



Event organized as part of the France-Korea year 2015-2016

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FRANCE-KOREA PARTICLE PHYSICS LABORATORY AND E-SCIENCE

KIAS, Seoul, May 18-20, 2016

2016 : France - Korea year

2

Event organized as part of the France-Korea year 2015-2016



외교부
Ministry of Foreign Affairs



INSTITUT
FRANÇAIS



프랑스 FRANCE
CORÉE 한국
2015 2016

« Sub-atomic Physics and
its applications : nine years
of collaboration between
France and Korea »

<http://www.anneefrancecoree.com>

3

Brief history and 2015 highlights

« Early days » of FKPPPL

4

- We have just ended the 2nd FKPPPL 4-year exercise: 2008-2011 & 2012-2015
- Outcome (2008-2014)
 - 16 collaboration research projects have been supported (in total)
 - Covered main research domains of IN2P3 with a strong interdisciplinary component: high energy physics, astroparticles, intensive computing and e-science, and bio-medical applications
 - 50 publications in international journals by both French and Korean collaborators
 - 4 patents
 - 7 French-Korean ALL workshops (since 2012, workshops were organized in collaboration with « TYL/ FJPPL », in France, in Korea or in Japan)
 - 5 focused research workshops: 4 in high energy physics (HEP), 1 on computing grids
 - 7 international schools in Korea, on Monte Carlo simulation of particle-matter interactions with Geant4 - GATE, and computing grids
- Funding mainly from
 - Korea national funding agencies (the National Research Foundation and the Korea Research Council of Fundamental Science & Technology) and Korean Institutions (eg. KISTI, NCC, ...)
 - CNRS/DERCI & CNRS/IN2P3
 - French MFA CampusFrance France-Korea STAR program

10 funded projects in 2015

5

□ **HEP: Experiments & Theory**

□ ALICE

■ G. Batigne, Y. Baek

□ CMS-IL

■ R. GdC, B. Hong

□ CompHS

■ G. Cacciapaglia, S. J. Lee

□ **Muon physics**

□ F. Kapusta, E. Won

□ **Neutrino physics**

□ A. Tonazzo, S. H. Seo

□ **HEP: R&D**

□ ILC/CALICE

■ R. Poeschl, J. S. Chai

□ RPC

■ I. Laktineh, D. W. Kim

□ **Interdisciplinary**

□ Beam

■ M. Verderi, K. Cho

□ HTCaaS

■ V. Breton, D. Kim

□ Med1

■ S. Incerti, S.B. Lee

Participating academic partners in 2015



□ France

□ CNRS/IN2P3 laboratories (8)

- APC
- CENBG
- IPNL
- LAL + OMEGA
- LLR
- LPC Clermont
- LPNHE
- Subatech

□ Universities & engineering schools (10)

- Bordeaux U.
- Blaise Pascal U.
- Ecole des Mines de Nantes
- Lyon Claude Bernard U.
- Nantes U.
- Paris 6 – Pierre et Marie Curie
- Paris 7 – Paris Diderot
- Paris 11 – Paris Sud
- Observatoire de Paris
- Polytechnique

□ CEA, Saclay (1)

- SEDI (Service d'Électronique des Détecteurs et d'Informatique)

□ Korea (10)

- Gangneung-Wonju National U.
- Inha U.
- Konkuk U.
- Korea Advanced Institute of Science and Technology (KAIST)
- Korea U.
- National Cancer Center
- Pusan
- Seoul National U.
- Sungkyunkwan University
- Yonsei U.

HEP: experiments & theory



2015

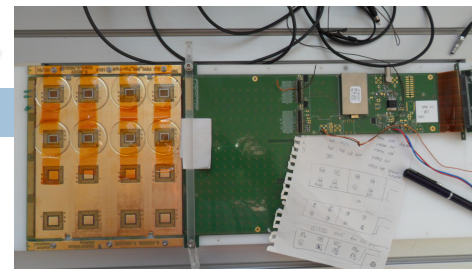
- ALICE (G. Batigne, Y. Baek)
 - **Muon TRigger maintenance & operation:** muon spectrometer (72 RPCs) and trigger electronics fully operational, 4.3 pb⁻¹ accumulated at 13 TeV for p-p and 112 np⁻¹ for Pb-Pb
 - **Muon TRigger Front-End Electronics upgrade:** a fully equipped RPC with 40 FEERIC3 (Front-End Electronics Rapid Integrated Circuit version 3) has been installed and will participate in data taking of Run2. Preparation of test bench on-going.
 - **Inner Tracking System and Muon Forward Tracker upgrade:** large collaboration on test of chips

- CMS-heavy ion dimuon (R. Granier de Cassagnac, B. Hong)
 - Run1 analysis and 4 presentations @ Quark Matter in Japan
 - Data taking for Run2 @ CERN
 - Mini workshop @ KU
 - 2 PhD students graduated (Nicolas Filipovic at LLR, and Hyunchul Kim at KU) – future dual degree program ?

