    - Cum Laude Award
  - Scholarships for international students + Grants for internships
What are the main actions under finalization?

- All the actions for students enrolled in the master’s degree in Instrumentation, Measurement, Metrology

- Action#6: Interactive escape game with our mascot
  - For students in level M1
  - Nuclear instrumentation after a module dedicated to introduction to research
  - First test during virtual mobility in July

- Action#7: Creation of an IEEE NPSS student branch
  - For all the students in level M2 (IME course) + PhD students
6 main actions for students enrolled in the master's degree in Instrumentation, Measurement, Metrology at Aix-Marseille University → In and for the nuclear field

**Action #1**
- 2004 IME course with the CRA

**Action #2**
- 2010 EFMMIN school

**Action #3**
- 2018 MOBIL-APP project

**Action #4**
- 2019 Agreement with EDF

**Action #5**
- 2022 IMSci-Nu course

**Action #6**
- 2021 Escape game

**Action #7**
- 2021 IEEE NPSS student branch

**Network**
- Research
- International
- Education
- Partners
- Alumni

**Industry**
- International
- Partners
- Alumni

**Conclusion**
- IV
- Education
- Research
- International
- Partners
- Alumni

**Partners**
- A*Midex
- Filière Instrumentation
- ISFIN
- IM2NP
- LIMMEX
- CEA

**International**
- Education
- Research
- International
- Partners
- Alumni

**Partners**
- A*Midex
- Filière Instrumentation
- ISFIN
- IM2NP
- LIMMEX
- CEA

**Alumni**
- Education
- Research
- International
- Partners
- Alumni

**Partners**
- A*Midex
- Filière Instrumentation
- ISFIN
- IM2NP
- LIMMEX
- CEA

**Partners**
- A*Midex
- Filière Instrumentation
- ISFIN
- IM2NP
- LIMMEX
- CEA

**Partners**
- A*Midex
- Filière Instrumentation
- ISFIN
- IM2NP
- LIMMEX
- CEA

**Partners**
- A*Midex
- Filière Instrumentation
- ISFIN
- IM2NP
- LIMMEX
- CEA
Thank you for your attention

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