INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech

Institut d'Optique is a member of université PARIS-SACLAY

Introduction to

Institut d'Optique

Graduate School

www.institutoptique.fr

May 2019

Pierre BALADI
Head of International Relations

 Paris-Saclay

 Saint-Étienne

 Bordeaux

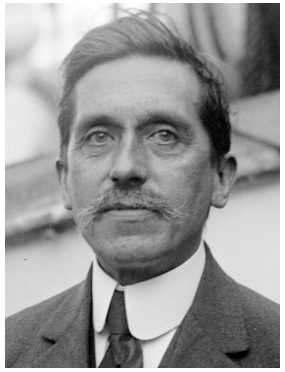
Inspired by light since 1917

- **2017: celebrated 100 years of research and education in optics and photonics**

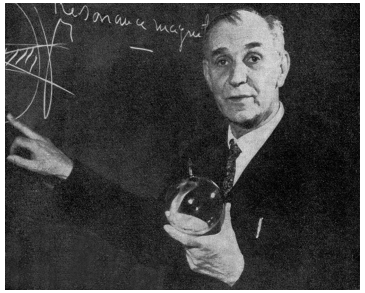
- **A century of expansion**
  - **1917**: creation of **Institut d'Optique**, in Paris
  - *1965: moving from downtown Paris to Orsay campus*
  - 2003: new campus in Rhône-Alpes
  - **2006**: *moving from Orsay to current location in Palaiseau*
  - 2012: new campus in Aquitaine
  - *2017: commitment to be a member of **Université Paris-Saclay***

- **2019:**
  → Saint Etienne
  → **Paris-Saclay**
  → Bordeaux

- **A rich history**



Charles FABRY
1st Director General (1917-1945)



Alfred KASTLER
President of the Board (1960s)

Alain ASPECT
Augustin Fresnel Chair Professor & Scientific Advisor

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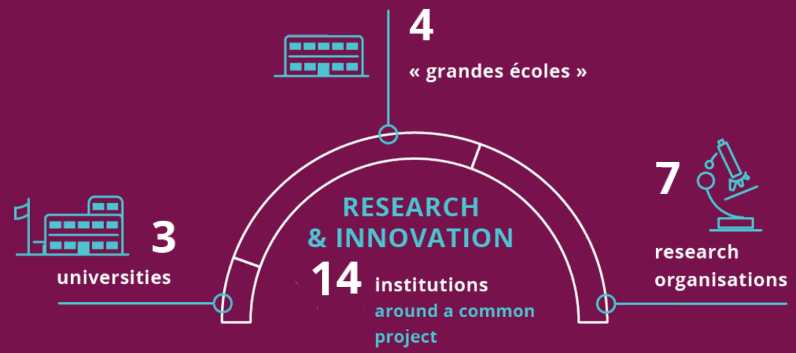
Saint-Étienne