- CompHS - The Dynamics of Composite Higgses (G. Cacciapaglia, S. J. Lee)
 - PHC STAR funding
 - « LIO International Workshop on Flavour, Composite models and Dark Matter » in Lyon
 - Main topics of collaboration:
 - Phenomenology of top partners in the presence of coloured scalars
 - Aspects of model building with top partners
 - Additional light composite scalars and di-boson resonances

HEP: R&D

2015

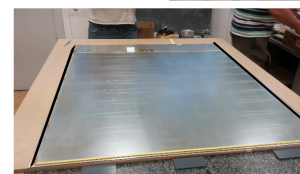


- ILC/CALICE (R. Poeschl, J. S. Chai)
 - ▣ Delivery of **first batch of EOS Printed Circuit Boards** for compact EM calorimeters
 - ▣ Successful **integration into ECAL DAQ** and first signals seen from combination SKIROC ASIC/PCB
 - ▣ **Intensive tests** in September 2015 during visit of SKKU students to LAL. Members of the **Kyushu Japanese University** participated in the tests.

- RPC: Development of High Performance Resistive Plate Chambers (I. Laktineh, D. W. Kim)
 - ▣ Semi-Digital Hadronic Calorimeter-CALICE of ILC project: in July, **first prototype of a large Multi-gap RPC** was built at CERN, developed a cassette adapted to SDHCAL-CALICE to host it, new DAQ system
 - ▣ **Beam test** at CERN PS in October (eff. > 90%)



Stopped from now on



Muons and neutrinos



2015

- Muons : precision muon physics at J-PARC (F. Kapusta, E. Won)
 - g-2 and COMET activities @ J-PARC
 - Korea: electronics developments (DC to DC convertor board) for g-2, trigger for COMET detector
 - France: computing environment setup @ CC IN2P3 for COMET, simulation and event reconstruction with GENFIT2 within ICEDUST, the software framework of COMET
 - Agreement between both collaborations for simulations for g-2/EDM detector using ICEDUST

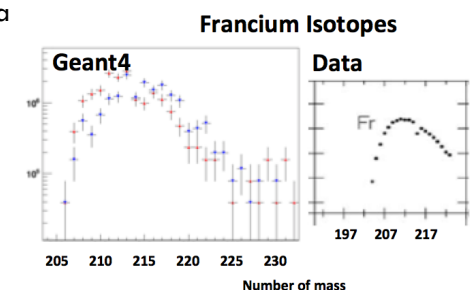
- Reactor neutrinos (A. Tonazzo, S. H. Seo)
 - Major discussions between the Double Chooz APC and the SNU RENO for the combination of scientific results from both experiments
 - The first workshop for such result combination is scheduled to take place in Autumn 2016 in Seoul : this will be a major milestone on the precision and accuracy of the θ_{13} parameter

Interdisciplinary

2015

□ Beam simulation (M. Verderi, K. Cho)

- [Geant4 tutorial for HEP and medical physics](#) @ NCC, about 40 participants (31/10-2/11-2015)
- Simulations by the Korean team for their implication in the [Rare Isotope Science Project](#) in Korea
- For the 10.2 Geant4 release
 - French group is leading the [event biasing effort in Geant4](#), which is of interest in beam, beam background and beam-based medical simulation applications
 - Korean group supports [validation of physics](#) supercomputer (tachyon2)
 - Reliability of Geant4 for the simulation of spallation fragments



□ HTCAAS (V. Breton, D. Kim) (END)

- identifying new potential drugs on selected diseases using the High Throughput Computing as a Service (HTCaaS) platform developed at KISTI
- In Korea, [in silico selection](#) and [in vitro testing](#) on Dengue (inhibitor of viral NS2B/3 protease) and SARS virus targets
- In France, assessed the [performance](#) of the HTCaaS environment for virtual screening
- [4 patents](#)
- [1 PhD student](#) graduation: Quang Bui The

□ Med1: Geant4 at the Physics-Medicine-Biology frontier (S. Incerti, S. B. Lee)

- [Geant4 tutorial for HEP and medical physics](#) @ NCC, about 40 participants (31/10-2/11-2015)
- Comparaison of [TED](#) and [cloud emulsion chambers](#) for proton LET measurement in protontherapy
- Contribution to 4 publications on Geant4-DNA and Geant4

