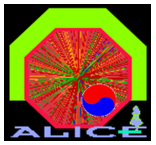








Korea CMS team Report

Oct. 29, 2012

The 12th CERN-Korea Committee

Inkyu PARK

Dept. of Physics, University of Seoul

KCMS
Activity Summary & Plan

Korea CMS institutions

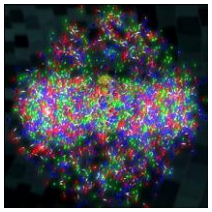
KCMS in number

- **Institutions: 7**
  - Going to be 8 in 2013
    - SNU (Feb. 2013)
- **Faculties: 12**
- **Postdocs, scientists: 17**
  - CERN (6), short-term visit (11)
- **Graduate Students: 35**
  - Ph.D. (23), MS (12)
  - CERN (8), short-term visit (27)
- **Staffs, technicians: 5**
  - Secretary (1), SI (1)
  - Engineers (3)

7 institutions & ~ 70 participants

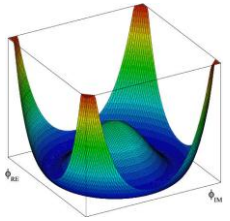
SNU (Feb. 2013)

Korea CMS Organization



Heavy Ion

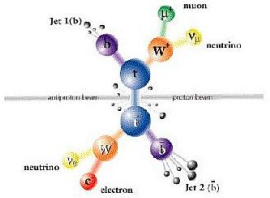
Higgs & NP



Top & SM

RPC Det.

KNU Tier2



UOS Tier3

CMS Upgrade

* A new team launched in 2012

KCMS Office

monthly

KCMS Board

twice / year

CMS Office

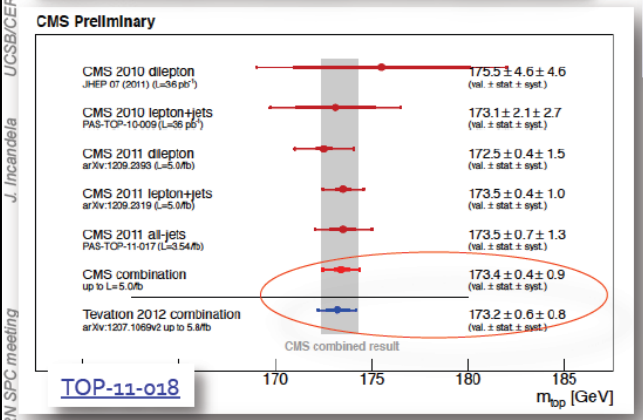
CKC

Research Highlight in 2012

Top Highlights: Properties

23

$m_t = 173.36 \pm 0.38\,(\text{stat.}) \pm 0.91\,(\text{syst.})\ \text{GeV}$

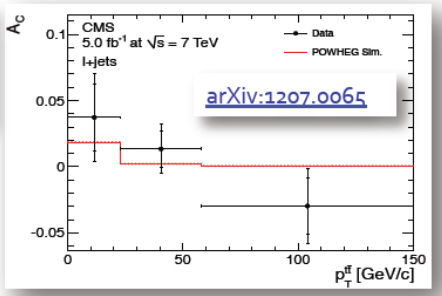


TOP-11-018

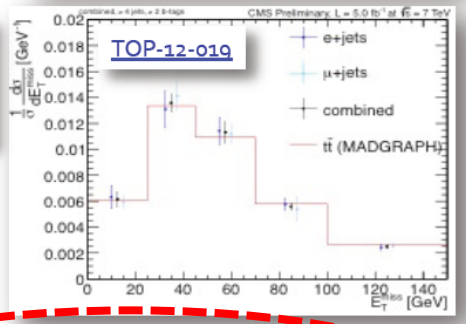
Table 2: Correlation coefficients between the input measurements

	Di-lepton 2010	Lepton+jets 2010	Di-lepton 2011	Lepton+jets 2011	All-jets 2011
Di-lepton 2010	1.00				
Lepton+jets 2010	0.30	1.00			
Di-lepton 2011	0.35	0.67	1.00		
Lepton+jets 2011	0.26	0.44	0.64	1.00	
All-jets 2011	0.36	0.59	0.71	0.56	1.00