Bordeaux

université PARIS-SACLAY

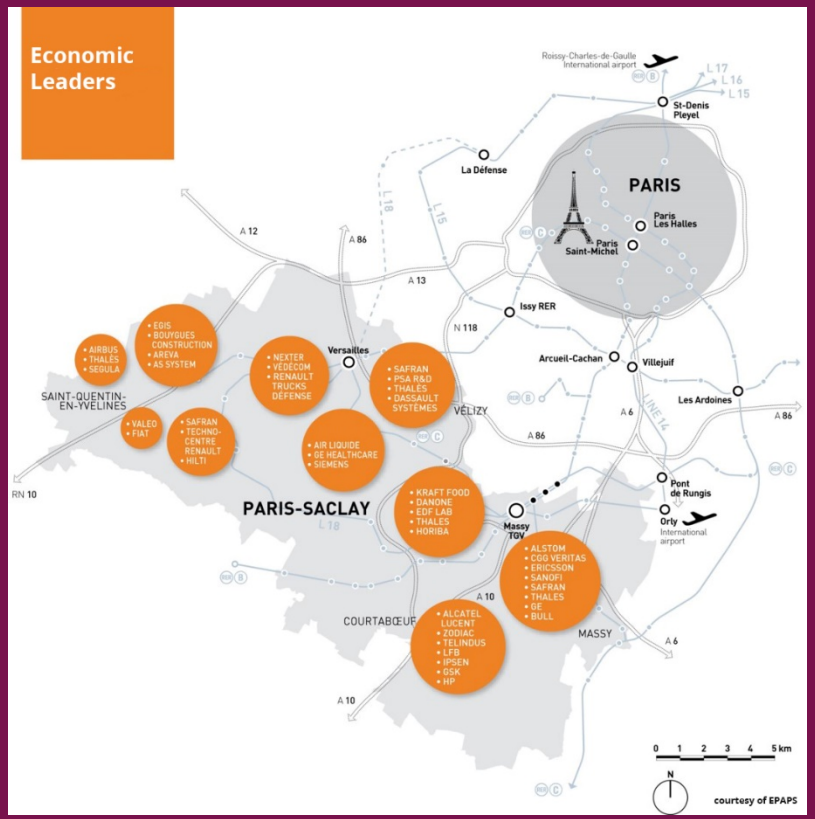


ACADEMIC RANKING OF WORLD UNIVERSITIES #16-20

Projected ranking 2017

US News Best Global Universities ranking 2018

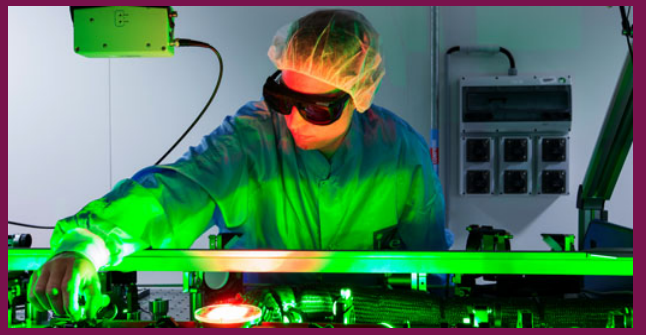
- 30th Worldwide
- 1st in European Union
- 1st in France
- Maths: 1st Worldwide, Physics: 5th Worldwide



- 13% of **French R&D**
- 2 Nobel Prize Winners
- **10 Fields Medallists**
- **8 Schools**
  - 45 Master's programmes
  - 300 Master's tracks (15% in English)
- **65,000 students**
  - 9,000 Master's students, 38*% international*
  - 4,600 PhD students, *42% international*
- 20 doctoral schools – **1,300 PhDs/year**
- **9,000 faculty & academic staff**
- **146 ERC grants** for **161 ERC projects** (1st in France, 3rd in Europe)
- **12,000 publications/year**

An International Research University

- **13 outstanding scientific facilities** - Equipex
- **11 Laboratories of excellence** - Labex
- **23 Strategic Research Initiatives**
- More than **400 active international partnerships**
- **45 CNRS International Associated Laboratories-**LIA – more than 25% of French LIAs



- International **Master's Scholarships** -160 Incoming full Master's scholarships / yr
- Over **350 full PhD grants / year** with additional **UPSaclay funding** for cotutelles with international universities
- **Jean d'Alembert fellowship programme** for junior and senior foreign scientists : 6-12 month stays - 10 laureates per call – Researchers working in any field & from any country
- Paris-Saclay **Chairs of excellence**: 5 laureates (450k€ / 3years)

université PARIS-SACLAY

Nationwide presence

Graduate education

Research **Innovation**

Paris Saclay

Physics & Engineering of light

Bordeaux

Nanophotonics & digital optics

St Etienne

The imaging chain, lighting & energy

Labo C. Fabry

Labo LP2N

Labo H. Curien

Paris-Saclay

Saint-Étienne

Bordeaux

A graduate school with >1000 people

Graduate education

- Master of Science in Engineering degree (500)
- Master degrees (50)
- PhD (150)

- Co-operative education programme ('co-op') with companies: CFA SupOptique

- Continuing Education

Research

3 research centers with international reputation

- LCF: Laboratoire Charles Fabry (150)