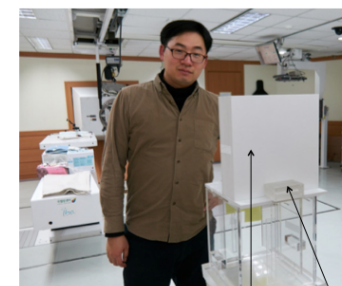
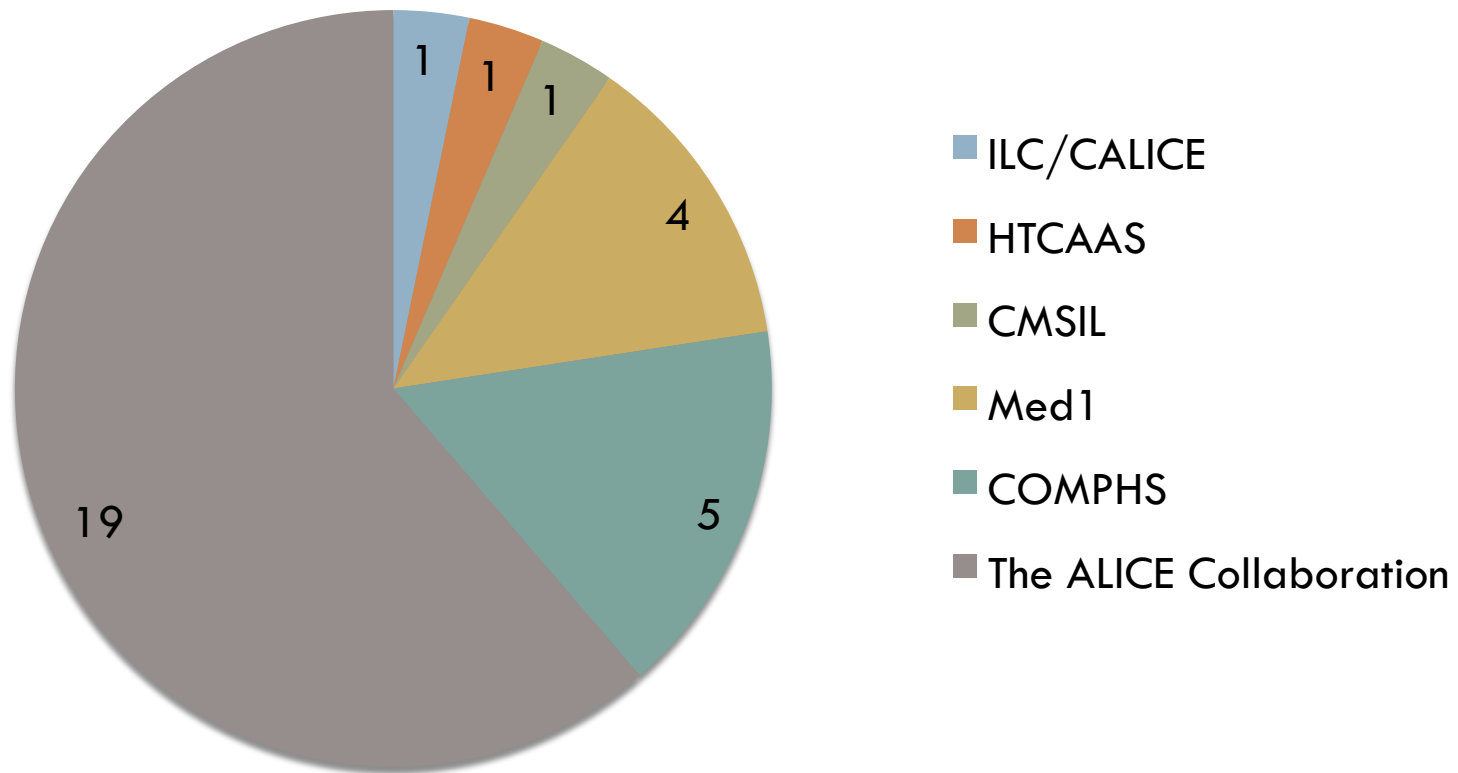


Fig. 1: Irradiation setup TED holder
RW-3 layers

31 **publications** reported in 2015

11



+4 patents for « HTCAAS »

Young researchers in 2015

12

- 3 trainees
 - « Muons »: Woodo Lee (KU)
 - « Beam »: Chanyoung Lee (KISTI)
 - « ILC/CALICE »: Ho Namgoong and Jeon Woo-Jeong from SKKU to LAL for tests of thin PCB, training on Data Acquisition chain and data analysis