- $t\bar{t}$ differential measurements:
  - e.g. Q asymmetry



Associated production $t\bar{t}$+ME_T



Associated production $t\bar{t}b\bar{b}$

$\sigma(t\bar{t}b\bar{b})/\sigma(t\bar{t}jj) = 3.6 \pm 1.1(stat.) \pm 0.9(sys.)\%$

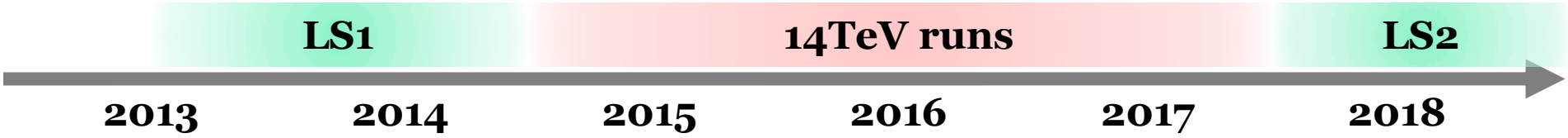
FCNC top decay limit: arXiv:1208.0957

B(t → Zq) < 0.24% @ 95% CL

September 17, 2012 CMS Highlights. CERN SPC meeting J. Incandela UCSB/CERN

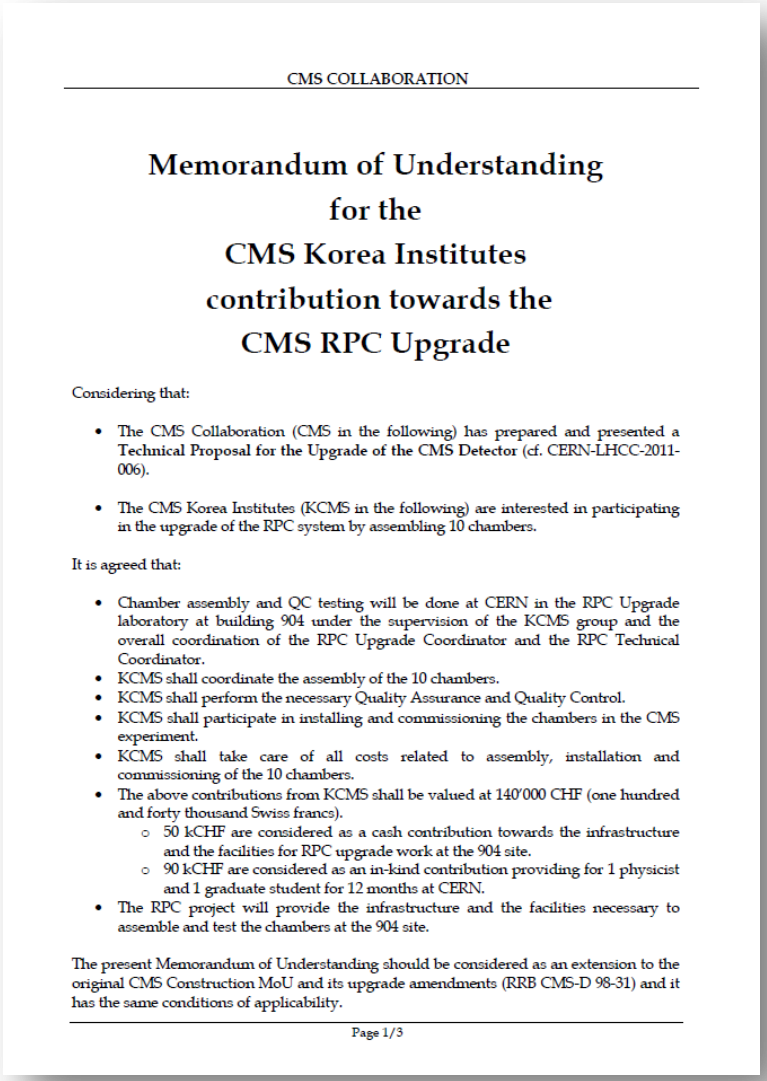
- **Joe Incandela's report in WGM126 (Sep. 19)**
  - **$\sigma(ttbb)/\sigma(ttjj)$ measurement → pure KCMS' analysis !!**

