



| The European Synchrotron



# Grenoble Innovation Campus: The role and impact of the European Synchrotron Radiation Facility

Ed Mitchell   *mitchell@esrf.fr*  
Head of Business Development  
Hon. Prof. Keele University (UK)

# THE SYNCHROTRON WITH AN INTERGOVERNMENTAL CONVENTION



## 22 PARTNER COUNTRIES

### 13 Member states:

France	27.5 %
Germany	24.0 %
Italy	13.2 %
United Kingdom	10.5 %
Russia	6.0 %
Benesync	5.8 %
(Belgium, The Netherlands)	
Nordsync	5.0 %
(Denmark, Finland, Norway, Sweden)	
Spain	4.0 %
Switzerland	4.0 %

### 9 Scientific Associate countries:

Israel	1.5 %
Austria	1.3 %
Centralsync	1.05%
(Czech Republic, Hungary, Slovakia)	
Poland	1.0 %
Portugal	1.0 %
India	0.66 %
South Africa	0.30 %





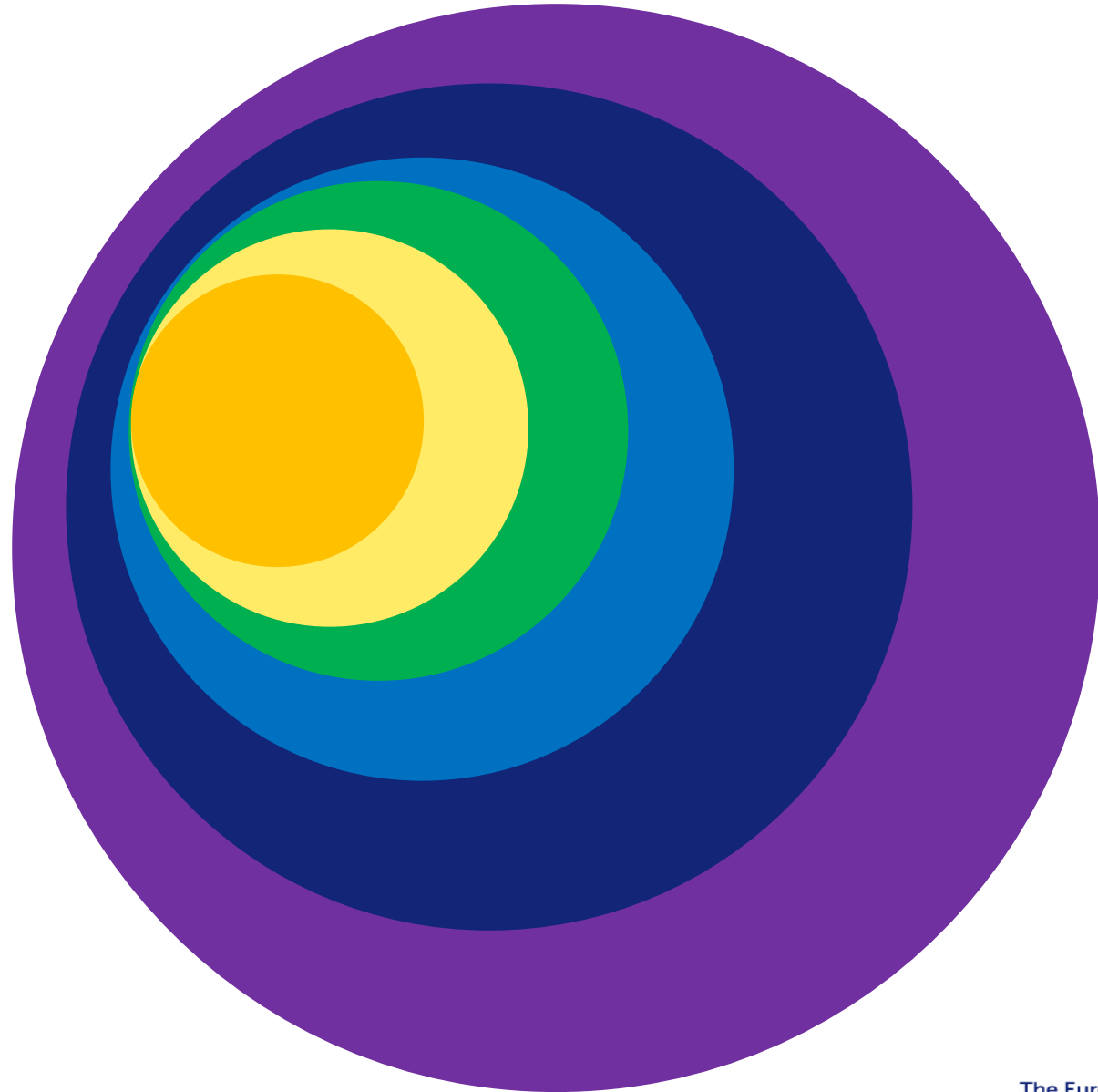
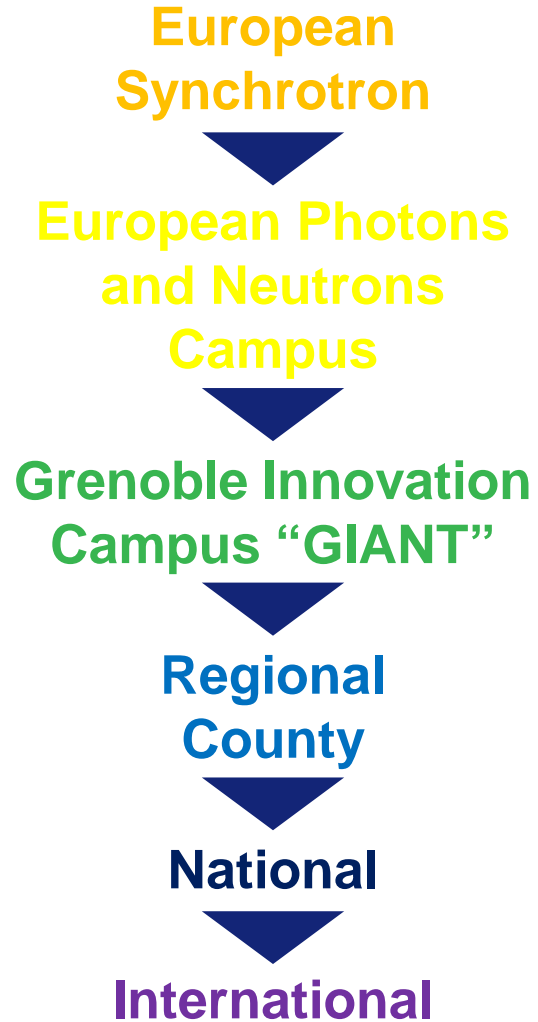
# THE ESRF EXPERIMENTS PROGRAMME TODAY