- 3 PhD students associated to FKPPL activities
 - « CMS/IL »: Nicolas Filipovic (LLR), Hyunchul Kim (KU)
 - « HTCAAS » : Quang Bui The (LPC Clermont)

- 2 postDocs for CMSIL
 - Yongwook Baek (12 months by NRF)
 - Mihee Jo (@ LLR by NRF & Marie Curie)

As suggested by TYL/FJPPL,
we shall propose a young researcher award for the new FKPPL

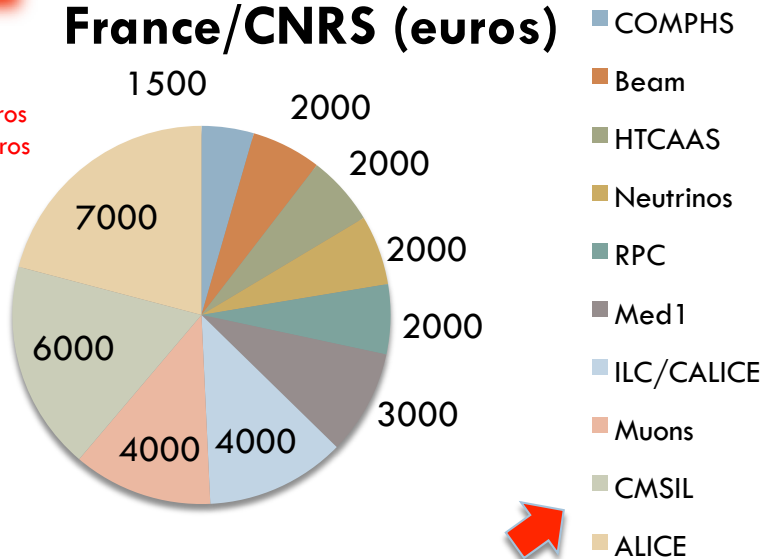
2015 Budgets



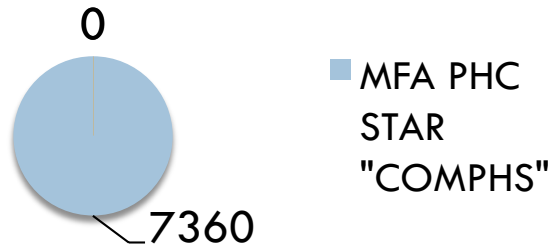
13

France/CNRS (euros)

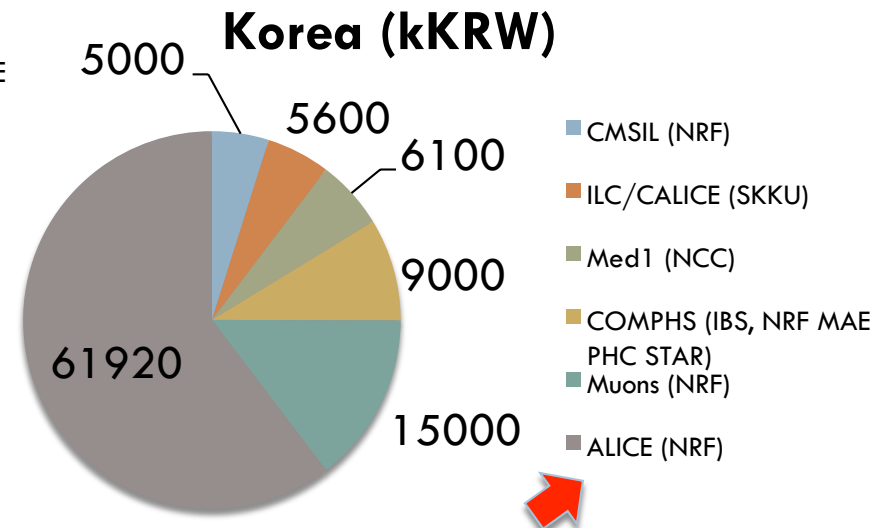
CNRS/DERCI: 16 keuros
CNRS/IN2P3: 28 keuros



Other (France, euros)