KCMS' participation to the CMS upgrade



- **KCMS during LS1 and for LS2 (5-year program)**
  - **RPC gap production (KODEL/Korea Univ.) – 405kCHF**
    - **MOU signed in 2011**
      - **Completed by the end of 2013**
  - **RPC chamber production (SKKU) – 140kCHF**
    - **MOU is ready to sign**
      - **See the Pigi's MOU proposal**
  - **KCMS LS2 preparation team launch (UOS, CNU) – 332.5kCHF**
    - **Detector R&D, CMS Upgrade**
      - **An MOU shall be prepared**
- **Total contribution → 975kCHF (RRB2012/04)**

RPC Gap production



CMS COLLABORATION

Memorandum of Understanding
for the
CMS Korea Institutes
contribution towards the
CMS RPC Upgrade

Considering that:

- The CMS Collaboration (CMS in the following) has prepared and presented a Technical Proposal for the Upgrade of the CMS Detector (cf. CERN-LHCC-2011-006).
- The CMS Korea Institutes (KCMS in the following) are interested in participating in the upgrade of the RPC system by assembling 10 chambers.

It is agreed that:

- Chamber assembly and QC testing will be done at CERN in the RPC Upgrade laboratory at building 904 under the supervision of the KCMS group and the overall coordination of the RPC Upgrade Coordinator and the RPC Technical Coordinator.
- KCMS shall coordinate the assembly of the 10 chambers.
- KCMS shall perform the necessary Quality Assurance and Quality Control.
- KCMS shall participate in installing and commissioning the chambers in the CMS experiment.
- KCMS shall take care of all costs related to assembly, installation and commissioning of the 10 chambers.
- The above contributions from KCMS shall be valued at 140'000 CHF (one hundred and forty thousand Swiss francs).
  - 50 kCHF are considered as a cash contribution towards the infrastructure and the facilities for RPC upgrade work at the 904 site.
  - 90 kCHF are considered as an in-kind contribution providing for 1 physicist and 1 graduate student for 12 months at CERN.
- The RPC project will provide the infrastructure and the facilities necessary to assemble and test the chambers at the 904 site.

The present Memorandum of Understanding should be considered as an extension to the original CMS Construction MoU and its upgrade amendments (RRB CMS-D 98-31) and it has the same conditions of applicability.

Page 1/3

- An MOU for Step3 signed in 2007
  - Cash contribution of 405kCHF
- following MOU signed in 2011
  - 405,000CHF cash contribution
    - KODEL received 360,000CHF to produce 660 RPC gaps
    - Production has been started.

Year	Cash contribution (CHF)
2008.05	113,992
2009.05	57,035
2011.09	233,973
Total	405,000

RPC Chamber production

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Page 1/3

- **RPC Chamber production**
  - ~ 10 chambers will be built and tested, starting from 2013
- **MOU is to be signed soon**
  - In kind 90kCHF
    - 1 FTE postdoc & 1 FTE grad student
  - In cash 50kCHF
    - Team account transfer

Budget request

Year	Authors	Travel Budget	M&O-A	M&O-B (CMS)	M&O-B (RPC)	CMS (Upgrade)	R&D Budget
2007	12		99,637				
2008	12	750MW	117,535	39,118		**113,992**	
2009	12	1,500MW	112,000	31,400	5,000	**57,035**	
2010	18	1,420MW	180,538		48,000		
2011	21	1,450MW	217,620		45,300	**233,973**	
2012	20 (22)	1,450MW	241,797		37,200	**97,511**	330MW
2013	**22 (20)**	**1,450MW**	**220,000?**		**35,000?**	**140,000**	**670MW**
2014	25	1,600MW	-		-	*332,552	1,250MW
2015	28	1,800MW	-		-		1,500MW
2016	30	2,000MW	-		-		1,250MW
sum						**975,063**	**5,000MW**

- **increase of authors (institutions)**
  - **M&O-A ↑, travel budget up ↑**
- **CMS upgrade and Det. R&D**
  - **An MOU is needed**

