Laboratoire des Sciences du Numérique de Nantes

Nantes Université

cnrs

Sharing experience and good practice

Barbara Pascal
bpascal-fr.github.io

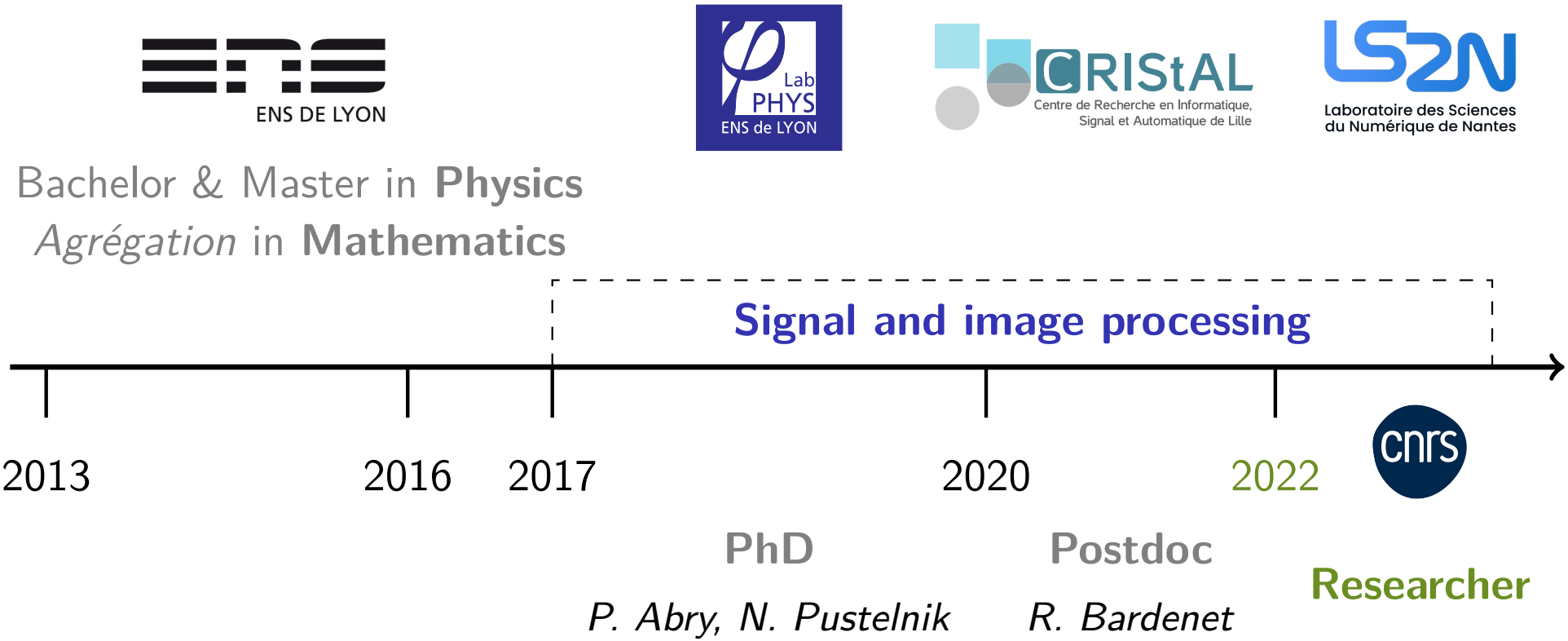
February 19, 2026

AI hackathon for women in the mathematical sciences

ICMS, Edinburgh, UK

Academic path : research in signal and image processing

After initial training in theoretical physics and mathematics



- **Signal and image processing:** models, methods and applications
- **Imaging:** inverse problems
- **AI and data science:** Statistical Machine Learning, Optimization

General introduction: women in science in France, and beyond

French population **51%** of **women**

Sources: French Ministries of Education and of Women and men equality,

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*: *patents filed between 2019 and 2023*

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The situation in France in **2024**:

- from humanities to exact and experimental sciences **30%** of **women** researchers
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A gradual yet clear **evaporation** of women in academia

- Master student: **60%** of women
- PhD Student: **44%** of women
- Assistant professor/researcher: **45%** of women
- Full professor/director of research: **32%** of women
- President of University: **26%** of women

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General introduction: women in science in France, and beyond

French population **51%** of **women** vs. in the world **49.6%**

The situation in France in **2024** and in the world:

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Fields medals and Nobel prizes from 1901 to 2025:

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The Magnificent Four: ⭐ J. Bardeen, M. Curie, L. Pauling, F. Sanger
among those who received two Nobel prizes 3 men and **1 women**