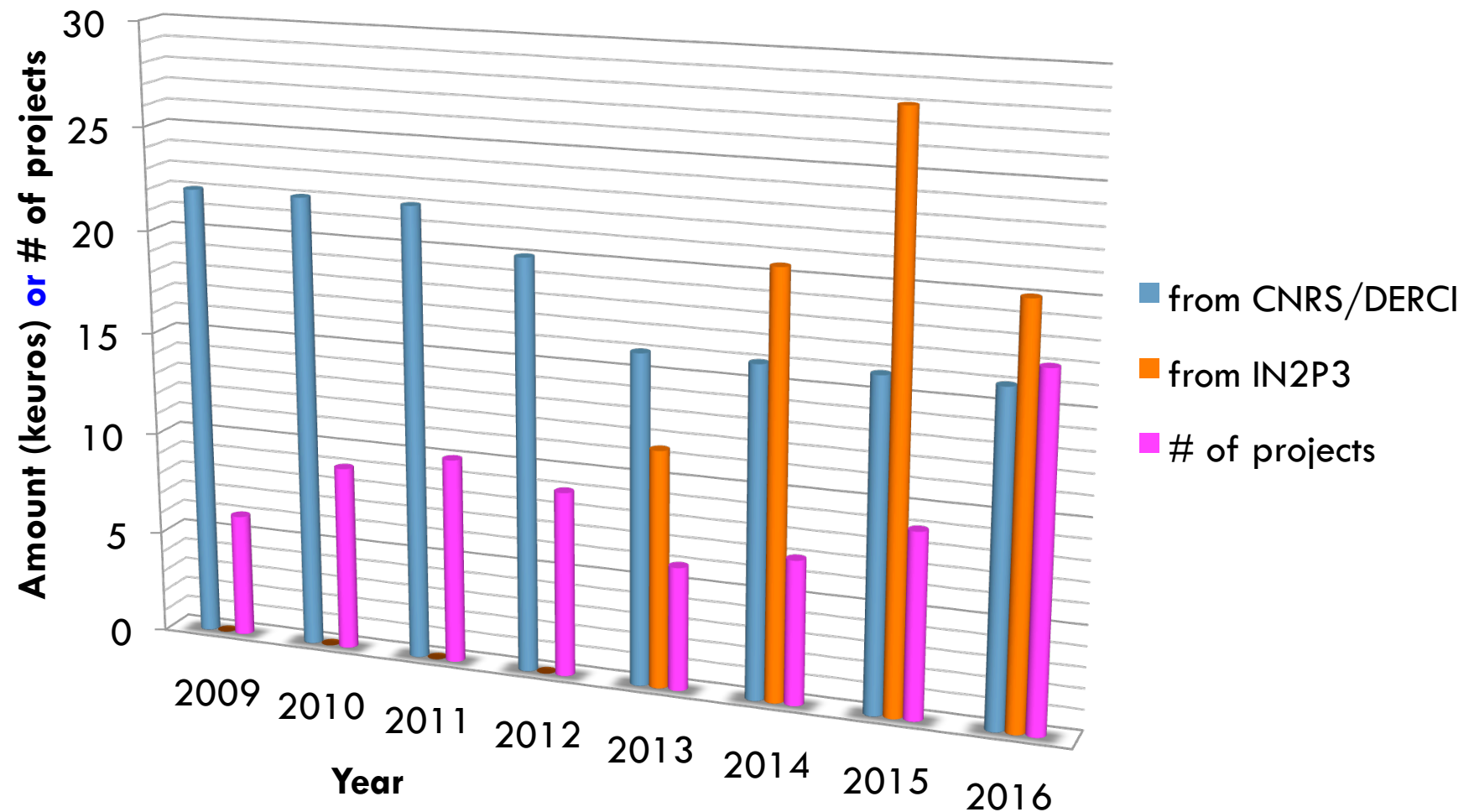
Korea (kKRW)



Significant funding for HEP

Funding over the years from CNRS

14



Note: in 2013 IN2P3 funded in addition a 1-y postdoctoral fellowship (48.6 keuros) for ALICE Muon project

15

New FKPPPL

2016-2019 exercise

New **directions** for 2016-2019

16

- Main focus on **HEP**
 - Strengthening of links between Korea and France around **ALICE & CMS @ CERN**
 - Favourable **regional context** of future research programs such as **ILC and Belle2** in Asia
 - Exploring further **Standard Model and beyond** (supersym., dark matter)
 - Strongly encouraged with the joining of **NPI**
 - Benefiting from already existing **links with Japan**
 - TYL/FJPPL – FKPPL annual common workshops
- Adding **new topics**, such as hadronic physics (medium energy), anti-matter...
 - Motivated by the joining of **CEA**
- While maintaining **interdisciplinary** activities
 - Physics-medicine-biology
 - Computing
 - Including regular tutorials (Geant4)
- And organizing **joint FKPPL – TYL/FJPPL workshops** (2016: **5th** joint workshop)