RPC Gap production
CMS Upgrade CF
Chamber production
*MUON upgrade

Remark & summary

- 2012 was a fantastic year for KCMS
  - New members and institutions are joined & expected
    - Chonnam, SNU
  - Applauses from Korean Physics communities and mass-media
    - Major TVs, radios, newspapers
  - Transfer of the MEST division for KCMS (a big move forward!)
    - International collaboration → Basic science
- 2013 will be another important year
  - We'll elect a new KCMS team leader for next 3 years
    - Especially important period for the CMS upgrade
      - 2007.5-2010.4 : KCMS formation (Young-Il Choi)
      - 2010.5-2013.4 : KCMS consolidation & boosting-up (Inkyu Park)

Thank you

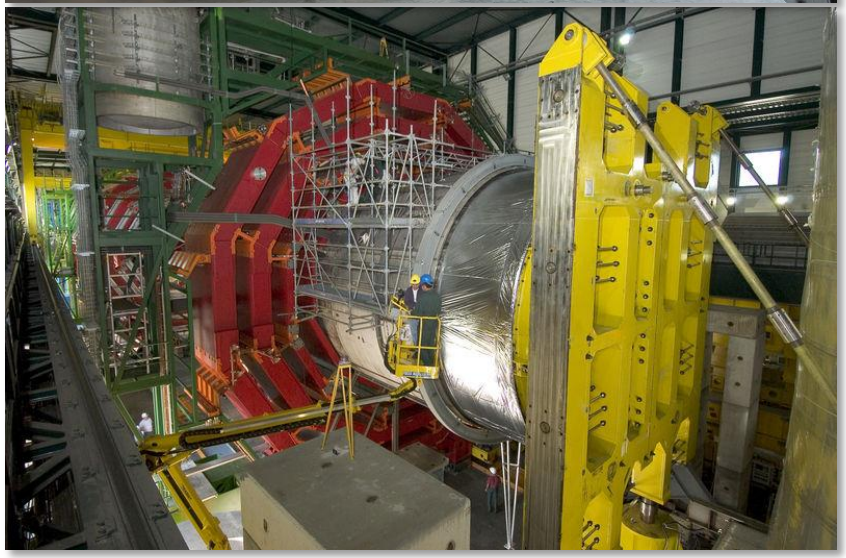
