

Links between research and education in Ukraine

Sergey Barsuk

LAL (IN2P3/CNRS and Paris-Sud University)

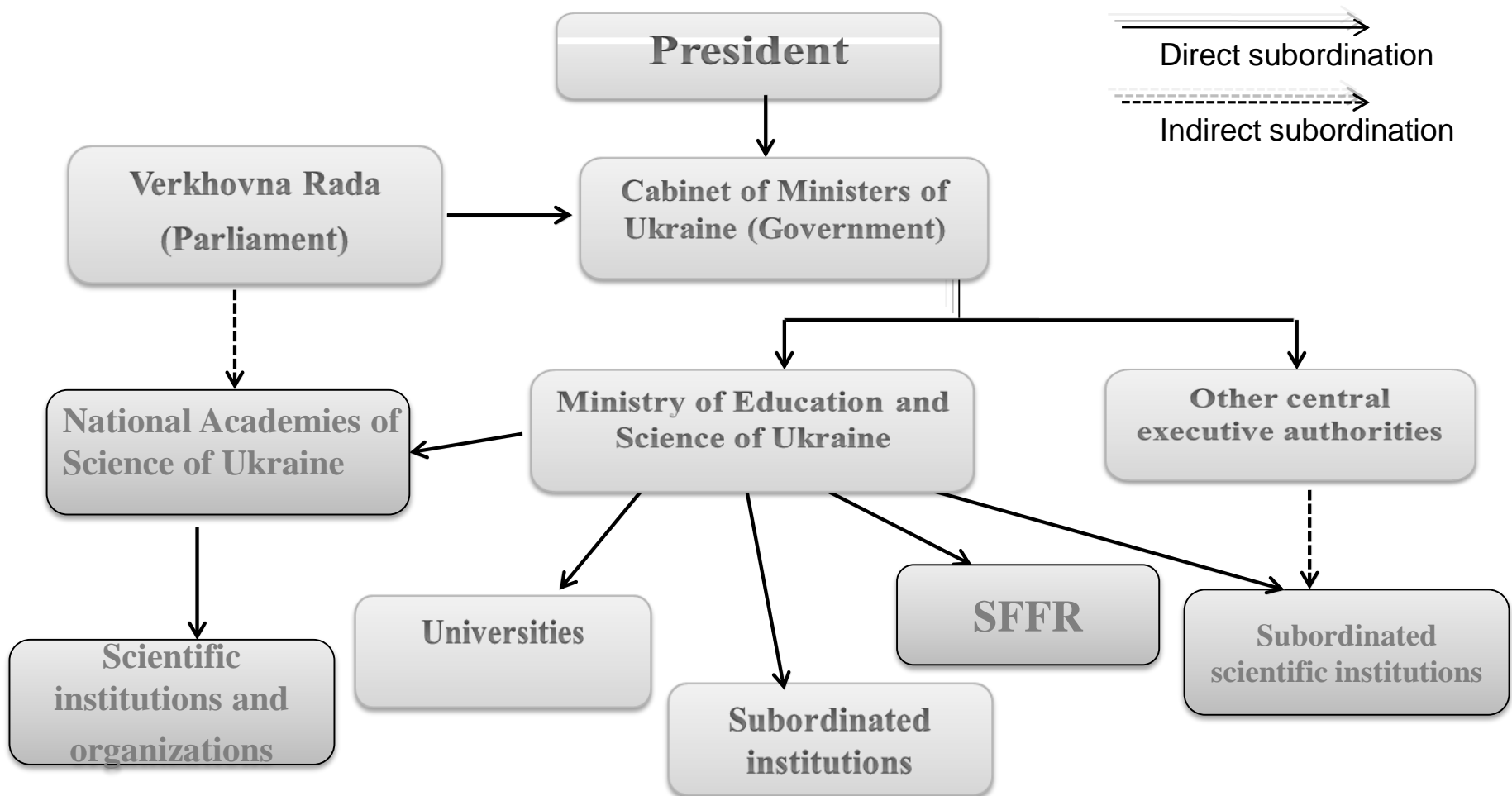
Using slides from M. Azarenkov, O. Bezshyyko, S. Fomin, B. Grynyov