- LP2N : Photonics, Digital Data and Nanosciences (50)

- *LHC : Laboratoire Hubert Curien (170) – common with UJM St Etienne*

Innovation

- 210 people (headcount)

- 37 startup companies in integrated partnership

- 2 innovation centres at the '503 Centre', Institut d'Optique's own innovation centre: 10000m² + 1500m²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Saint-Étienne


Bordeaux

A graduate school of international level

Graduate education

- One of the widest ranges of courses in photonic and optical engineering
- Strong links between Master-Engineering degree-PhD : 35% of graduates undertake a PhD worldwide *(4th /168 engineering schools in France)*

Research

- 1 scientific paper and 2 communications per day
- 37 Highly Cited Papers (web of science)
- Numerous international prizes

Knowledge dissemination

- Today: home of *Société Française d'Optique* (National Optical Society)
- European Optical Society was created at Institut d'Optique (1993 merger)


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A graduate school of international level

Innovation

- **3 MIT Technology Review Best World Innovators Under 35**
- **2 start-up companies created per year since 2008**

French Research & Higher Education Assessment Agency, Evaluation report, Aug. 2014

« Its strategic position as a leading engineering school specializing in optics and photonics, makes it unique in France and among the very best in the world. »

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Research areas

Components & Systems
for Photonics

Virtual &
Augmented Reality

Digital
Images

Cold Atoms
Quantum Optics
Biophotonics
Nanophotonics

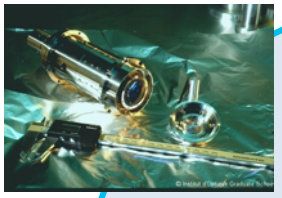
Lasers
Nonlinear Materials
X & UV Optics

Instrumentation

Image Processing

Visual Rendering
Safety

BORDEAUX
Laboratoire Photonique Numérique et Nanosciences
LP2N
(50 people)



PARIS-SACLAY
Laboratoire Charles Fabry LCF
(150 people)

SAINT ETIENNE
Laboratoire Hubert Curien
(170 people)

Paris-Saclay

Saint-Étienne

Bordeaux

Innovative Engineers

4 x more patent holders than the average French school of engineering

Pierre ANGÉNIEUX (1929) — *Inventor of the automatic zoom lens*
French optics accompanied the first men on the moon

Bernard MAITENAZ (1947) — *Inventor of the progressive lens (Varilux)*
Chairman of the Board & CEO Essilor

Sébastien BIGO (1992) — *Record transmission on a single optical fiber (70 Tbit/s over 10 000 km)*

MIT Technology Review Best World Innovators Under 35

Gabriel CHARLET (1999) — *Optical communication platforms at 40 & 100 Gigabit/s,*

Thibaut MERCEY (2000) — *Fast optical detection of molecules*

Anaïs BARUT (2014) — *Non invasive detection of skin carcinoma*

INTERNATIONAL 3D SOCIETY

Cecile SCHMOLLGRUBER (2008)
3D technology Awards: Sofware of the year
Hollywood, Sep. 2014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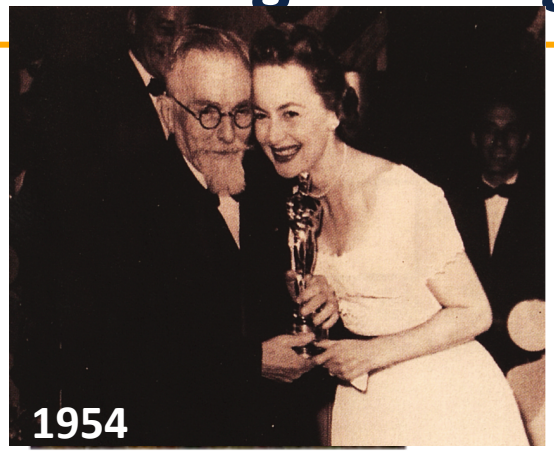
The School of Engineering with 4 Oscars

Henri CHRETIEN
for his "hypergonar" optical system



Pierre ANGENIEUX (1929):
2 Oscars (1964 & 1989)
for his motion picture zooms lenses