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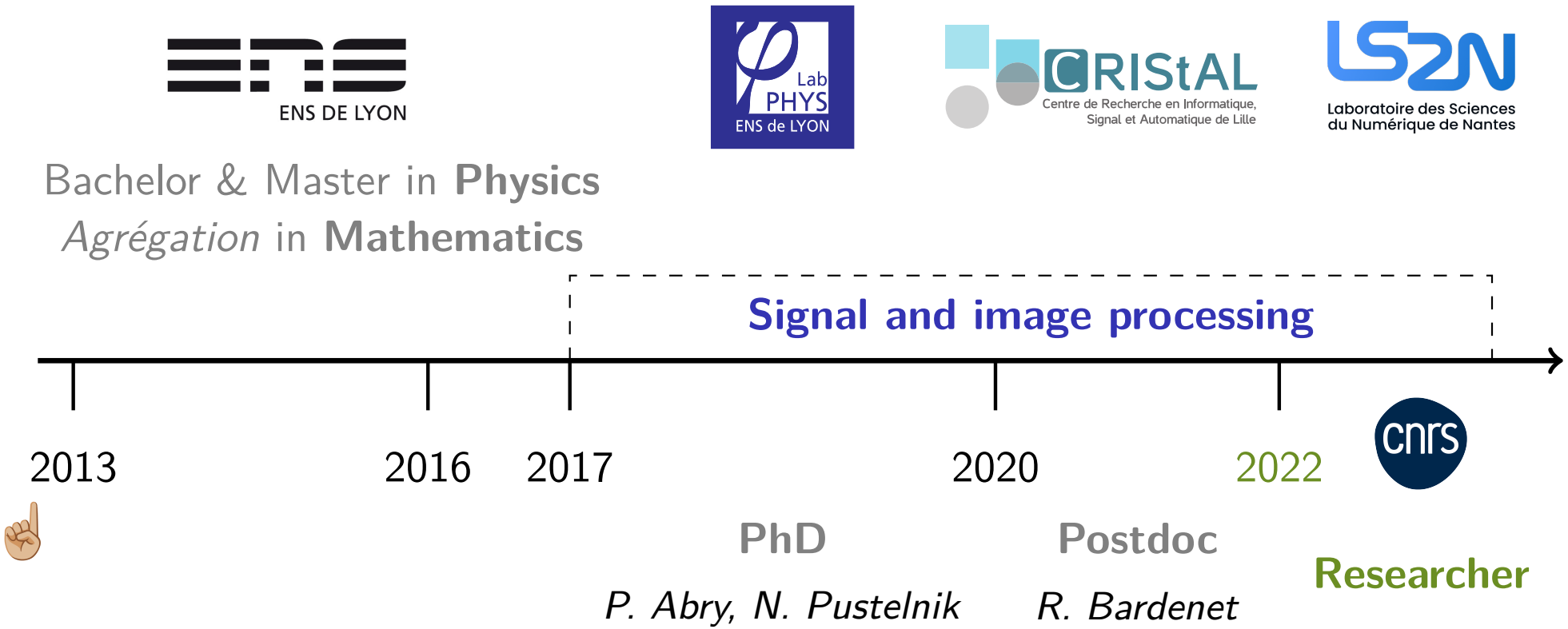

Scientific preparatory classes

In France, after high school, two or three years of **intensive training** to enter either

- engineering schools, the top one *École Polytechnique* is **military**
- top "universities": *Écoles Normales Supérieures* preparing careers in academia

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C. Perronnet, PhD, French sociologist: high school students encouraged to join

- for **male**, if their grades are higher than **12/20**
- for **female**, if their grades are higher than **15/20**

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Importance of role models: after the testimony of a female scientist in class

increase from **30%** to **45%**

of female students enrolling in a scientific preparatory class

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- sit, think deeply... until receiving a revelation from your inner-self?

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Sept. 2010: I enrolled in a **Mathematics & Physics** preparatory class

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and then become a **Math teacher** in preparatory classes