- **44 beamlines**
  - 29.5 PUBLIC beamlines
  - 14 CRG beamlines ( Teams from Member States)
- **5,520 USM hours (2016) with ~ 99% reliability**
- **7,000 user visits for 1,500 projects**
  - 31,200 requested shifts (1 shift=8hrs)
  - 12,290 allocated shifts
- **11 Beam Time Allocation Panels**
  - Beam time granted on scientific excellence
  - Free access fully open to industry
  - Travel and local expenses refunded to users
- **~ 2000 refereed publications / year**
  - ~ 280 papers IF> 7
  - 25 166 refereed papers in the period 1994-2014
- **150 clients for commercial research**
  - Dedicated Business Development Office earning 2-2.5MEuros annually
  - Overall ~ 30% of research with industrial partners
- **~ 630 Staff (>30 nationalities)**
  - 60 post-docs, ~ 40 PhD students
  - Many joint funded



# EUROPEAN SYNCHROTRON: WORKING ACROSS GEOGRAPHICAL SCALES



# THE EUROPEAN PHOTONS AND NEUTRONS CAMPUS



**10 billion Euros investments**  
**80 X-ray and neutron instruments**  
**500+ scientists within walking distance**

- Exploit complementarity of neutron and X-ray characterisation techniques
- Foster synergy and share resources and expertise
- Create new interfaces and off-line capacities for our user community
- Enhance visibility and outreach





GIANT  
INNOVATION CAMPUS

GIANT Innovation Campus  
Building a leading innovation ecosystem



# The GIANT Campus : 60 years of evolution

**GIANT**  
INNOVATION CAMPUS

1956 CEA (CENG)



Atomic Energy  
Commission

1962 CNRS



National Centre for  
Scientific Research

1967 ILL



European  
High Flux Reactor

1988 ESRF



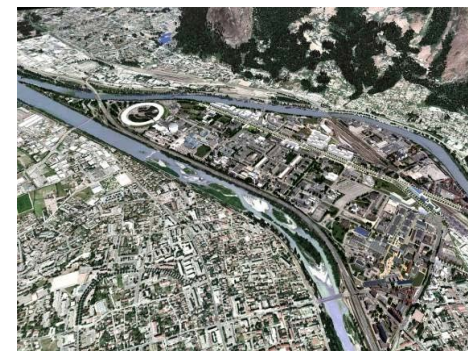
European Synchrotron  
Radiation Facility