Jacques DEBIZE (1967)
Technical Oscar 2009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Innovation study track

Innovation Entrepreneur Track (FIE)

- 70 projects created (since 2006)
- 14 new companies
- 16 national & international awards
- 2 industry awards

EFFI Flex 2013 product of the year in industrial vision

2014 3D Technology Awards
software of the year

- 48 other awards


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Some companies created by FIE

LED Lighting for the industry

LiDAR for wind plant optimisation

Spectrometers
For medecine

Wind speed measurement

Breast cancer diagnosis tool

Thickness control of industrial coatings

Air quality analysis

High quality 3D information

Logistic solutions for industry

LED Lighting for theArts & Decoration

3D laser animations

Non invasive skin diagnostic


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Education at Institut d'Optique

1 2 3 4 5 6 7 8 — Years of Higher Education

Bachelor | Master Degree | Doctorat (PhD)

Diplôme d'Ingénieur de l'Institut d'Optique
Master of Science in Engineering

Master Degrees
Powered by

Doctorate (PhD) in Physics
Prepared at

Advanced Master ELS

Continuing Education


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Course Structure

MScEng – Diplôme d'Ingénieur

1st year = Bachelor final	2nd year = Master 1st	3rd year = Master 2nd
General inter-disciplinary education	General inter-disciplinary education	General inter-disciplinary education
General scientific education	General scientific education	Wide range of openings and specialisations
Photonics	*Paris Saclay* : Light-Matter Interactions, Signal and Image Sciences, Nanosciences, Extreme (X and UV) Optics	
	Bordeaux : Photonics and Digital Sciences, Virtual Reality, Cognitive Sciences, Physics and Modelling	
	St Etienne : Photonics for Imaging, Lighting, Energy	
1 month internship	3 month internship	4-6 month internship

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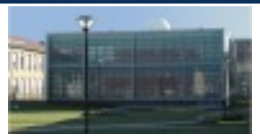

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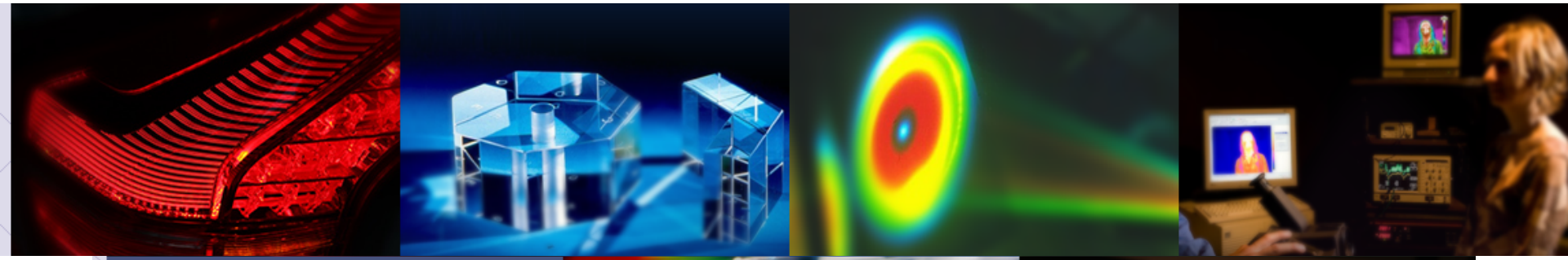
Continuing Education

Every subjects related to photonics and innovation:

- Instrumentation, components
- Sources, Lighting
- Optical design
- Image processing
- Telecommunication
- Electro-optical systems
- Measurements

Training

- On catalogue
- On demand, in French or in English
- Short or long programs



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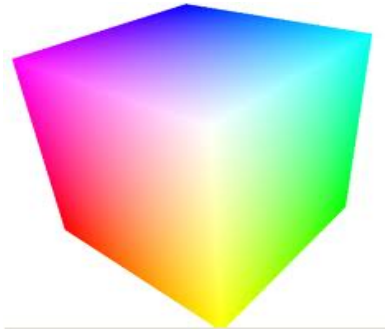
Education Lab in photonics