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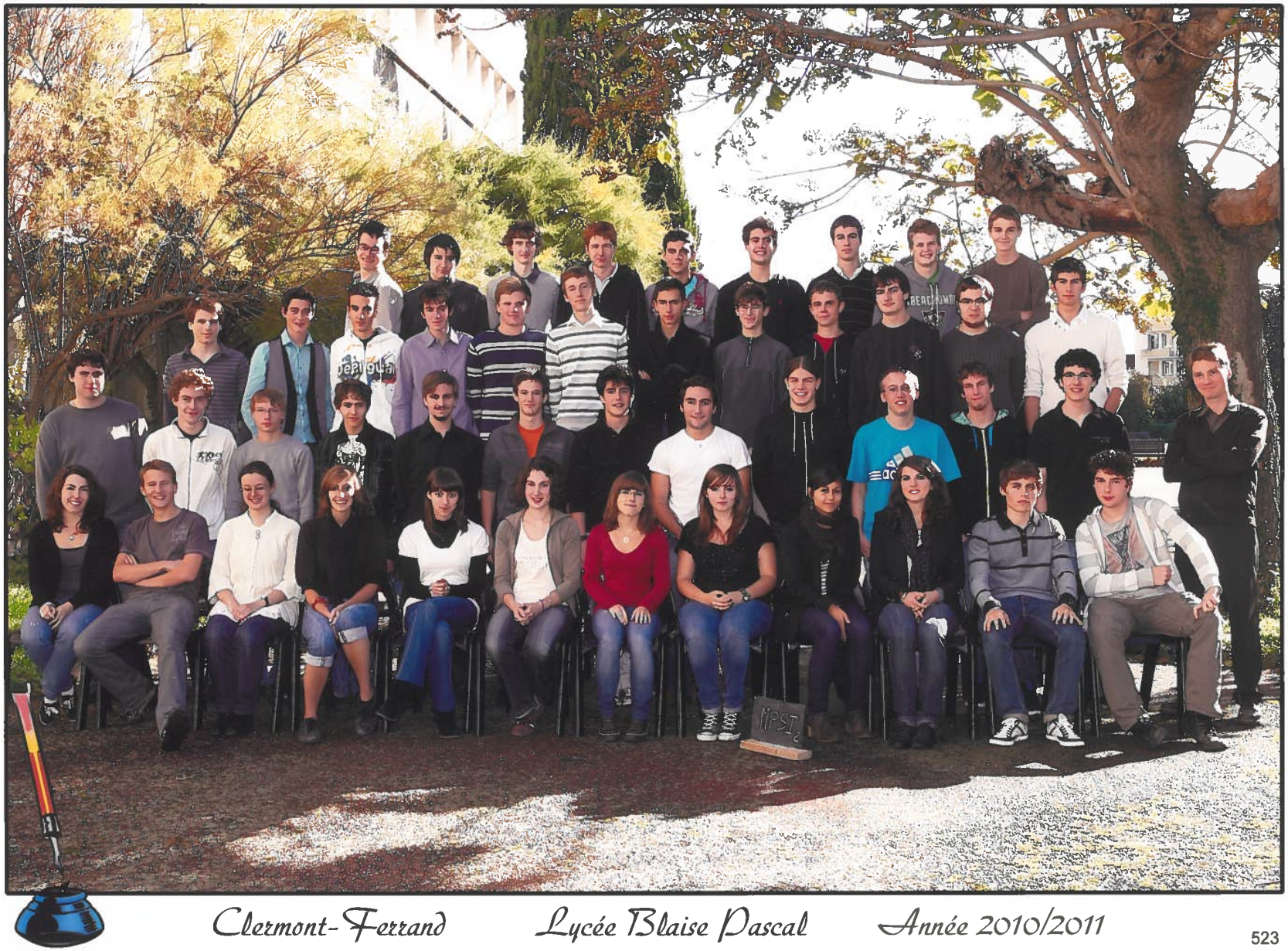
These three years were **exhausting**.

Preparatory classes: The first year 20% of women, 9 over 45



Preparatory classes: My *1st* second year 13% of women, 4 over 31

Preparatory classes: My *2nd* second year 11% of women, 3 over 27

Clermont-Ferrand Lycée Blaise Pascal Année 2012-2013

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Scientific preparatory classes

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Influence of environment on performance:

- female engineering students,
- engineering test,
- called with a male student

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Along my way, discovered **signal processing** & **optimization**