2005 MINATEC



Micro and  
Nanotechnologies

2008 GIANT



An alliance for  
innovation



# **GIANT: Investing in the future**

## **Learning, exploring, creating, living**

**2018**

**10 000  
students**

**10 000  
researchers**

**10 000  
jobs**

**10 000  
inhabitants**

**1800 M€ in 10 years**

**Building a campus of excellence, comparable to  
ambitious initiatives around the world**

**Attracting world-class researchers, engineers,  
innovators**

**Higher education + R & D + advanced industry**

**→ Innovation and job creation**

**2008**

**5 000  
students**

**6 000  
researchers**

**5 000  
Industry jobs**

**300  
inhabitants**



# GIANT campus investment



Total  
GIANT Investment  
**Phase 1: 2008-2018**



Infrastructures R&D  
and academic labs  
**600 M€**



Scientific equipment,  
technological platforms  
**600 M€**



Infrastructures, tramway, housing  
and public equipment  
**600 M€**



Global Investment  
**1.8 B€**

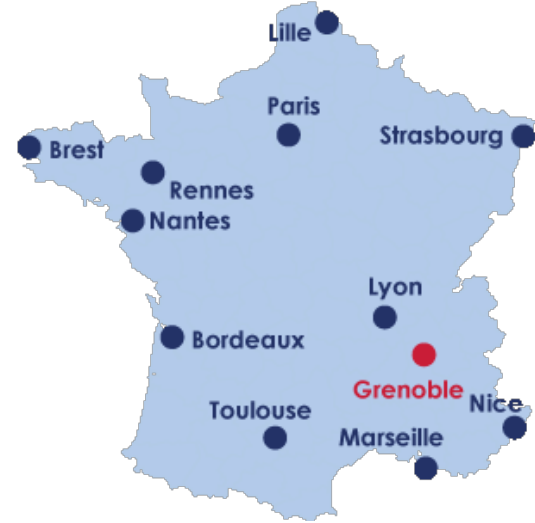
Public and private funding

- 19% State
- 24% Local government
- 19% European large scale infrastructures
- 5% CEA
- 33% Private



# Grenoble: an international ecosystem

**GIANT**  
INNOVATION CAMPUS



**No. 2** French regional  
research centre

**23,500** researchers

Public & private

**62,000** students

(41 % in scientific fields)

**No. 1** attractive city  
for students in France  
*L'Etudiant 2017*

**8** major French government  
research labs, including CEA, most innovative  
government research institute in the world *Reuters*  
2016,17,18

**4** competitive clusters

**No.5** most inventive city  
in the world - *Forbes 2013*

**No. 3** European city  
for its strategy regarding  
foreign investment  
*Financial Times 2016*

# An alliance of all local stakeholders

## → GIANT founding members:

- Higher Education: INP, UGA
- Fundamental Research: CEA DRF, CNRS
- Technological Research: CEA Tech
- **Ultimate Characterisation: ESRF, ILL, EMBL**
- Technology Management: GEM



## → GIANT partners:

- Industry: Schneider Electric, Siemens, ST Microelectronics, Biomérieux, start-ups ...
- Investors: Crédit Agricole, Caisse des Dépôts, SuperNova...



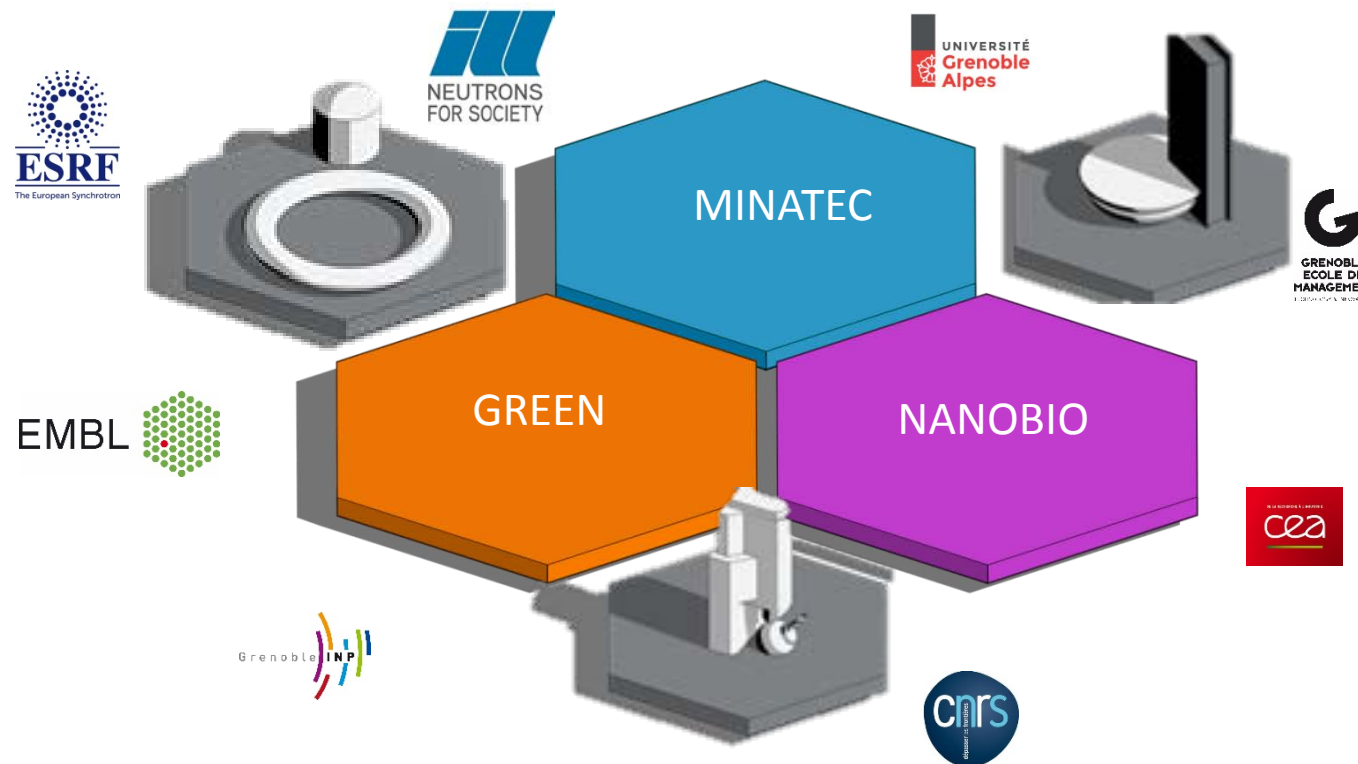
## → Local/regional/national/European government, urban planning actors