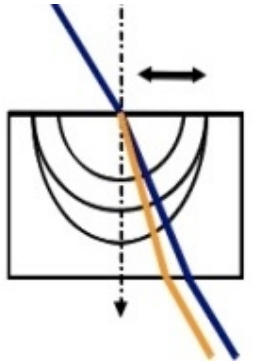
Very wide spectrum from embedded electronics to quantum optics



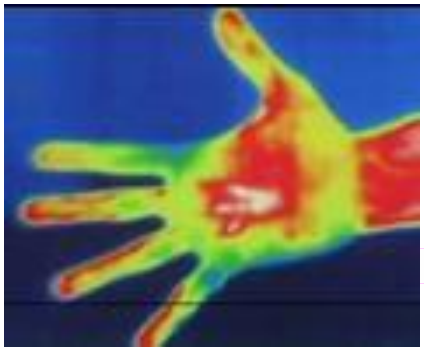
Photometry

Lasers

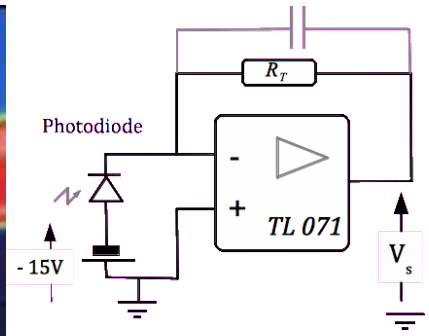
Fibers



Polarization

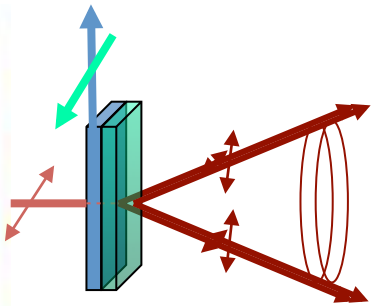


Infrared



Electronics

Optical systems



Quantum optics

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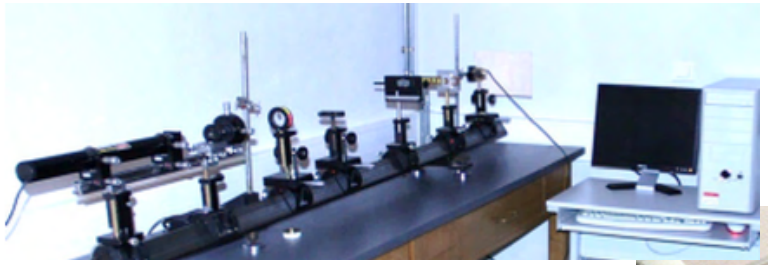
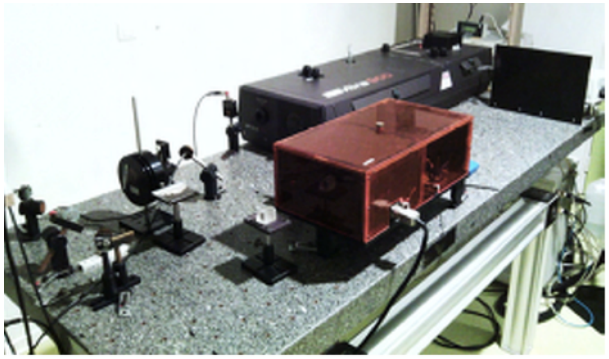
Education Lab in photonics