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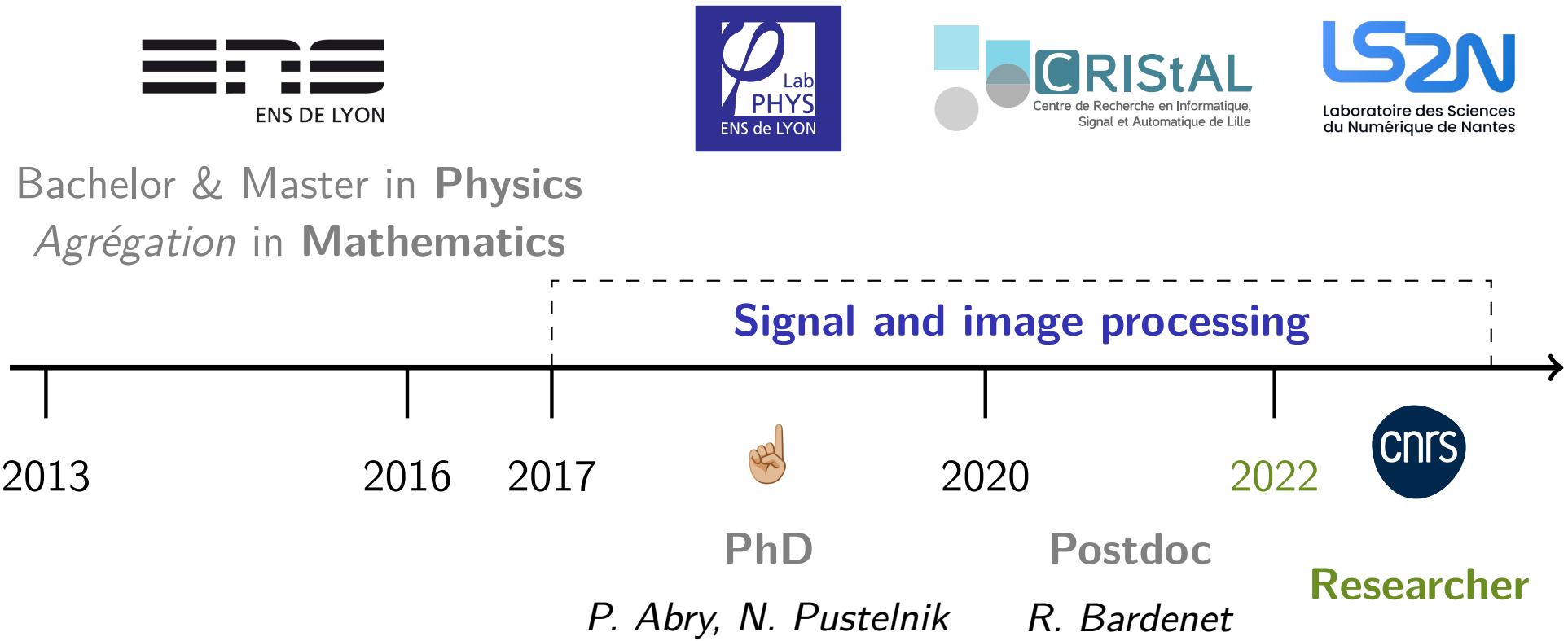

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Enriching: teaching experience

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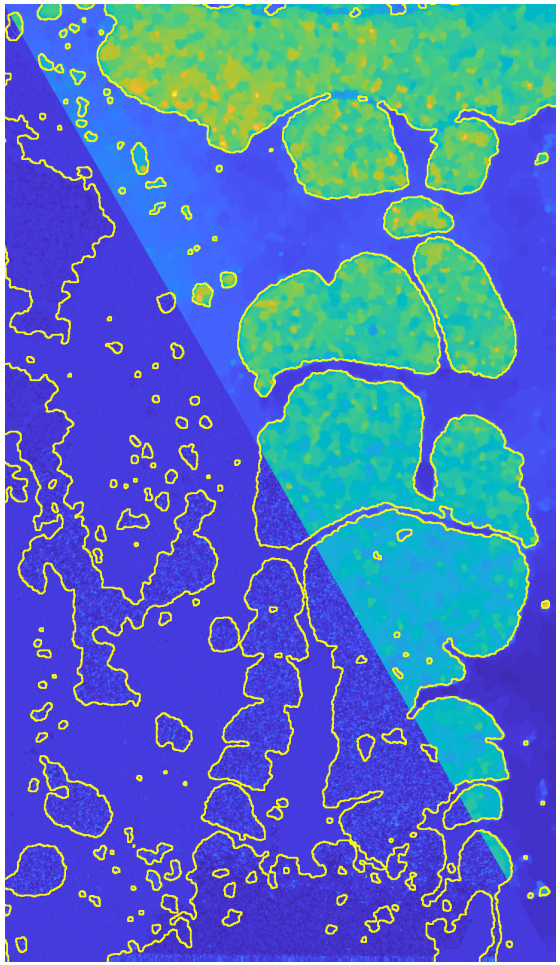