# GIANT objectives in Phase 1

2008-2018

- to respond to major societal challenges: **information, energy and health**
- to remove barriers to create centres of excellence (6 thematic districts)
- to achieve a major urban transformation by harmonising urban and scientific development





# GIANT structuring: 6 thematic districts

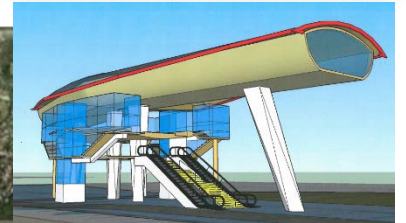
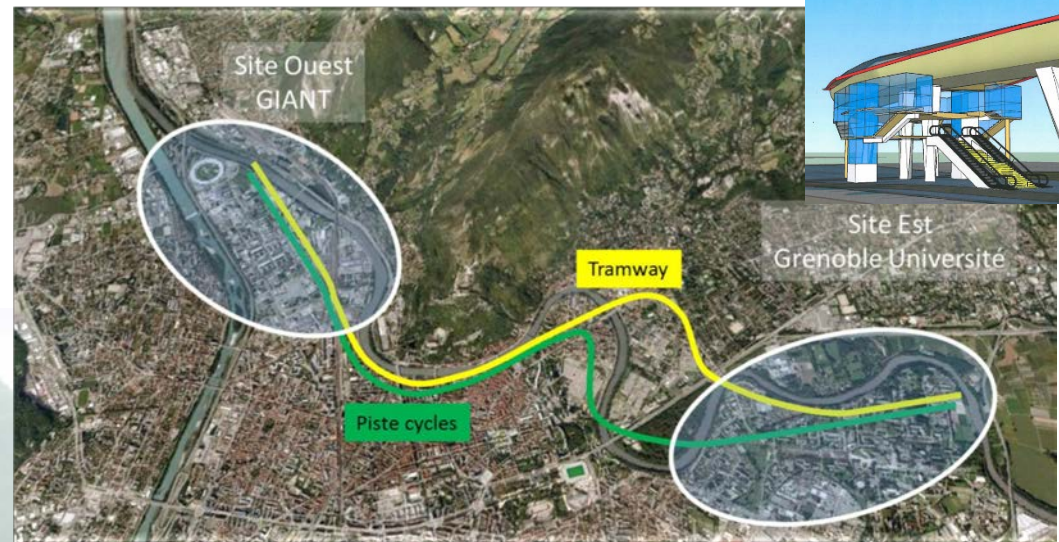




# A urban transformation

- Development of new Grenoble neighbourhood: "Presqu'île"
- Extension of tram line B – "The knowledge line"

10,000 inhabitants



# GIANT economic output



GIANT Phase 1 :  
**2008-2018**



Global  
Investment  
**1.8 B€**

**10,000** researchers

**10,000** industrial jobs

**10,000** students

**10,000** residents

**Largest technology  
campus in France**

**4.1 B€** /year on the local  
economy

**One third** of the Grenoble  
area Gross Domestic Product





## Five examples:

- Science: The Partnership for Structural Biology
- Training: GIANT@School
- Training: Grenoble International Internship Programme
- Industry: The Technology Research Institute “NanoElec”
- Everything: The Open Innovation Centre

# Science: The Partnership for Structural Biology



THE **P**ARTNERSHIP FOR **S**TRUCTURAL **B**IOLOGY





THE **P**ARTNERSHIP FOR **S**TRUCTURAL **B**IOLOGY



Nov 2002: MoU creating PSB  
Jan 2006: CIBB Inauguration  
Jun 2013: PSB 10<sup>th</sup> anniversary  
Jan 2016: Renewal Collaboration Agreement

- **6 GIANT Partners implicated**
- **350 staff involved**
- **60-70 PhD students**
- **60-70 Postdocs**
- **15% multi-institute publications**

## Broad & Diverse Biological Science for users:

- Host-Pathogen Interactions
- DNA/RNA & Gene Regulation
- Stress Response in Prokaryotes
- Cell Division
- Metalloproteins/Enzymology
- Methodology & instrumentation developments for Structural Biology

## Wide Range of Technical Platforms

### Protein Expression

Cell Free  
ESPRIT  
Eukaryotic Expression Facility  
Deuteration Lab (ILL LifeSciences)  
RoBioMol

### Sample Characterisation

Analytical Ultra Centrifugation  
Biophysics  
Cell imaging  
Mass Spectrometry  
Membrane Protein Purification Platform  
NMR Quality Control  
Protein Sequencing  
Surface Plasmon Resonance

### High Resolution Studies

Cryobench  
FIP Beamline (BM30)  
High Field Nuclear Magnetic Resonance  
HT Crystallisation  
HT Membrane Protein Crystallisation  
Neutron Diffraction (ILL - LSS & DIFF)  
Structural Biology X-ray Beamlines

### Supramolecular Structures

Electron microscopy  
SANS/ SAXS (ILL Life Sciences, LSS, ESRF)





THE PARTNERSHIP FOR STRUCTURAL BIOLOGY

## “A European Centre of Excellence”

The collaboration brings together the remarkable expertise and facilities available for structural biology on this unique international campus.