150 experiments including 80 different subjects





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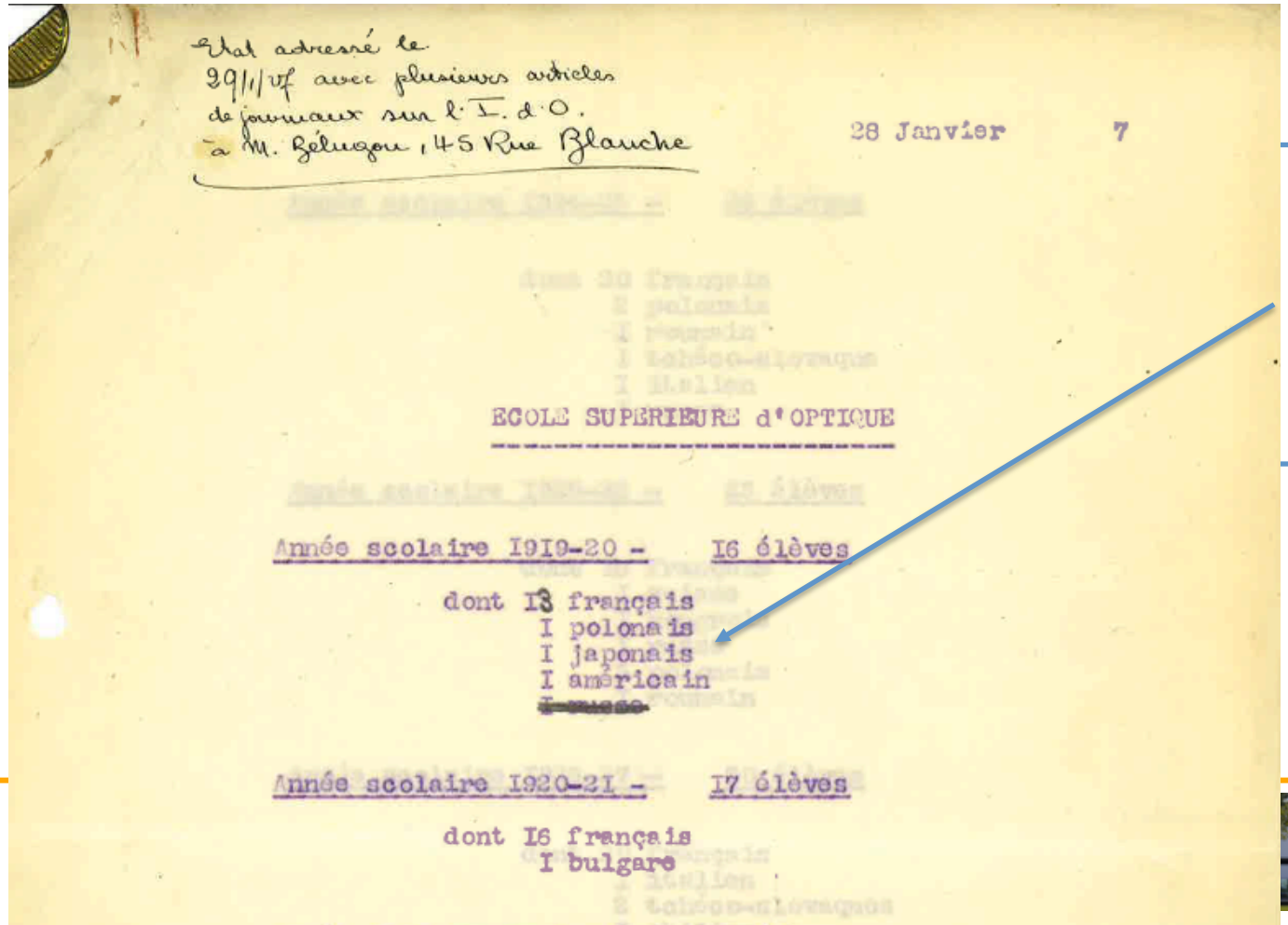
International perspectives

Looking back on a century of History…

Foreign students since the first intake (1919 for the MScEng programme)



État adressé le
29/1/17 avec plusieurs articles
de journaux sur l'I. d'O.
à M. Bélugou, 45 Rue Blanche