**2nd EuCAN workshop
Universities meet Laboratories 2016 (ULA2016)**

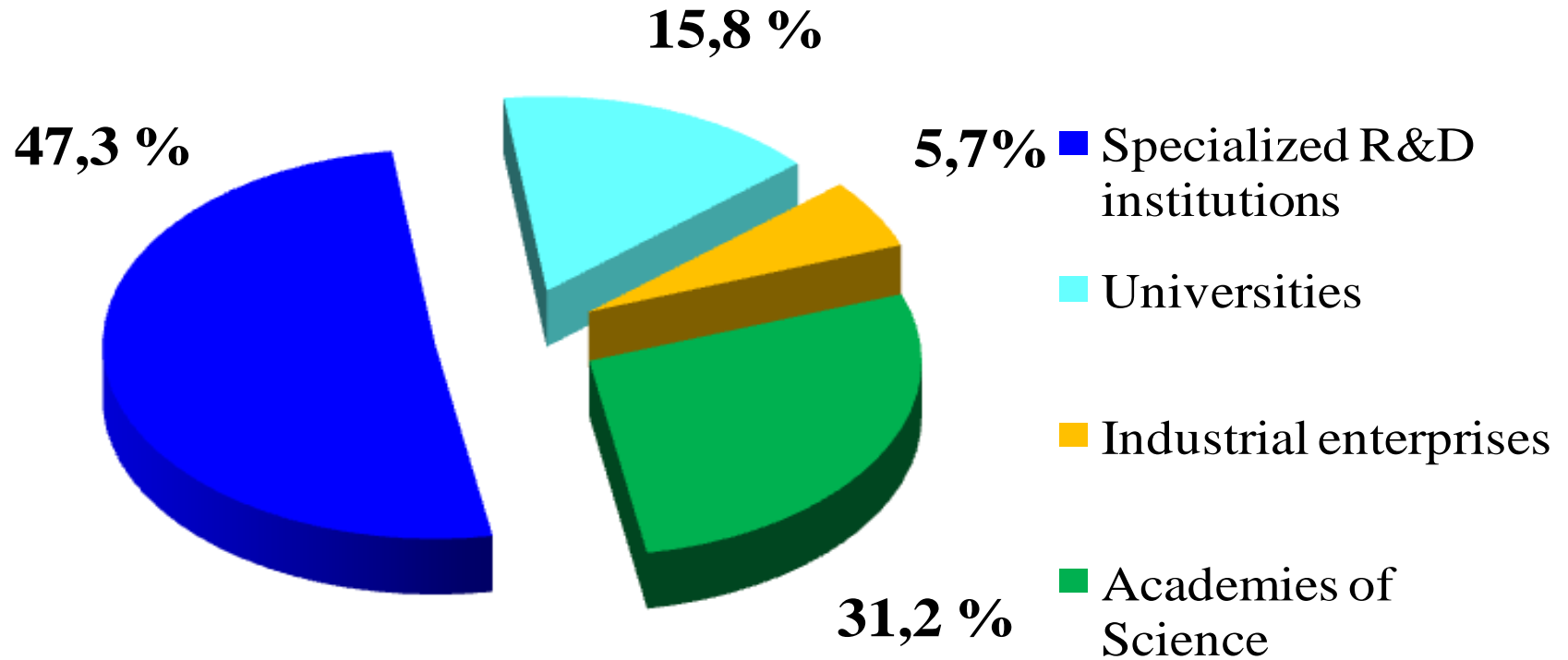
LAL, Orsay

Research actors in Ukraine

STATE GOVERNANCE OF THE SCIENCE AND TECHNOLOGY SECTOR (2016)



DISTRIBUTION OF ORGANIZATIONS IN ACCORDANCE WITH THE SECTOR OF SCIENCE (as of 2014)



Research in universities, example

Taras Shevchenko National University of Kyiv



Taras Shevchenko National University of Kyiv



Part of new buildings of physics, mathematics and cybernetics faculties



Faculty of physics



Faculty of Radio Physics, Electronics and Computer Systems

Taras Shevchenko National University of Kyiv



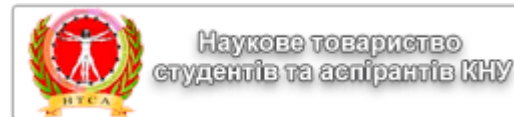
- ❑ 13 Faculties, 7 Institutes, more than 40 specialities
- ❑ **27500** students, **1630** PhD students
- ❑ In 2000-2015: **3250** PhD theses (including **500** in mathematics and physics), **318** D.Sc. theses
- ❑ Teaching: **611** D.Sc., **1744** PhD
- ❑ Research and assisted research by students