Back up slides

An introduction for our new CKC members

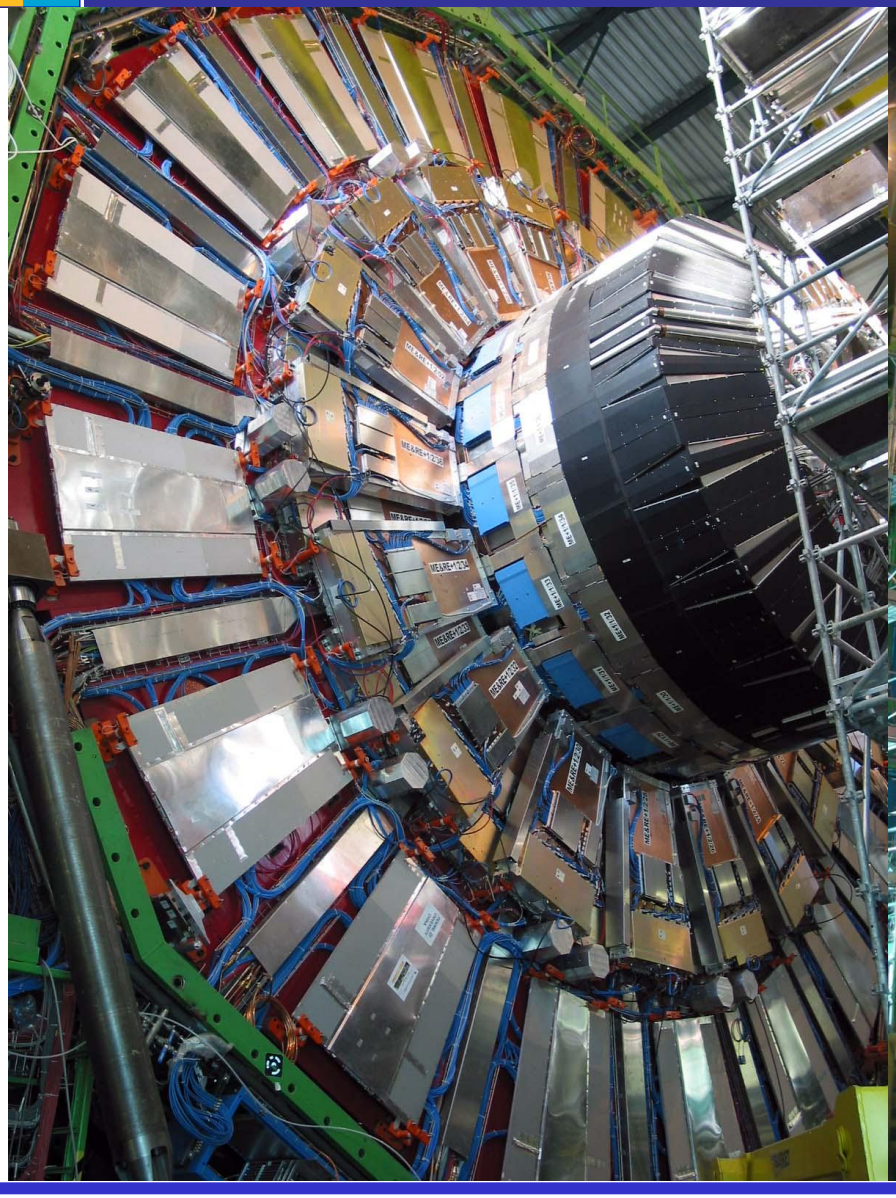
Brief history of Koreans at CERN

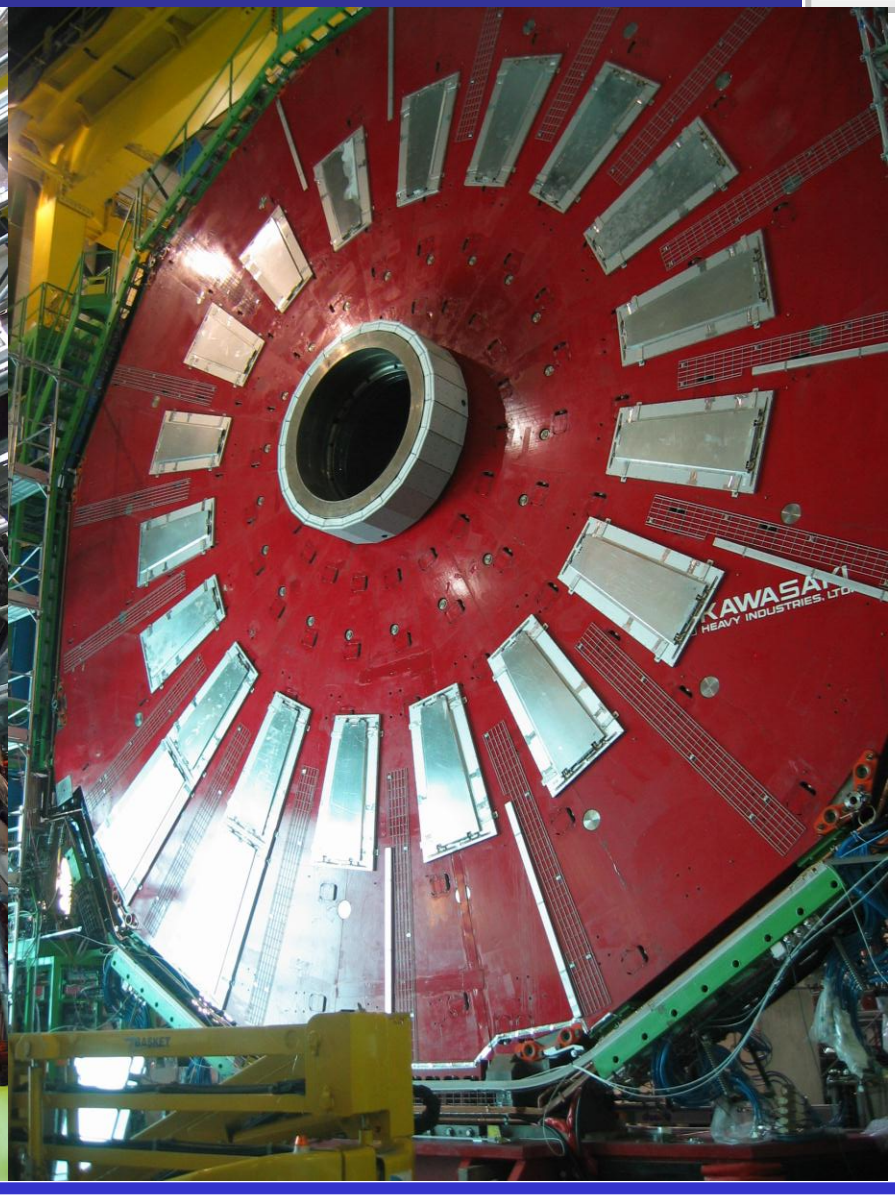
- 1980-1990: Prehistoric age (individual based)
  - individual participations
- 1990-1998: LEP age (research group based)
  - e+ e- collisions at Z0, W pair production energies
    - ALEPH : KU, KWNU et al.
    - L3: KNU, KAIST et al.
  - Neutrino oscillation
    - CHORUS : KSNU et al.
- 1998-2006: LHC preparation age (university based)
  - MOST (Former MEST) funded "Korea-CMS" (~$2M)
    - 12 universities
      - Superconducting magnet platform (815kCHF)
      - Forward RPC production (500kCHF)
      - Online DAQ hardware (500kCHF)