### Recent Advances and Applications in Structural Biology – Lecture series

Thursday – 14:00 – 15:00  
CIBB Meeting Room

Open  
access  
lectures

- September 14 | François PARCY (BIG)**  
Integrated structural biology of flower development
- September 21 | Jo ZACCAI (ILL)**  
From water to ribosomes: Structural dynamics insights from neutrons
- September 28 | Juan FONTECILLA-CAMPS (IBS)**  
Role of protein-bound iron-sulfur clusters in catalysis and gene expression regulation
- October 05 | Laurent BLANCHON (BIG)**  
Directed cytoskeleton self-organization
- October 12 | Martin WEIK (IBS)**  
Opportunities for using X-ray free electron lasers in structural biology
- October 19 | Montserrat SOLER- LOPES (ESRF)**  
Structural insights into melanogenesis
- October 26 | Stephen CUSACK (EMBL)**  
Structural insights into RNA synthesis by the influenza virus transcription/replication machine
- November 09 | Guy SCHOEHN (IBS)**  
The resolution revolution in electron microscopy
- November 16 | Sigrid MILLES (IBS)**  
Single molecule fluorescence for structural biology and protein dynamics
- November 23 | Martin BLACKLEDGE (IBS)**  
NMR of highly dynamic and intrinsically disordered proteins: Beyond classical structural biology
- November 30 | Marco MARCIA (EMBL)**  
3D structure determines RNA functions
- December 7 | Wojtek GALEJ (EMBL)**  
Mechanism and evolution of pre-mRNA splicing