Scientific park



<http://scp.univ.kiev.ua>

Scientific society



<http://ntsa.univ.kiev.ua/>

(Young) scientific council



<http://rmn.knu.ua/>

Research work

<http://science.univ.kiev.ua>



Scientific grants and directions in 2015:

- ❑ 63 government grants
 - ❑ 46 fundamental directions
 - ❑ 17 applied scientific topics
- ❑ 68 agreements on research and technological cooperation
 - ❑ 23 with Ukrainian and foreign universities
 - ❑ 18 with Research Institutes of the National Academy of Sciences of Ukraine and foreign Research Institutes and Laboratories
 - ❑ 7 with industrial companies
 - ❑ 6 with medical clinics and Institutes of the National Academy of Medical Sciences of Ukraine
- ❑ With LAL : beam optics simulation, beam diagnostics, spectrometer for local e-machine, instrumentation for UA9 ... (University), beam profiler (KINR), ...

Links between research institutes and universities, example



Education & Science in the Field of NP & HEP at KNU & NSC KIPT



**V.N.Karazin Kharkiv National University
(KNU)
Institute of High Technology
School of Physics and Technology**



**National Science Center
"Kharkiv Institute of Physics & Technology"
(NSC KIPT)
National Academy of Science of Ukraine**

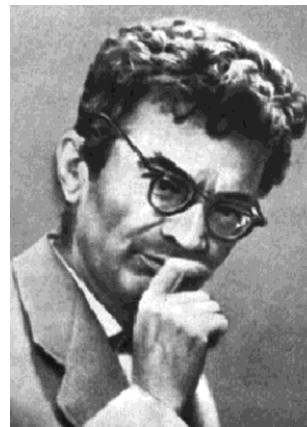
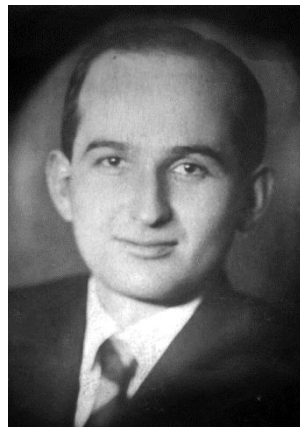
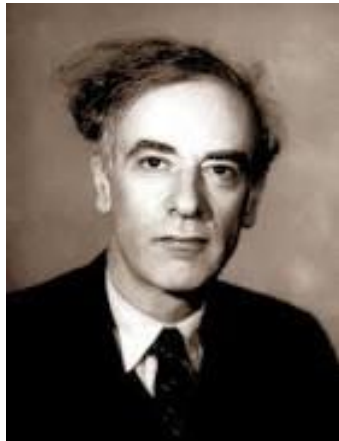
A number of famous scientists, especially mathematicians, have worked and taught at the **Kharkiv University** since its foundation in **1804**.



M. Ostrogradsky O. Lyapunov V. Steklov N. Akhiezer V. Drinfeld, ...

1928: Creation of Ukrainian Institute of Physics and Technology (now NSC KIPT)

1932-1937: Creation of **Landau School of Theoretical Physics**



Lev Landau
(Nobel Prize, 1964)

E. Lifshiz

Ya. Pomeranchuk

A. Akhiezer

I. Lifshiz, ...

“Phys-Tech system” of Education - Landau’s tradition today

1) Leading scientists as well as actively working young scientists of NSC KIPT give lectures and practical training at Karazin Kharkiv National University:

- **Shulga Mykola**, academician-secretary of NASU, director general of NSC KIPT
- **Voyevodin Victor**, corr. member of NASU, director of Institute for Solid State Physics, NSC KIPT
- **Garkusha Igor**, corr. member of NASU, director of Institute for Plasma Physics, NSC KIPT
- **Slyusarenko Yuriy**, corr. member of NASU, head of dep., Akhiezer Inst. Theor. Physics NSC KIPT
- **Onishchenko Ivan**, corr. member of NASU, head of dep., Inst. of Plasma Electronics NSC KIPT
- ...