1998-2006 : Swiveling table



1998-2006: Forward RPC





2006: Korea-CERN Program launch

❑ 2006: CERN-Korea Collaboration Agreement

- Won-Hwa Park, Ambassador of the Republic of Korea to Switzerland
- Robert Aymar, Director General of the CERN

❑ Followed by K-CMS, K-Alice MOUs

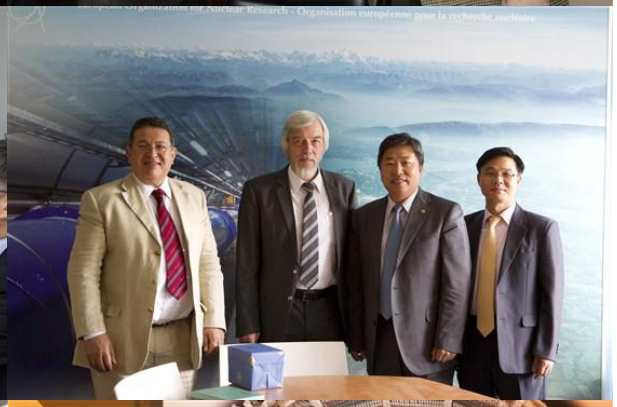
- Yearly budget of ~$1M

New Era of CERN-Korea Program

- **2007-present: LHC age (federation based)**
  - **Organization**
    - Ministry, Funding Agency, Research Teams
  - **Federations of universities**
    - Korea CMS, Korea ALICE
      - Research, communication, competition, evaluation,
      - M&O-A, M&O-B, contributions to H/W construction
  - **Supporting programs, Fellowship, Education**
    - CMS/ALICE Tier2 computing
    - Korea-CERN Theory Fellowship
    - High-School Teacher Education
- **What will be the future?**
  - **Evolution to a National Laboratory / a HEP Organization.**
    - KEK (Japan), FNAL, BNL (USA), DESY (Germany), CERN (EU)
    - IN2P3 (France), INFN (Italy)