Master 2 – Integrated Structural Biology



### EMBO Practical Course

## Small angle neutron and X-ray scattering from proteins in solution

11–15 September 2017 | Grenoble, France

#### ORGANIZER

**Frank Gabel**  
Institut de Biologie Structurale / Institut  
Léon-Langevin, FR

#### CO-ORGANIZERS

**Anne Marzel**  
Institut Léon-Langevin, FR

**Petra Pernot**  
European Synchrotron Radiation Facility, FR

**Martha Brennich**  
European Molecular Biology Laboratory  
Grenoble, FR

#### REGISTRATION

Application deadline

16 June 2016  
PhD Student..... 200 EUR  
Academic..... 300 EUR  
Industry..... 1000 EUR

#### CONTACT

embo2017@ill.eu

#### SPEAKERS

**Frank Gabel**  
Institut de Biologie Structurale / Institut  
Léon-Langevin, FR

**Javier Pérez**  
Synchrotron SOLEIL, FR

**Alexey Kikhney**  
European Molecular Biology Laboratory  
Hamburg, DE

**Daniel Franke**  
European Molecular Biology Laboratory  
Hamburg, DE

**Cy Jermies**  
European Molecular Biology Laboratory  
Hamburg, DE

**Dmitri Svergun**  
European Molecular Biology Laboratory  
Hamburg, DE

**Marc Jamin**  
Institut de Biologie Structurale, FR

**Anne Marzel**  
Institut Léon-Langevin, FR

**Petra Pernot**  
European Synchrotron Radiation Facility, FR

**Martha Brennich**  
European Molecular Biology Laboratory  
Grenoble, FR

**Robert Rambo**  
Diamond Light Source, UK

**Dina Schneidman-Duhovny**  
The Hebrew University of Jerusalem, IL

**Bernd Simon**  
European Molecular Biology Laboratory  
Hamburg, DE

**Pau Bernadó**  
Centre de Biologie Structurale Montpellier, FR

**Lise Arleth**  
University of Copenhagen, DK

**Olwyn Byron**  
University of Glasgow, UK

**Christiane Berger-Schäffzel**  
University of Bristol, UK

**Jochen Hub**  
Georg-August-Universität Göttingen, DE

**Bente Vestergaard**  
University of Copenhagen, DK

**Meindert Lamers**  
MRC Laboratory of Molecular Biology, UK

**Michael Hartlein**  
Institut Léon-Langevin, FR

meetings.embo.org/event/17-small-angle-scattering



### EMBO Practical Course

## Characterization of macromolecular complexes by integrative structural biology

12–19 May 2018 | Grenoble, France

#### ORGANIZER

**Marco Marcia**  
EMBL, FR

#### CO-ORGANIZERS

**Montserrat Soler Lopez**  
ESRF, FR

**Carlo Petosa**  
ES, FR

**Daniele De Sanctis**  
ESRF, FR

**Estelle Mossou**  
ILL, FR

#### CONFIRMED SPEAKERS

**Kim Remans**  
EMBL Heidelberg, DE

**Navtej Toor**  
University of California at San Diego, US

**Joseph Marsh**  
University of Edinburgh, UK

**Radu Aricescu**  
MRC Laboratory of Molecular Biology, UK

**Jonas Riles**  
EMBL Heidelberg, DE

**Song Tan**  
Penn State University, US

**Teresa Carlomagno**  
Leibniz Universität Hannover, DE

**Christophe Romier**  
ICBM, FR

**Helen Saibil**  
University of London Birkbeck, UK

**Bertrand Seraphin**  
ICBM, FR

**Andrea Sliuz**  
Martin-Luther-Universität Halle-Wittenberg, DE

#### CONTACT

**Rokhaya Tounkara**  
Email: rtounkara@embl.fr

**Marco Marcia**  
Email: mmarcia@embl.fr

#### REGISTRATION

Registration deadline

28 February 2018

Students / Postdocs..... 250 EUR

Academics..... 250 EUR

Industry..... 1000 EUR

meetings.embo.org/event/18-characterization





- **“From Gene to Structure”  
service offer**

Cell free  
expert



## • Benefits

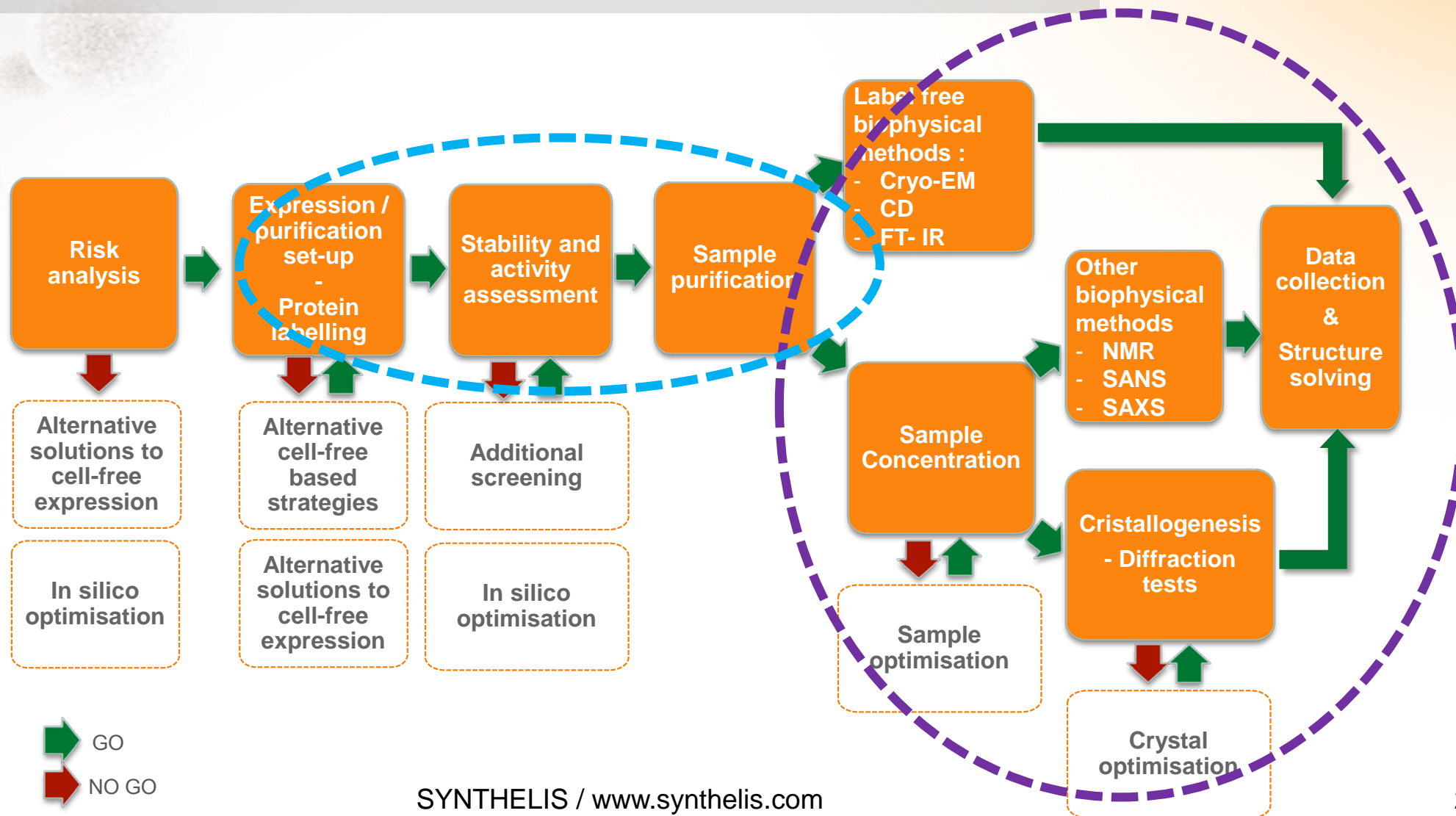
- Expert teams and know-how to answer industrial challenges