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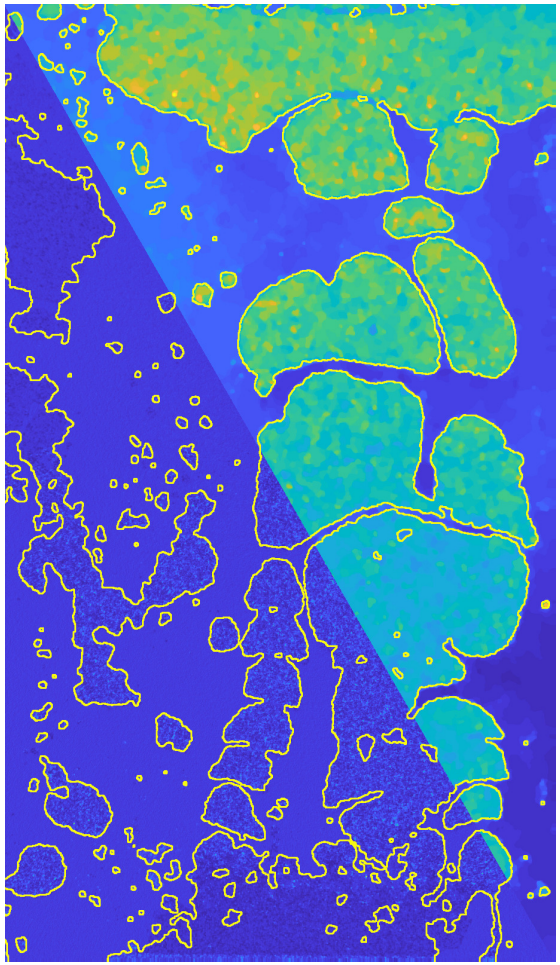

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At the beginning of **third year**, started to look for a **postdoc** position.

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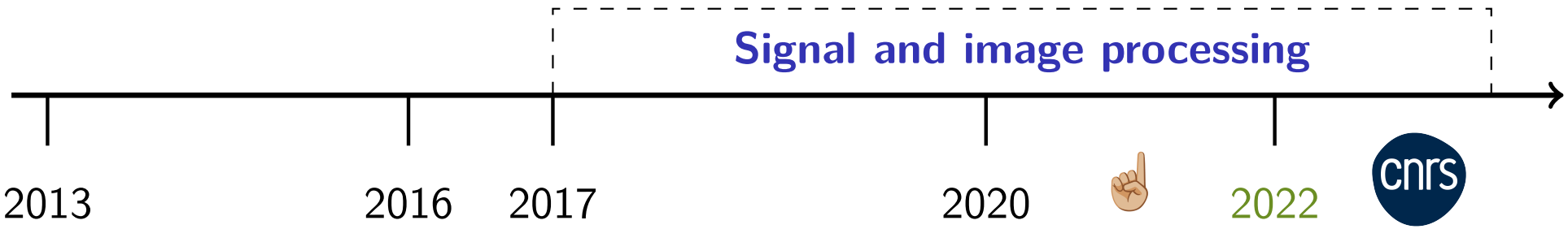
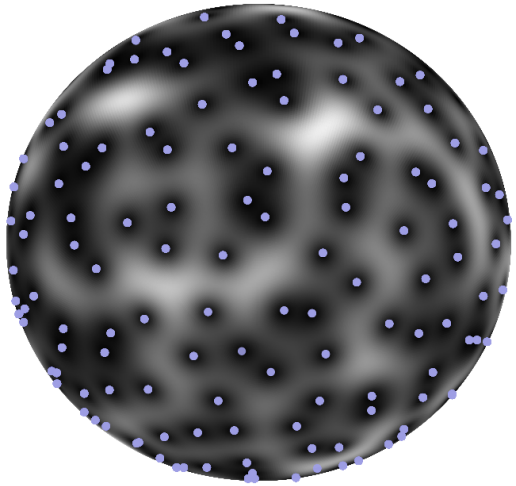


The Kravchuk transform and its zeros

- signal processing
- theory of time–frequency analysis
- original connection with the theory of spin
- spatial statistics



Postdoc: Data science laboratory of Lille

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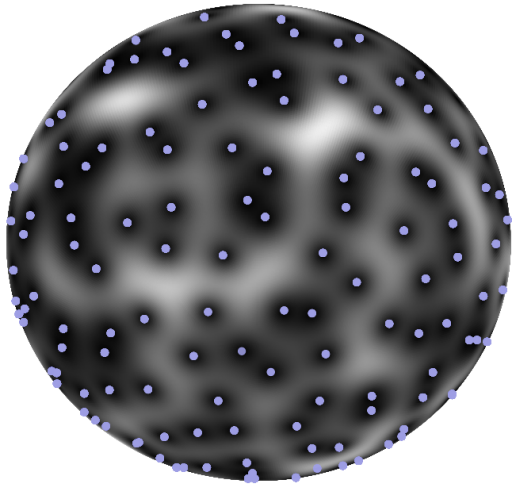

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Autonomy: more freedom means more responsibility