2) Many of the University’s departments were founded and headed by KIPT scientists:

- **Plasma Physics department** at KGNU by **K.D. Sinelnikov**, academician of NASU, ex-director of KIPT
- **Experimental Nuclear Physics dep.** at KGNU by **A.K.Valter**, academician of NASU, head of dep., KIPT
- **Theoretical Physics department** at KGNU by **A.I. Akhiezer**, academician of NASU, head of dep., KIPT
- ...

3) Affiliates of 8 departments of Kharkiv Universities are now based directly in NSC KIPT:

- **Microelectronic equipment department** – headed by prof. **A.M. Dovbnia**, corr. member of NASU
- **Reactor materials department** – headed by prof. **V.M. Voyevodin**, corr. member of NASU
- **Plasma Physics department** – headed by prof. **I.F. Garkusha**, corr. member of NASU
- **Theoretical Physics department** – headed by prof. **M.F. Shul’ga**, academician-secretary of NASU



Akhiezer Institute for Theoretical Physics NSC KIPT
School of Physics and Technology, Kharkiv University,
Ukrainian Physical Society



Kharkov citywide seminar “Problems of Modern Physics”



More than 170 seminars starting from 2004

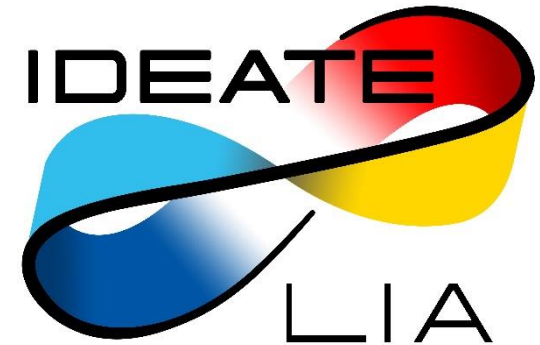
www.youtube.com/channel/UCI05L2IaiuHjSrp9IOsFeWw/feed

Winter & Summer Schools on HEP



- With LAL : UA9, expertise in bent crystals, synergy between ThomX and Nestor, ...

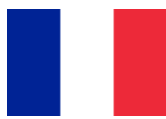
Research institutes and universities in the network, example



<http://ideate.lal.in2p3.fr/en/home/>

"IDEATE: Instrumentation Developments for Experiments at Accelerator facilities and accelerating TEchniques"

- ❑ Collaboration between CNRS, CEA and Universities from French side and leading research Institutes and Universities from Ukrainian side
- ❑ **Scientific and educational** components of the LIA:
students became major actors in the scientific projects