28 Janvier 7

ECOLE SUPERIEURE d'OPTIQUE

Année scolaire 1919-20 - 16 élèves

dont 13 français
1 polonais
1 japonais
1 américain

Année scolaire 1920-21 - 17 élèves

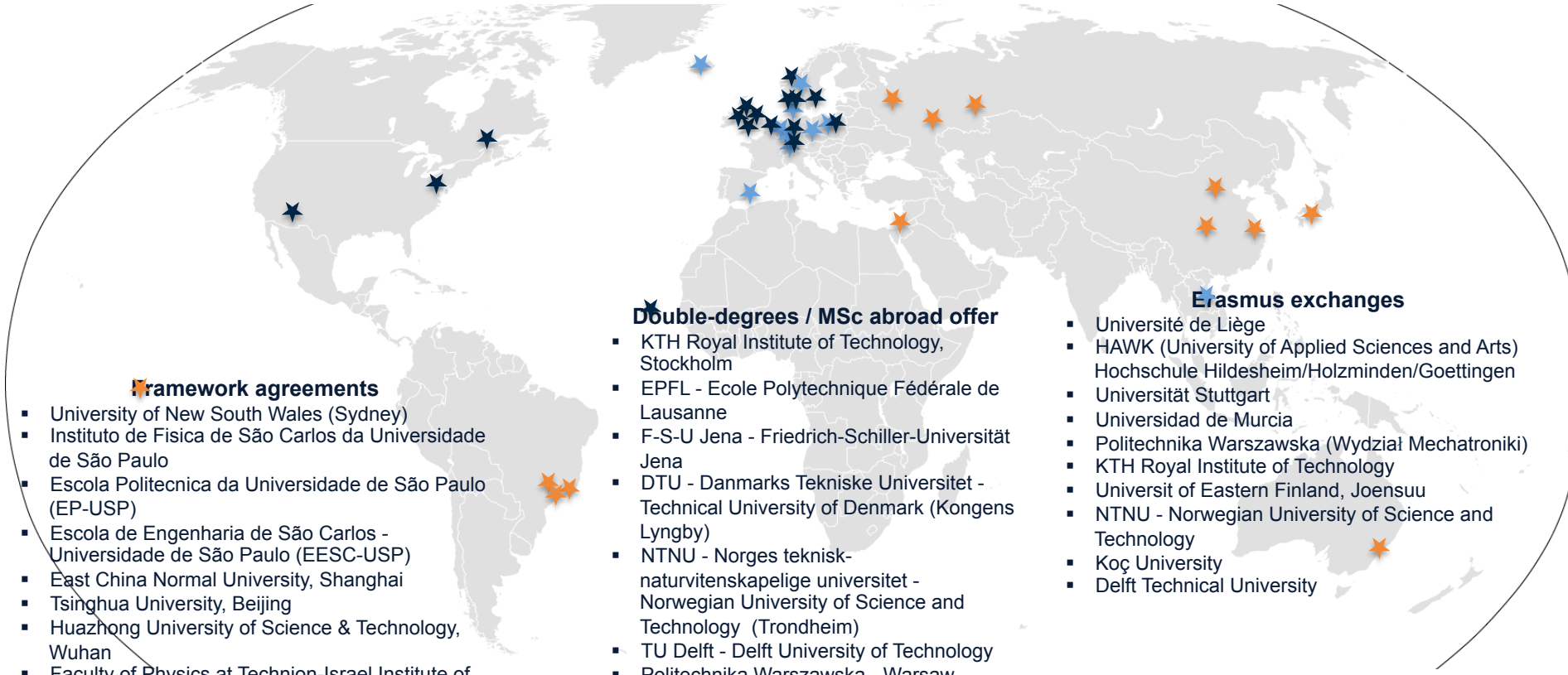
dont 16 français
1 bulgare

1st cohort from 1919:
among 16 students,
1 from Poland
1 from Japan
1 from the USA

Bordeaux

International perspectives

Worldwide partnerships in the 21st century



Framework agreements

- University of New South Wales (Sydney)
- Instituto de Fisica de São Carlos da Universidade de São Paulo
- Escola Politecnica da Universidade de São Paulo (EP-USP)
- Escola de Engenharia de São Carlos - Universidade de São Paulo (EESC-USP)
- East China Normal University, Shanghai
- Tsinghua University, Beijing
- Huazhong University of Science & Technology, Wuhan
- Faculty of Physics at Technion-Israel Institute of Technology
- School of Engineering Science, Osaka University
- Université d'Etat de Moscou, Bauman
- Université d'Etat de Novossibirsk
- Tomsk Polytechnic University
- ITMO University, Saint Petersbourg