Informative: adjust the level of mathematics vs. application

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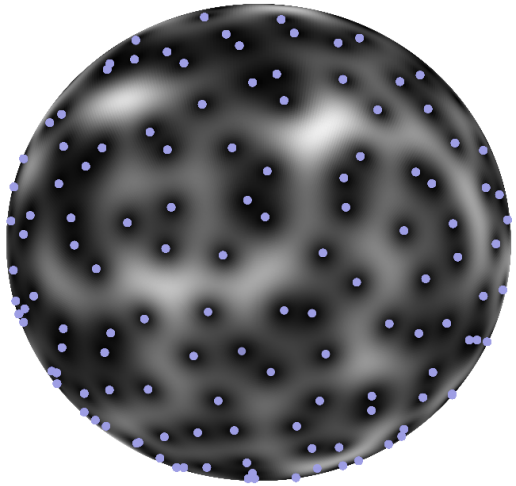

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It's time to start applying to **permanent** positions!

Postdoc: Impostor phenomena

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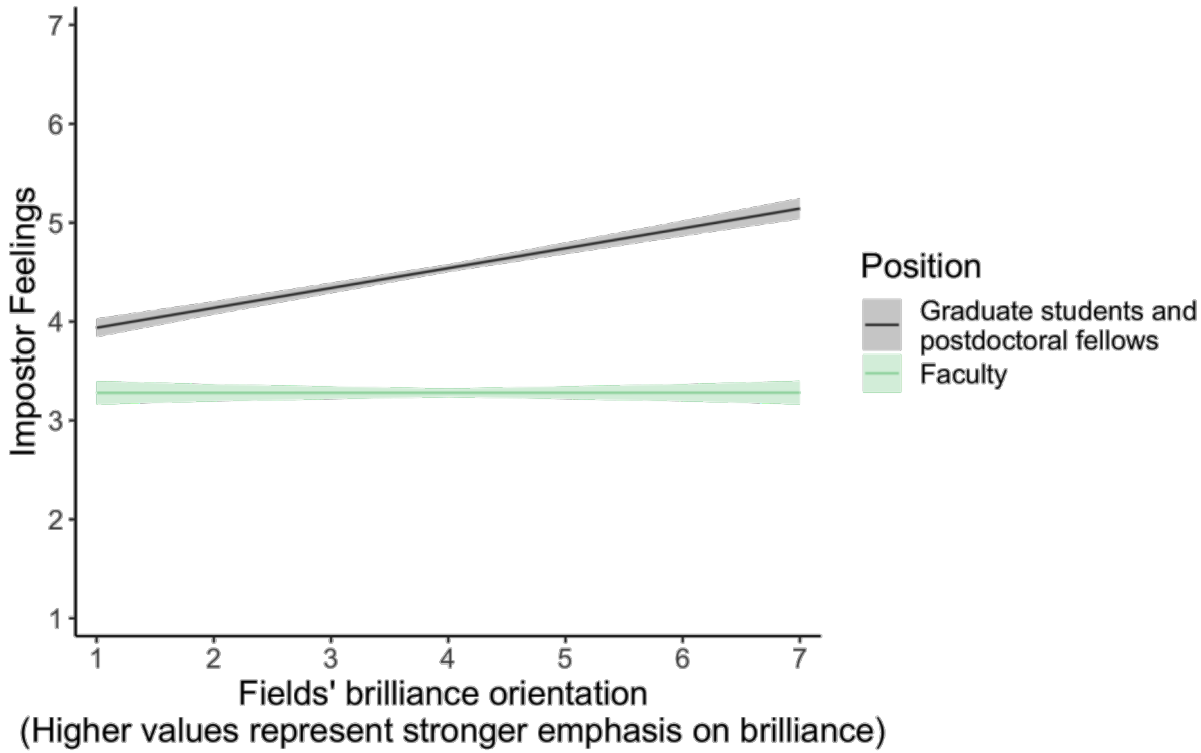

Figure 2. The relationship between academics' perceptions that their field values brilliance and their impostor feelings, by career stage. Bands represent ± 1 *SE*.

Muradoglu, M., Horne, Z., Hammond, M. D., Leslie, S. J., & Cimpian, A. (2022). Women—particularly underrepresented minority women—and early-career academics feel like impostors in fields that value brilliance. *Journal of Educational Psychology*, 114(5), 1086.