LIA partners

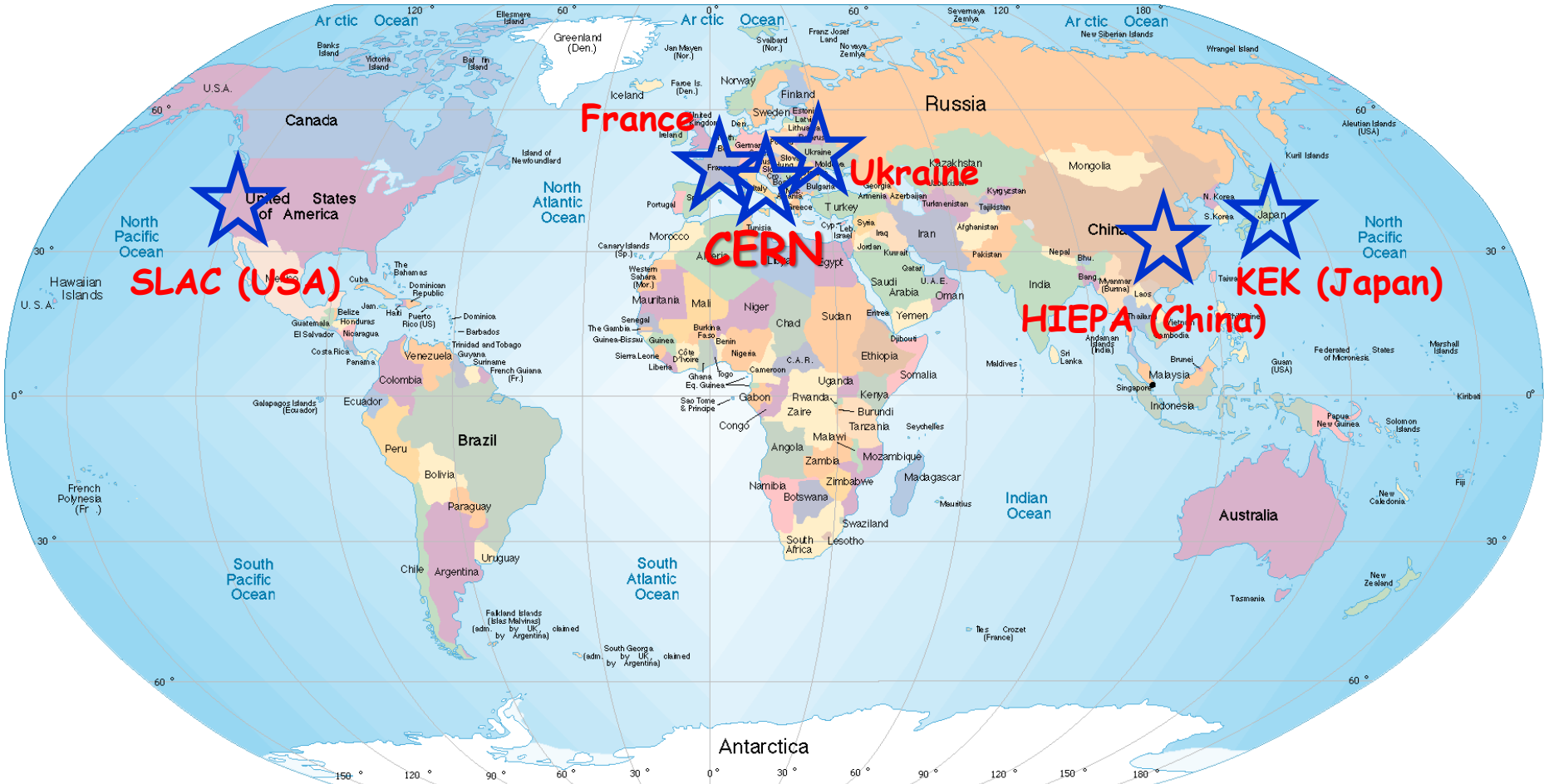


- ❑ Laboratoire de l'Accélérateur Linéaire (IN2P3/CNRS and Paris-Sud University)
- ❑ Laboratoire de Physique Théorique (IN2P3/CNRS and Paris-Sud University)
- ❑ Institut de Physique Nucléaire Orsay (IN2P3/CNRS and Paris-Sud University)
- ❑ Centre de Sciences Nucléaires et de Sciences de la Matière (IN2P3/CNRS and Paris-Sud University)
- ❑ Imagerie et Modélisation en Neurobiologie et Cancérologie (CNRS, Paris Diderot University and Paris-Sud University)
- ❑ Laboratoire de Physique Corpusculaire (IN2P3/CNRS and Blaise Pascal University)
- ❑ Laboratoire de Physique Nucléaire et de Hautes Energies (CNRS, Paris Diderot and Pierre et Marie Curie University)
- ❑ Laboratoire Leprince-Ringuet (IN2P3/CNRS and Ecole Polytechnique)
- ❑ Institut Pluridisciplinaire Hubert Curien (CNRS and Strasbourg University)
- ❑ Service de Physique des Particules (IRFU, DSM/CEA)
- ❑ Service de Physique Nucléaire (IRFU, DSM/CEA)
- ❑ Service d'Électronique des Détecteurs et d'Informatique (IRFU, DSM/CEA)
- ❑ Taras Shevchenko National University of Kyiv
- ❑ V.N. Karazin Kharkiv National University
- ❑ O. I. Akhiezer Institute for Theoretical Physics, NSC "Kharkov Institute of Physics and Technology"
- ❑ Institute of High-energy Physics and Nuclear Physics, NSC "Kharkov Institute of Physics and Technology"
- ❑ Institute of Applied Physics National Academy of Sciences of Ukraine
- ❑ Kyiv Institute for Nuclear Research National Academy of Sciences of Ukraine
- ❑ M. M. Bogolyubov Institute for Theoretical Physics National Academy of Sciences of Ukraine
- ❑ E. O. Paton Electric Welding Institute of the National Academy of Sciences of Ukraine
- ❑ Institute for Scintillation Materials
- ❑ Uzhgorod National University

1. R&D on **detector techniques**, experimental platforms.
Joint participation in Large scale projects.
Joint construction and exploitation of experimental platforms.
2. R&D on **accelerator techniques**.
Joint participation in Large scale projects.
3. Developments for **flavour physics**.
Joint participation in Large scale projects.
4. Developments for **nuclear physics**.
5. Developments for **hadron physics**.
6. Instrumentation for **medical imaging**.
7. **Pedagogical activities**: teaching and students exchange, joint Ph.D. theses.