- Synthelisis cell-free technology and know-how to produce in quality & quantity your protein of interest
- Full access to state-of-the-art platforms and expertise of the Grenoble structural biology cluster
- Single point-of-contact, industry-driven service offer with full understanding of challenges and service quality requirements
- A dedicated Synthelisis scientist for your project to ensure respect of timelines and confidentiality
- From project risk analysis to structure determination
- Expert support through GO/NO GO steps to give you the best recommendations

- ✓ Expert multiplier as a bridge to industry
- ✓ Glue for tech platforms
- ✓ Project management



# Overall process



# Training: The Grenoble International Internship Programme





**Providing international research experience**  
**Fostering international collaborations**  
**Building sustainable international partnerships**

**GIIP since 2011**

**216** interns (151 summer, 65 autumn)

**42** students@USA

**18** students came back to Grenoble

**400+** attendees to the French American Workshop

**Partner universities**

**20+** worldwide

**11** collaborative projects or co-funded programmes

**> 17** publications linked to the programme



# Training: GIANT@School







# Educational outreach for high school students and teachers



[www.giantatschool.org](http://www.giantatschool.org)



Scientifique,  
toi aussi !

**J'invente demain**





## Synchrotron@School

*a pour objectif de faire découvrir aux lycéens les sciences menées dans un grand équipement de recherche international comme l'ESRF.*

Au programme de cette journée : rencontre avec des scientifiques (chercheurs, ingénieurs...), mise en situation avec des expériences scientifiques sur des instruments de pointe, conduite d'un projet de recherche, constitution d'équipes de recherche et présentation des résultats des travaux menés durant cette journée.

**Partenaires :** ESRF, Éducation nationale

-  **Public :**  
1<sup>ères</sup> et Terminales S, STI2D et STL, lycées professionnels
-  **Lieu :**  
ESRF
-  **Période :**  
1 journée de novembre à juin
-  **Contact :**  
[synchrotron@giant-grenoble.org](mailto:synchrotron@giant-grenoble.org)

## Synchrotron@School

- Held on-site at the ESRF in the Visitor Centre
- Secondary school students
- Meeting real scientists
- Performing experiments in project teams and presenting results





# Educational outreach for high school students and teachers

**GIANT**  
INNOVATION CAMPUS

## GIANT@SCHOOL EN QUELQUES CHIFFRES



**+2 200**

Lycéens scientifiques  
et techniques/an



**+125**

Enseignants  
formés/an



**1/3**

des lycées  
de l'académie  
sensibilisés



**+80**

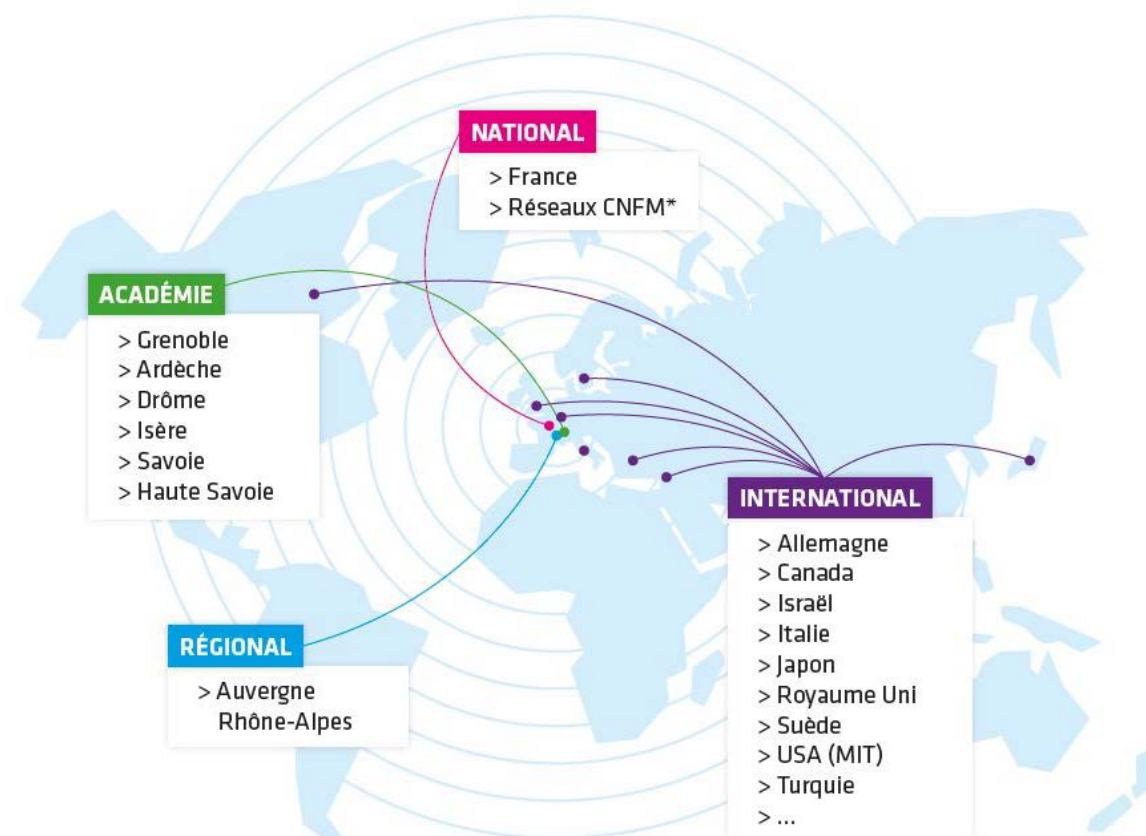
Journées  
sur site



**+70**

Intervenants  
/an

## DES PROGRAMMES À RAYONNEMENT NATIONAL ET INTERNATIONAL



\*Coordination Nationale pour la Formation en Micro électronique et en nanotechnologies