2006 – present : Visitors





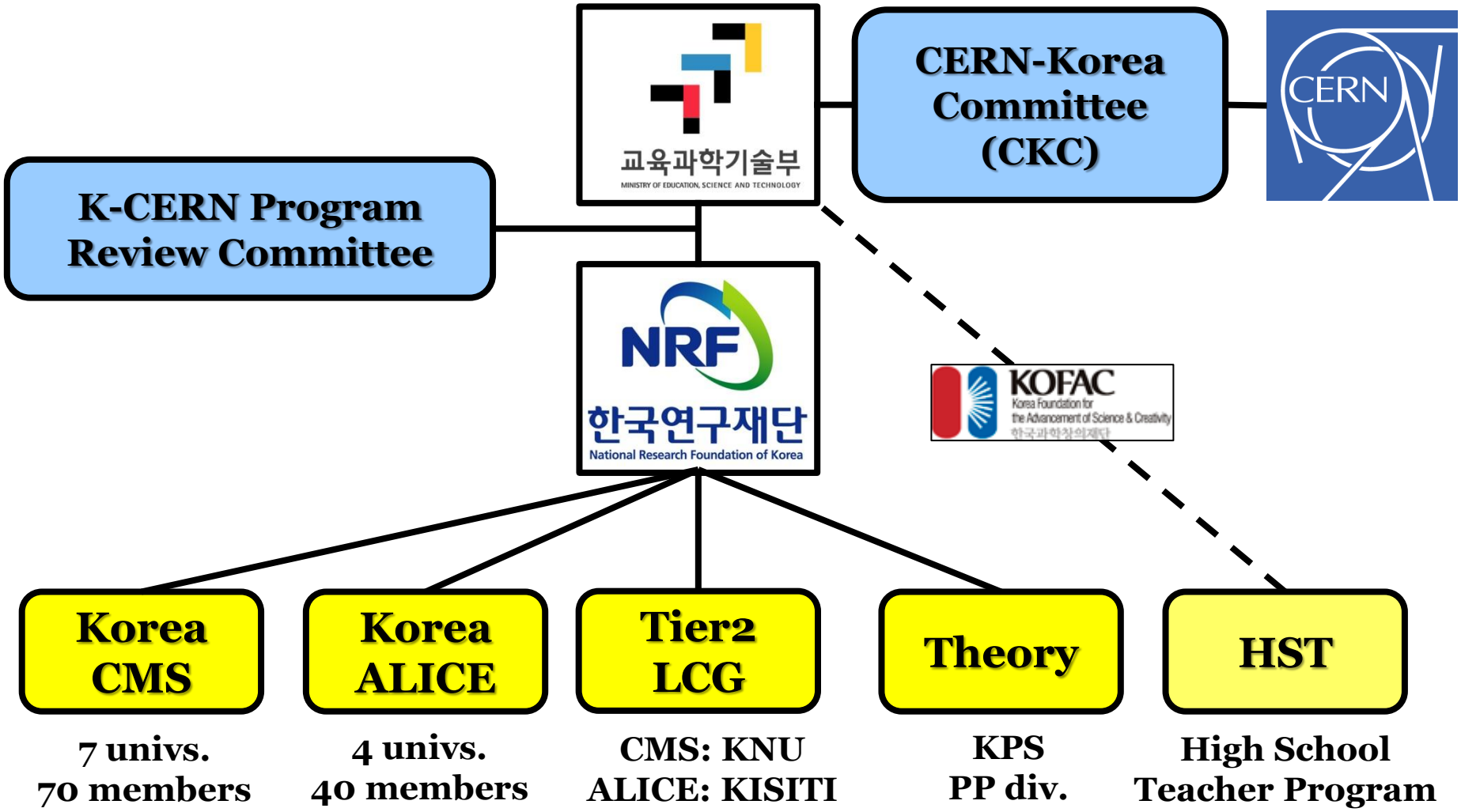
2006:
- **Mayer of Seoul**

…

2010:
- **Nat'l Assembly**
- **Ambassador**
- **Minister & Vice Min.**

2011:
- **Vice Min.**
- **National Assembly**
- **National Labs.**
- **Media : KBS, MBC, EBS**
- **Journalists**

K-CERN Program Organization



K-CERN Program budget

Budget profile

- Small bang → inflation → slow down → accelerating expansion..
  - Contribution to CMS/ALICE upgrade (LHC LS1, LS2)
    - Dark Energy : MEST / NRF + visitors + media …