LIA IDEATE on the map

- Joint contributions to the experiments/projects in France and Ukraine, at CERN, SLAC (USA), HIEPA (China), KEK (Japan)



LIA IDEATE : basic principles

- ❑ Virtual laboratory comprising 19 laboratories/centers/institutes/universities, **unique combination of expertise**
 - 100 researchers/engineers/PhD students, i.e. ➢ 20 FTE

- ❑ Intimate link between research and educational programs

- ❑ Symbiosis of expertise of senior scientists and real research work by the (Bachelor, Master and PhD) students within LIA program :
 - ❑ 4 acting co-chaired PhD theses
 - ❑ More than 80 student x months internships in France in 2015-2016
 - ❑ Associated master programs (NPAC, GI, ...)

- ❑ In 2015-2016 : ➢ 20 joint publications and ➢ 40 joint conference presentations

School as a meeting platform for research and education, example

10 years of Trans-European School for High-Energy Physics

- TESHEP is a platform, aiming at reinforcing East-West Europe scientific and pedagogical links.
- Annual **summer school**, one of the main pillars of TESHEP, delivers lectures on high energy physics, mainly focusing on experimental particle physics, and brings together European students from different universities.

Professors and pedagogical/organising team:

Ukraine, France, UK, Germany, Greece, Italy, Poland, Romania, Serbia, Hungary, US, CERN, ...

Students: Ukraine, France, Belarus, Bulgaria, Czech Rep., China, Croatia, Georgia, Germany, Hungary, Italy, Montenegro, Poland, Romania, Russia, Serbia, Slovenia, Spain, Sweden, Taiwan, Turkey, UK, CERN, DESY, ...

03.11.2016

**La «Trans-European School of High Energy Physics»
fête ses 10 ans**

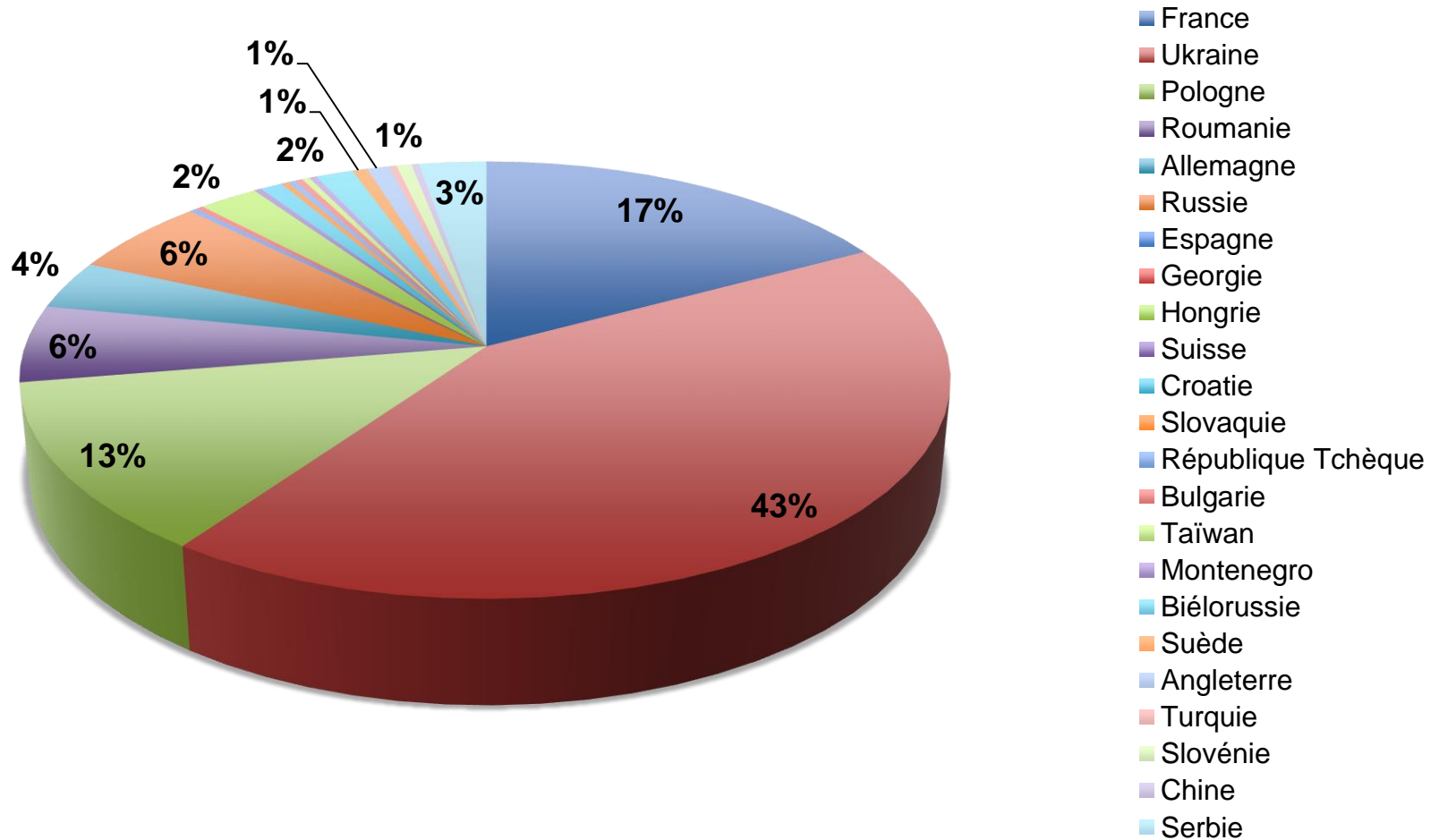
**Транс-Європейська школа фізики високих енергій
святкує 10 років**