# Industry: Technology Research Institute “NanoElec”





# A REGIONAL INDUSTRY PARTNERSHIP



**A French Public-Private  
Partnership 450M€**

*[www.irtnanoelec.fr](http://www.irtnanoelec.fr)*

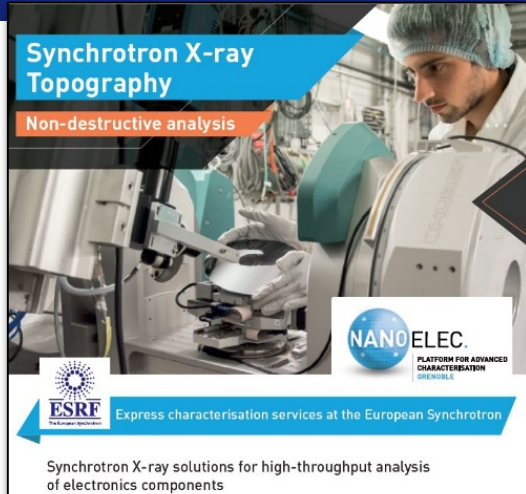
**Funding a Pathfinder Programme to create a better interface between the ESRF & ILL and the nano/micro-electronics industry.**

**6.5M€ over 9 years for:**

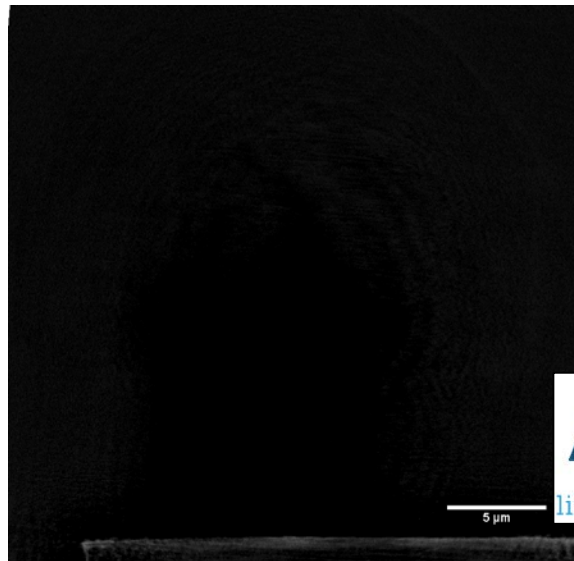
- 1. Sample preparation tools**
- 2. Instrumentation development**
- 3. Proof-of-concept**
- 4. Business development**



# A REGIONAL INDUSTRY PARTNERSHIP



**Right resources, right people, right equipment, right context.**



**3 year Innovation-Led Project**



**New services**

**Integrated industry offer**

**Joint research with industry**

**Cooperation with an SME**





# Platform for Advanced Characterisation-Grenoble (PAC-G)



**The Single Entry Point**  
for commercial services of electronics characterisation

- ✓ Targets electronics industry
- ✓ Dedicated business plan
- ✓ Dedicated business and marketing team
- ✓ Dedicated web and social media



**Kater Varela Della Giustina**  
Business Developer

[support@pac-grenoble.eu](mailto:support@pac-grenoble.eu)

+33 (0)4 57 42 80 77

[www.pac-grenoble.eu](http://www.pac-grenoble.eu)



[@PACGrenoble](https://twitter.com/PACGrenoble)

# **Coming soon: The Open Innovation Centre**



# Usages and open innovation

Participation of citizens, cultural development,  
exchange of ideas and information...



Giving students, industry partners, startups,  
researchers, access to: Open Labs, FabLabs,  
training in new methods...

## Open Innovation Centre on the GIANT campus:

A space dedicated to innovation

Based on CEA Tech and GIANT technological platforms and competencies

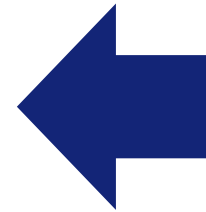
Opening in 2020



# NOT JUST IN GRENOBLE....



MAX-IV and European  
Spallation Source site  
near Lund, Sweden



Rutherford-Appleton  
site with DIAMOND  
Light Source and ISIS  
Neutron Source, UK

+ many others worldwide.



A new, sustainable district  
LUND NE / BRUNNSHÖG

- A European role model for sustainable urban planning
- A regional destination for research, culture and recreation
- The worlds best research and innovation environment



An aerial photograph of a city, likely Denver, Colorado, showing a river winding through the urban landscape. In the foreground, a large circular stadium is visible. The city is surrounded by dark, forested mountains, and in the far background, a range of snow-capped mountains stretches across the horizon under a clear blue sky.

Thank you for  
your attention