Benefits

17

□ Scientific expertise

- coordination of run & data taking ([ALICE and CMS at LHC](#))
- corresponding data analysis
- software development for track reconstruction ([COMET and g-2 muon experiments](#))
- theoretical physics : Higgs physics, hadronic physics, physics beyond standard model, supersymmetry, astrophysics, dark matter, flavour physics, reactor neutrino physics, muon physics...
- development and application of Monte Carlo simulations ([Geant4](#))

□ Technical expertise

- development and operation of detectors ([Muon Trigger on ALICE and on CMS](#))
- development of high granularity electromagnetic ([worldwide expertise of the EOS Korean company, in collaboration with the OMEGA/CNRS cell](#))
- electronics and trigger development ([COMET and g-2 experiments](#))

□ Privileged access to **unique facilities**

- computing [grids at KISTI](#)
- protontherapy proton beams at the [National Cancer Center](#) in Seoul.

HEP focus would hopefully trigger strong additional funding from Korea in order to further encourage collaborations with CERN, Belle2 and ILC.

2016 Projects

18

- **17** projects have been submitted this year for evaluation : theoretical HEP (5), R&D (3), heavy ions collisions (2), interdisciplinary (2), muons, neutrinos (2), hadronic, antihydrogen

- including **4** new **Institute of Physics / CNRS** projects
 - **BSM** : Beyond Standard Model and astrophysical probes ([A. Falkowski](#) / [S.C. Park](#))
 - **FNPEs** : Finding New Physics : From the Earth to the Sky ([Y. Mambrini](#) / [H.M. Lee](#))
 - **H-Potential** : Unravelling the Higgs Potential at future colliders ([B. Fuks](#) / [P. Ko](#))
 - **SUSY** : Phenomenology of the Higgs sectors in extended Supersymmetric models ([U. Ellwanger](#) / [M. Park](#))

- And **5** new **CEA** projects
 - **GBAR** : Antihydrogen ion production ([P. Perez](#) / [S. Kim](#))
 - **GPD** : Generalized Parton Distributions ([F. Sabatie](#) / [W. Kim](#))
 - **LAMPSES**: LAMPS electronic system ([E. Pollaco](#) / [K.Y. Jin](#))
 - **LYAWDM**: Implications of Lyman- α forest for sterile neutrinos and warm dark matter ([C. Yèche](#) / [G. Rossi](#))
 - **MMCD**: Metallic Magnetic Calorimeters – Development ([X. F. Navick](#) / [Y. H. Kim](#))

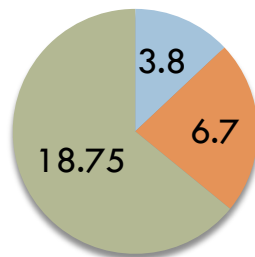
- These new projects will all be presented orally through longer talks, stay tuned !

Expected FTE for 2016



Permanent

29.3



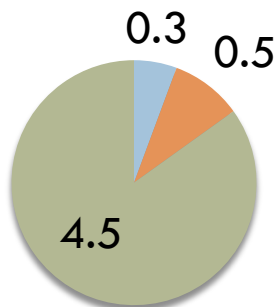
INP

CEA

IN2P3

Non permanent

5.3



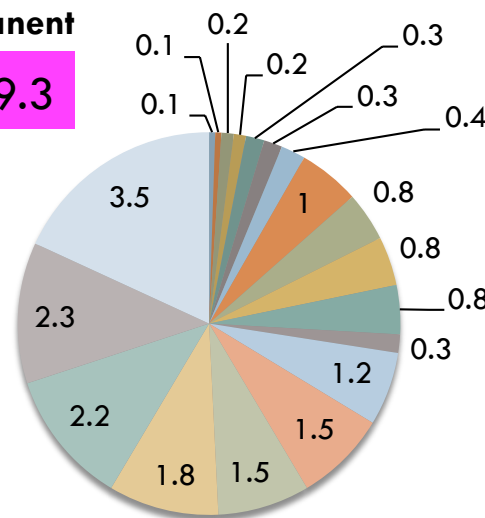
CEA

INP

IN2P3

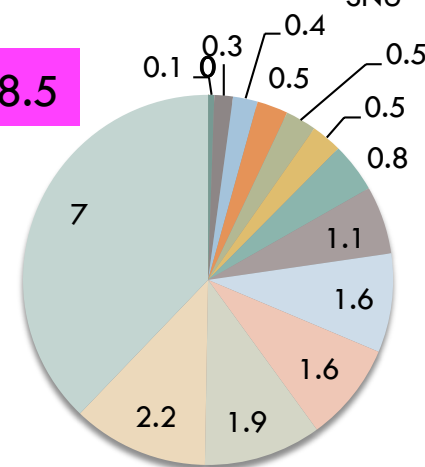
Permanent

19.3



Non Permanent

18.5



Balanced FTE : 35 vs 38

KISTI
IBS
Chung-Ang U.
KIAS
NCC
Sejong
SKKU
Inha
Konkuk
Yonsei
SeoulTech
APCTP
SNU
KNU
KAIST
Pusan
KU