Postdoc: Applications and the threat of stereotype

Difficult task, e.g., writing a **research proposal**: need much **executive resources** to

- cope with stress arousal
- maintain vigilance
- use working memory
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Under the **threat of stereotype**: energy used to

- induce physiological stress response which impairs prefrontal processing
- constantly monitor performance
- try to suppress negative thoughts and emotions

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Spring 2022:	Assistant professor position in **applied mathematics**	✗ ranked **second**
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	Full-time researcher position in **signal processing**	✓ ranked **first**

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My experience: what is absolutely necessary scientifically and emotionally

- **ask** for information, advice, examples, support, rehearsals

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Spring 2021:	Assistant professor position in **signal processing**	✗ ranked **third**
Fall 2021:	Assistant professor position in **applied mathematics**	✗ ranked **fourth**
Spring 2022:	Assistant professor position in **applied mathematics**	✗ ranked **second**
	Assistant professor position in **applied mathematics**	✓ ranked **first**
	Assistant professor position in **applied mathematics**	✓ ranked **first**
	Full-time researcher position in **signal processing**	✓ ranked **first**

My experience: what is absolutely necessary scientifically and emotionally

- **ask** for information, advice, examples, support, rehearsals
- start to feel that you are the worst researcher ever?

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Academic path : research in signal and image processing

After initial training in theoretical physics and mathematics

ENS DE LYON

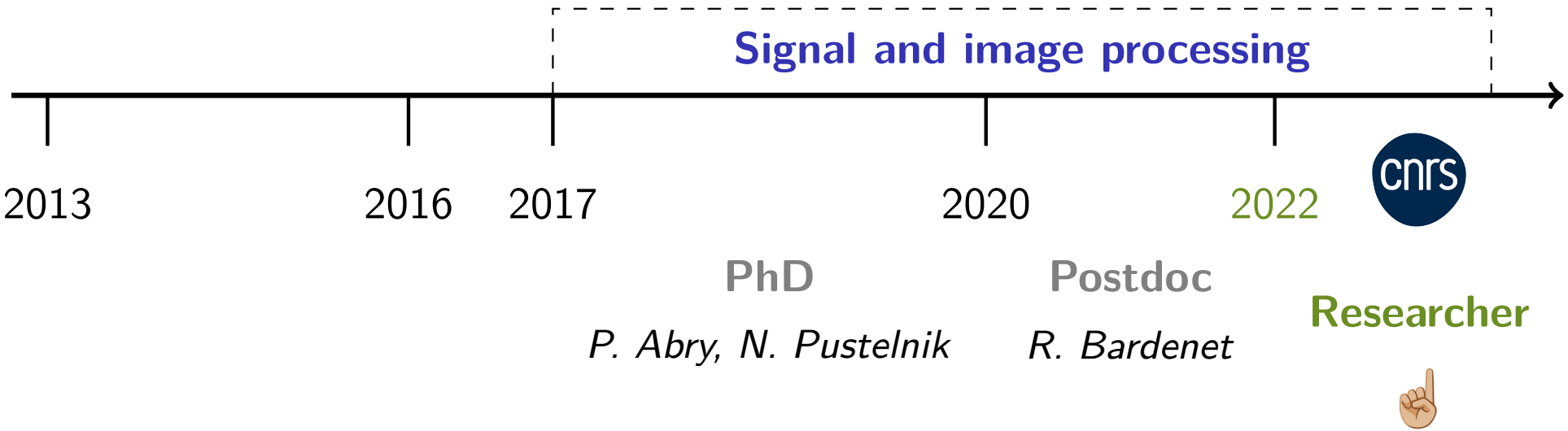
Lab PHYS ENS de LYON

CRIStAL Centre de Recherche en Informatique, Signal et Automatique de Lille

LS2N Laboratoire des Sciences du Numérique de Nantes

Bachelor & Master in **Physics**

Agrégation in **Mathematics**



Full-time researcher: Digital Science Laboratory of Nantes

SIMS team: Signal IMage and Sound

- Models and methods for solving inverse problems
- Machine learning for computer-aided decision making
- Mathematical and numerical tools for large dimensional calculation
- Multidisciplinary applications:

medical	urban environments	art creation
ecoacoustics	epidemiology	...

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Permanent staff

- 2 Directors of research
- 2 Researchers
- 3 Professors
- 3 Assistant professors

3 women and 7 men **30%**

Temporary staff

- 1 Research engineer
- 24 PhD students
- 6 Postdocs

3 women and 7 men **30%**

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Produce and share knowledge:

Scientific community service:

Training in/through research and evaluation

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Produce and share knowledge:

- write articles, implement algorithms and make it publicly accessible
- write proposals to get funding
- present work at conferences
- initiate new collaborations, design a research network
- report on your work
- form an opinion and defend one's scientific views

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- participate to conference organizing committee
- engage in national and international scientific organizations: EURASIP, IEEE, SIAM
- organize thematic meetings for the national community
- organize the scientific seminars of one's research group
- take part in and initiate outreach activities, engage with the general public