Dominique Longjumeau, LAL-ONSAI 2016

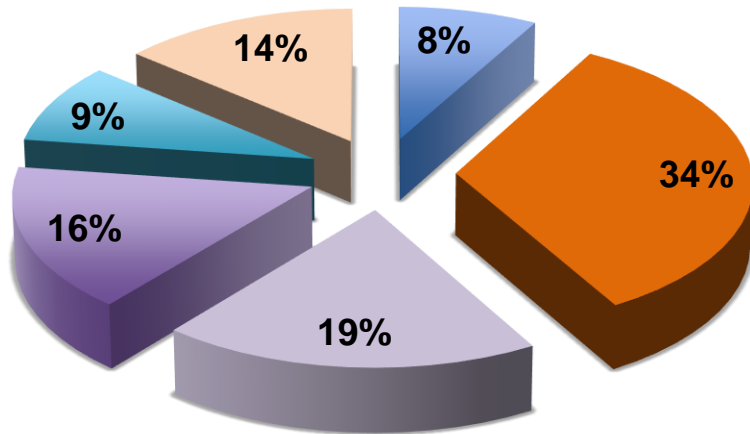
TESHEP on the map



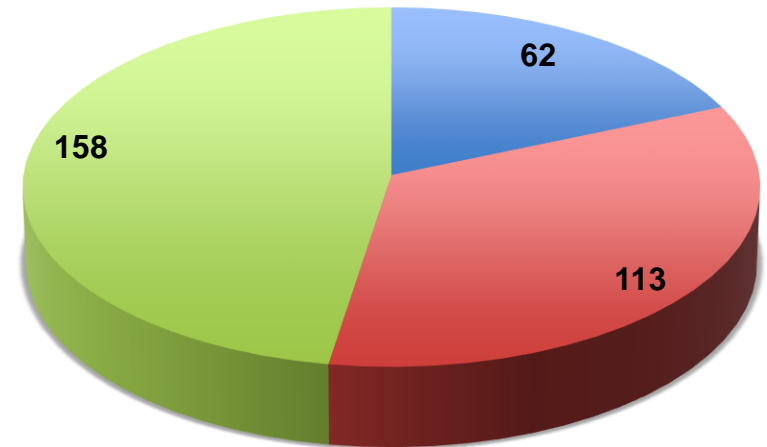
TESHEP international



TESHEP: profile and level of the students



- DESY/Tevatron/B Factories
- CERN
- Theory
- Instrumentation
- Phys. Nucléaire
- Others



- Licence
- Master
- Thèse

Accelerator axis, always popular



Alessandro Variola



Massimo Giovannozzi



Nicolas Delerue



Yannis Papaphilippou