New signing partners

20

□ France

- IN2P3 (CNRS) (9)
 - APC, CENBG, IPNL, IPNO, LAL, LLR, LPC Clermont, LPNHE, SUBATECH
- Institute of Physics (CNRS) (4)
 - CPhT, LAPTH, LPTHE, LPTO
- Commissariat à l'Energie Atomique (CEA) (5)
 - IPhT, LIST, SEDI, SPhN, SPP
- Other academic (13)
 - Blaise Pascal U., Bordeaux U., Ecole des Mines Nantes, Ecole Polytechnique, Lyon 1 U., Nantes U., Observatoire de Paris, Paris 6 U., Paris 7 U., Paris 11 U., Paris Saclay U., Savoie Mont Blanc U., Sorbonne Paris Cité U.

□ Korea (17)

- Asia Pacific Center for Theoretical Physics
- Chung-Ang University
- Gangneung-Wonju National University
- Institute for Basic Science
- Konkuk University
- Korea Advanced Institute of Science and Technology
- Korea Institute for Advanced Study
- Korea Institute of Science and Technology Information
- Korea Research Institute of Standards and Science
- Korea University
- Kyungpook National University
- National Cancer Center
- Pohang University of Science and Technology
- Sejong University
- Seoul National University
- Sungkyunkwan University
- Yonsei University

Management of new FKPPL AIL

21

- New **Directorate** of co-directors and deputy co-directors
 - Korea: **Pyungwon Ko** (KIAS), **Soonwook Hwang** (KISTI)
 - France: **Marc Besançon** (CEA), **Sébastien Incerti** (CNRS), **David Sarramia** (Blaise Pascal U.)

- New **Steering Committee**
 - France: **N. Alamanos** (IRFU), **U. Bassler** (IN2P3), **A. I. Etienne** (IRFU), **F. Le Diberder** (IN2P3), **B. van Tiggelen** (INP), **P. Verdier** (IN2P3)
 - Korea: **P. Ko** (KIAS), **J. Lee** (KISTI), **B. H. Lee** (Sogang), **S. H. Seo** (SNU)
 - Chair: **F. Le Diberder** (IN2P3)
 - Co-chair: **J. Lee** (KISTI)

- New **Review Committee**
 - HEP: **P. Colas**, **F. Le Diberder**, **S. Jézéquel**, **P. Ko**, **D. Zerwas**
 - Hadronics : **H. Fonvieille**
 - Computing and interface : **J. Lee**, **M. Verderi**

A big thank you !

Funding: other calls from French side

22

□ CampusFrance « STAR »

- Eg. RECFEB by R. Poesch et al. (ILC/CALICE)
- 2 previously supported: MED1, COMPHS
- <http://www.campusfrance.org/fr/star>



□ French embassy « Blaise Pascal » grants for Korean students

- Post-doctoral fellows : 6 months maximum
- PhD students : 12 months maximum
- Master students : 24 months maximum
- <http://campusbourses.campusfrance.org/fria/bourse/#/program?id=397>



□ French universities specific funding schemes

- Eg. IDEX Bordeaux University
 - Welcoming postdoctoral fellows up to two years
 - International PhD grants for laboratories involved in ALLs

□ ANR France-Korea

- Last call in 2011 with NRF – no recent news

Regarding evaluation, FKPL is usually not consulted. Let's propose a « FKPL » label after a short review by our Review Committee



Funding : other calls from **Korea** side

23

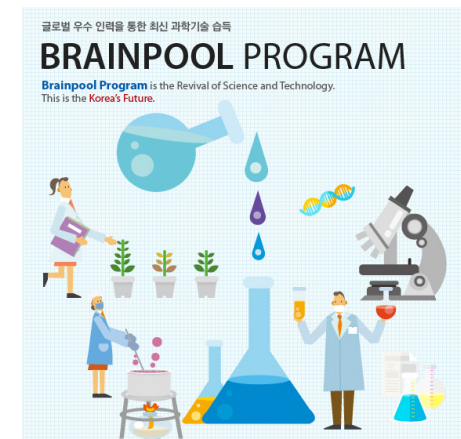
ibs Institute for
Basic Science

□ Young Scientist Fellowship (YSF)

