Julien Michaud, chargé de recherche CNRS

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Laboratoire de Physique des 2 Infinis Irène Joliot Curie, Orsay

Scientific profile : accelerator scientist

Accelerator physics is the field concerned with the study of all phenomena related to particle accelerators. Beam dynamics, in which I have specialized, lies at the core of accelerator physics and focuses on modeling the interactions between particles and electromagnetic fields, whether generated by accelerator components (magnets, RF fields, etc.) or by the particles themselves (space charge effects, synchrotron radiation, etc.).
In particular, during my PhD I developed models for the evolution of hadron trajectories and spins; during my postdoctoral research, I commissioned a high-resolution mass spectrometer; today, I am responsible for the beam dynamics studies of the PERLE and DESIR projects. I am supervisor of one phD student.

Key words:
Electron beams: accelerator design, collective effects, accelerating cavities, longitudinal dynamics
Hadron beams: analytical models, spin dynamics, transverse dynamics, aberrations, spectrometer
General skills: simulation, analysis, instrumentation, diagnostics, nuclear physics

Education

2015/2016	**Master 2**	Grenoble	*Energetic physics*	*Nuclear, reactors and accelerators*
2016	**School**	CERN	*JUAS*	*Accelerators physics & technology*
2016	**Master 1**	Grenoble	*Fundamental physics*	*Quantum phy., nanosciences…*
2011/2014	**Licence**	Bdx-Montreal	*Fundamental physics*	*Electromagnetism, thermod…*

Teaching and student supervision

2025/	**M2**	**Lect/TD**	**18h**	*M2 GI*	*Particle beam dynamics*
2025/	**Doc**	**Lecture**	**4,5h**	*Univ Paris Saclay*	*Introduction to accelerators*
2024	**Doc**	**Lecture**	**4,5h**	*ED PHENIICS*	*Introduction to accelerators*
2024	**Doc**	**Th school**	**2h**	*KU Leuven*	*Separation of radionucleides*
2021	**IUT**	**Lect/TD**	**18h**	*Uni. Bordeaux*	*Electromagnetism*
2020	**IUT**	**Lect/TD**	**18h**	*IUT GEII*	*Electromagnetism*

Students supervision :

2026	**phD**	**Supervisor**	**3y**	*Longitudinal beam dynamics on PERLE*
2025	**M2**	**Supervisor**	**5 m**	*Longitudinal beam dynamics on PERLE*
2025	**M2**	**Co-Supervisor**	**5,5 m**	*Beam losses and halo studies on PERLE*
2022/5	**phD**	**Support**	**3 y**	*Strong support to 2 phD thesis*
2023/5	**phD**	**Support**	**2 y**	*PERLE :«injector design» and «magnets errors»*
2024	**L3**	**Supervisor**	**3 m**	*Data analysis and emittance measurements*

Research experience

2022/-- **CRCN: Recrutement au concours CNRS 01/02 affecté à IJCLab**

Topic: Beam dynamics and lattice design for the energy recovery linac PERLE

- Responsible of lattice development
- Collective effects, coherent synchrotron radiation, longitudinal matching
- Injection line and diagnostics studies

Publications : Phys. Rev. Accel. Beams **27**, 031603 JACoW-IPAC2025-MOPS041

2019/22 **Post-doc: Commissioning of the DESIR high resolution mass separator**

Content: Correction of optical aberrations up to 5th order with the help of an emittance-meter and a 48-poles electrostatic multipole

Main achievements:

- Characterization of an ion source and an emittance-meter with a test bench
- Writing of an analysing software for emittance reconstruction
- Highlight of multipolar aberration correction with the multipole (3rd order)
- Best resolution measurements (R ~ 25000)

Publications : 10.1016/j.nimb.2023.05.033 10.1016/j.nimb.2023.05.033

2016/19 **PhD: Electric dipole moment of hadrons on a storage ring**

Main achievements:

- Analytical model for an electrostatic deflector fringe field
- Ions trajectories in a deflector (Hamiltonian)
- Spin dynamics model in a deflector
- Writing of a particles tracking code (in BMAD)

Publications : arXiv:1812.08535 10.18429/JACoW-IPAC2019-TUPRB006

Experimental and shifts:

- **JEDI**: Operation of the WASA polarimeter at the COSY storage ring
- **Nectar (GANIL)**: Characterisation of Ge/Si Solar panels under 5/10/15MeV/A Kr beam
- **Actar (GANIL)**: Beam identification with the LISE spectrometer
- **Wizard (ISOLDE)**: Beam tuning & data acquisition for Wizard at ISOLDE
- **ThomX(IJCLab)**: Regular participation to shifts and simulations

Responsabilities

WP leader PERLE : Task leader of the task « Lattice design and beam dynamics » of the PERLE project.

DESIR project: Coordinator of « beam production and purification » package

IPAC26 : Local organizing comitee of IPAC26 (~1800 participants). Responsible of student activities

GDR SCIPAC : Steering comitee, responsible of lepton accelerators activities. Webmaster.

Organisation of international seminars: « Open ERL seminars ». 3 to 4 seminars a year.

Other activities:

phD students association presidency: LPSC, 2 years. Participation to lab direction board.

Convener: « beam dynamics » session of the SCIPAC calculation workshop

Jury : IPAC25 student poster, M2 GI defenses, Roscoff's SFP days poster jury, IPAC26 student poster