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Training in/through research and evaluation

- supervise interns, co-supervise PhD students, collaborate with postdoctoral researchers
- teach to stay connected to potential PhD candidates
- review articles, participate to editorial boards
- serve on thesis juries
- participate in selection committees

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First year: a multiscale welcome

- at CNRS with **all** recruited people of the year +150

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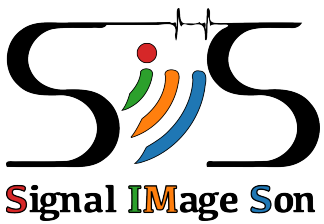

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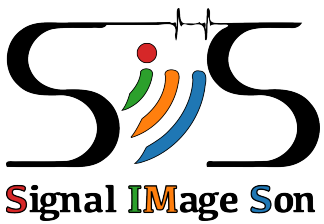
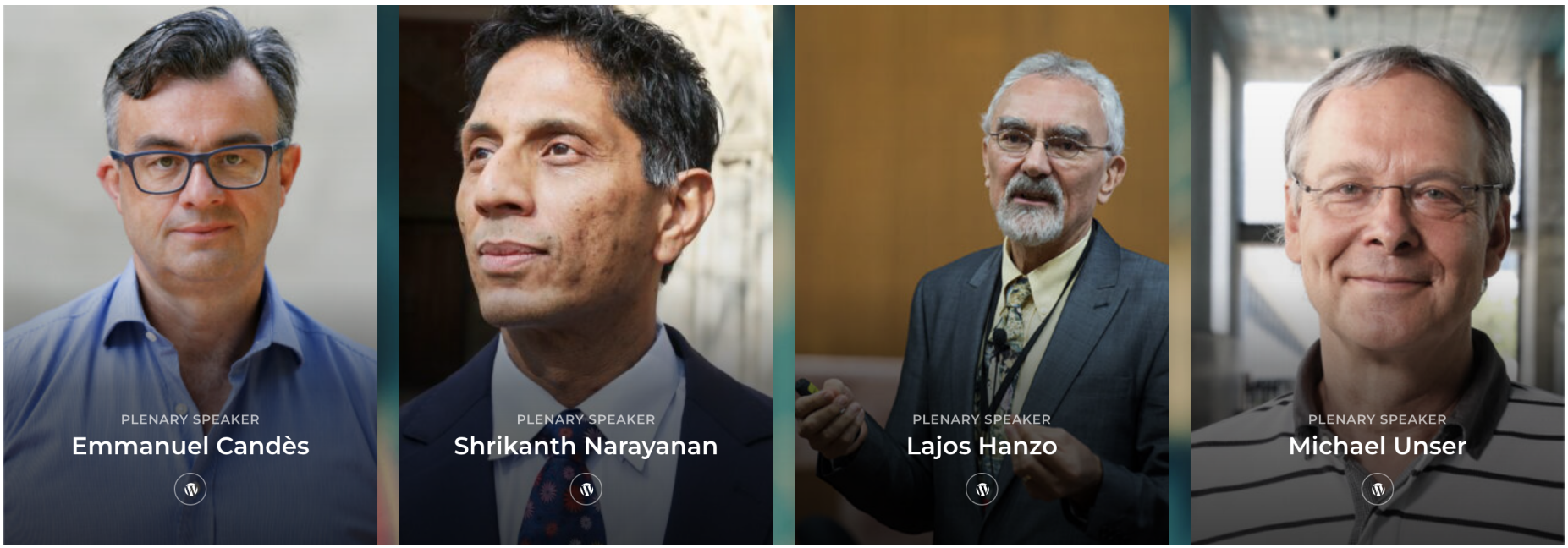


Career advancement:

- day at **Institute** after **three** years: supervision and responsibilities
- day at **Institute** after **seven** years: application to director of research position

General introduction: ICASSP 2026 keynote speakers

International Conference on Acoustics, Speech, and Signal Processing 2026



Source: https://2026.ieeeicassp.org/speakers/

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Not responsible for knowing them, but for **controlling** them

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- know that: *Evaluation is highly complex: our brains simplify it using simplistic rules.*

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What can we do?

- know that: *Evaluation is highly complex: our brains simplify it using simplistic rules.*
- understand how biases work to be able to control them
- be careful during the **entire** recruitment process

writing the job offer	*discussing about the candidates*
evaluating the applications	*taking the final decision*
conducting the interviews	*giving feedback*

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences*, 109(41), 16474-16479.

Madera, J. M., Hebl, M. R., & Martin, R. C. (2009). Gender and letters of recommendation for academia: agentic and communal differences. *Journal of Applied Psychology*, 94(6), 1591.