- Institute for Basic Science “Young Scientist Fellowship (YSF) program
- For **postdoctoral fellows**, **3** years (renewable) in IBS research centers. PhD thesis obtained within last 5 years or less than 40 yo candidates.
- Many application domains
- https://www.ibs.re.kr/eng/sub01_03_01.do and http://www.ibs.re.kr/eng/sub04_04.do
- Selection in two steps
 - Intent letter: deadline: July 31, 2016
 - Application: deadline: September 30, 2016

□ Brainpool

- Grants for research proposals in public or private institutions
- 6 months up to 1 year, renewable till 3 years
- **Foreign researchers, with PhD and with 5 years of experience in research**
- If private institution, masters and engineers with 5 years of experience in industrial research can also apply
- Many application domains: fundamental research, mechanics, astronautics, biotechnology, energy, ocean, environment...
- Application: May 9-31, 2016
- <http://www.ultari.org/kofst/contents/Contents.do?c=brainpool&a=BrainMain&mc=191&sc=1>

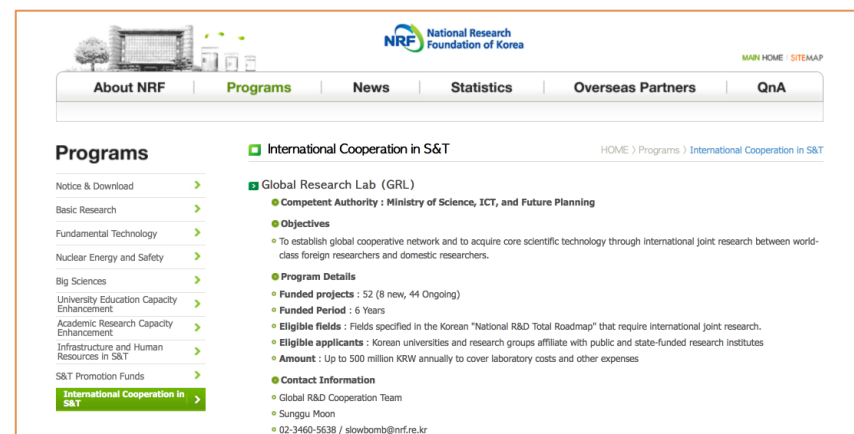




Funding : other calls from **Korea** side : NRF

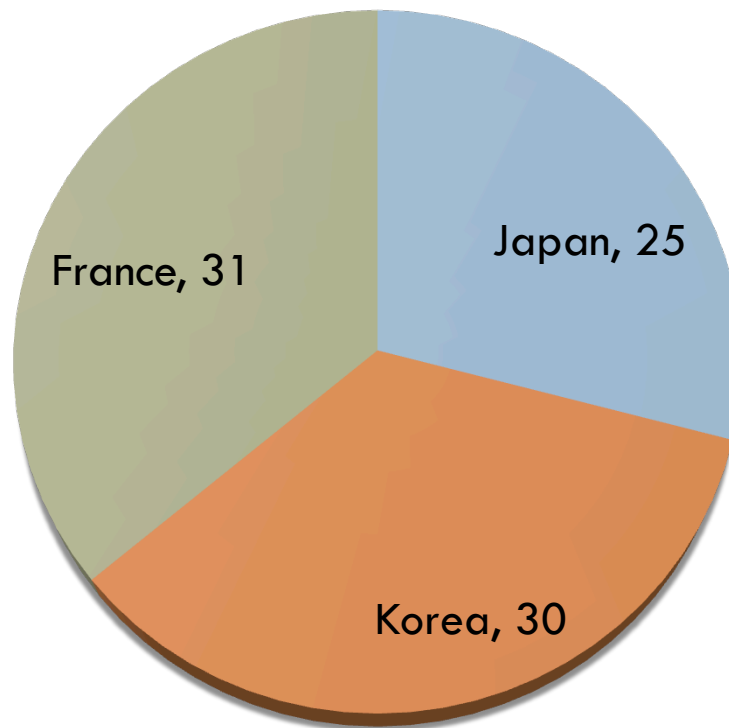
24

- <http://www.nrf.re.kr/>
- International cooperation in Science & Technology calls by the **National Research Foundation**
 - Global Research Lab (GRL)
 - Global Research Development Center (GRDC)
 - Global Research Network (GRN)
 - NRF Joint Research programs
 - EU framework
 - Korea - EU Joint Research Support Program (H2020)



Let us thank the **local organizers** !

25



86 participants

Thank you for your participation !



26

We wish you all a very fruitful workshop !



**and an enormous thank you to Dr Jysoo Lee
for his constant support and FKPPL leadership in Korea over the years**