Double-degrees / MSc abroad offer

- KTH Royal Institute of Technology, Stockholm
- EPFL - Ecole Polytechnique Fédérale de Lausanne
- F-S-U Jena - Friedrich-Schiller-Universität Jena
- DTU - Danmarks Tekniske Universitet - Technical University of Denmark (Kongens Lyngby)
- NTNU - Norges teknisk-naturvitenskapelige universitet - Norwegian University of Science and Technology (Trondheim)
- TU Delft - Delft University of Technology
- Politechnika Warszawska - Warsaw University of Technology
- University of Cambridge
- Cranfield University
- Imperial College (Londres)
- University of Southampton
- Université de Laval (Québec)
- University of Arizona, College of Optical Sciences (Tucson, Arizona)
- University of Rochester, Institute of Optics (Rochester, NY)

Erasmus exchanges

- Université de Liège
- HAWK (University of Applied Sciences and Arts) Hochschule Hildesheim/Holzminden/Goettingen
- Universität Stuttgart
- Universidad de Murcia
- Politechnika Warszawska (Wydział Mechatroniki)
- KTH Royal Institute of Technology
- Universit of Eastern Finland, Joensuu
- NTNU - Norwegian University of Science and Technology
- Koç University
- Delft Technical University

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Outgoing international mobilities for MScEng

Bachelor final year

- **ATHENS Programme week**: 1-week course in March in European partner universities within ATHENS network
- ***Internship (>4 weeks)****: can be carried out abroad, especially in summer schools (ITMO)*

Master 1st year

- ***Internship (>3 months)****: can be carried out abroad, in university lab or company*

Master 2nd year

- First **semester** can be done as **exchange student** in a partner university
- ***Final internship (>4 months)****: can be carried out abroad, in university lab or company*
- Whole year can be replaced by **MSc in a foreign university (DD)**


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Incoming international students in MScEng

Semester or year as exchange student (non-degree)

- From September 2017 onwards, **one semester offered in English**
  - First semester of M1 level courses

Degree-seeking student (2 or 3 years)

- Either admitted for M1-M2 years: possibility of international track thanks to the first semester in English
  - → 1 Semester in English, with language courses of French for foreigners (=adaptation semester), then other semesters in French
- Or admission in Bachelor final year for 3 years (B3-M1-M2), but in French first (and then some courses in English)


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Incoming international students / other mobilities

Research internships

- In Institut d'Optique's labs
- Usually several months, typically for thesis (BSc or MSc thesis)

Advanced master in Embedded Lighting Systems

- Admission after a Master degree or Bachelor and several years of professional experience
- Specific field: embedded lighting systems in the automobile industry
- Can be part of continuing education

PhD programme

- After a Master degree, for 3+ years, in one of our labs


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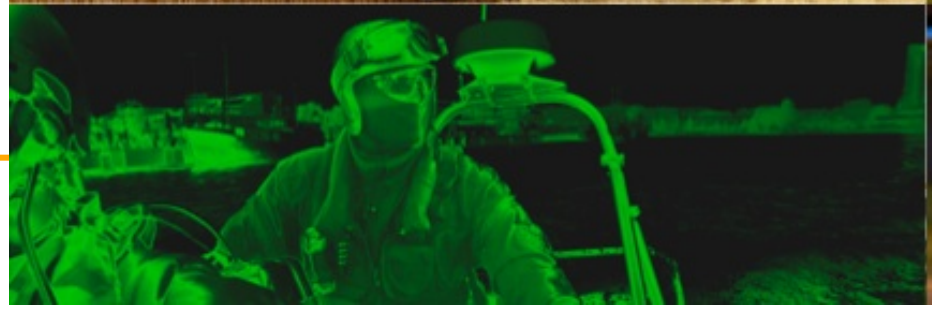
INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech 100 ans

Photonics

Science and Technology of light



Thanks for your attention!

A graduate in action

0-G experiments in parabolic flights

www.institutoptique.fr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