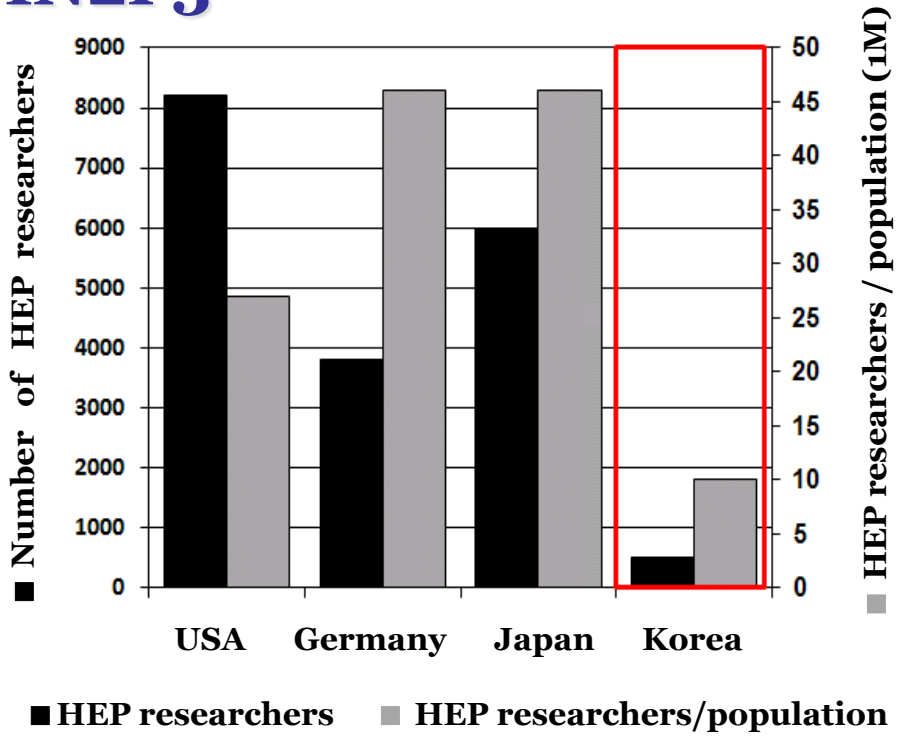
(Unit: 1BWon~M$)

CERN-Korea Programs	Host	2007	2008	2009	2010	2011	2012
KCMS	UOS	0.8	0.75	1.50	1.42	1.45	1.78
KoALICE	PNU	0.2	0.25	0.50	0.58	0.55	0.72
CMS Tier2	KNU	-	-	0.20	0.20	0.20	0.20
ALICE Tier2	KISTI	-	0.1	0.20	0.20	0.20	0.20
Theory	KPS	-	-	0.25	0.35	0.35	0.35
M&O-A	NRF	0.14	0.17	0.30	0.30	0.30	0.27
Total		1.14	1.27	2.95	3.05	3.05	3.52

Future of Korea HEP

- ~500 HEP community (including grad students)
  - MEST report (Sunkee Kim et al., 2010/07)
- Current funding → chopped up for many projects
  - They amount ~$10M / Y already
- Korea HEP Lab a la INFN, IN2P3
  - $100M/Y seems to be a unit

Country	Labs	Year	Employees	Budget
USA	FNAL	1967	1800	$310M
	JLab	1985	617	$100M
Europe	CERN	1954	3000	$1,200M
Germany	DESY	1959	1560	$250M
	GSI	1969	900	$110M
England	RAL	1957	1200	$690M
Italy	INFN	1951	2014	$450M
Japan	KEK	1971	699	$400M
China	IHEP	1973	1087	$100M
Canada	TRIUMF	1970	384	$56M



Financial Plan in 3 Steps : 2007-2012

Amount in CHF

FUNDING AGENCIES	Contributions received 2007-2012				Total received 2012
	Step 1	Step 2	Step 3	Total	
Member States					
AUSTRIA	211 000	45 000		256 000	
BELGIUM FNRS	136 000	55 500	311 000	502 500	
BELGIUM FWO	136 000	55 500	109 001	300 501	
FINLAND	272 000	49 000		321 000	
FRANCE - CEA	341 000	58 000		399 000	
FRANCE - IN2P3		2 000 000		2 000 000	
GERMANY BMBF	919 000	169 000	637 000	1 725 000	
GERMANY DESY		2 000 000		2 000 000	
GREECE	221 000			221 000	
ITALY	2 402 900			2 402 900	
SPAIN	341 355	142 645		484 000	
SWITZERLAND		124 000	466 000	590 000	
UNITED KINGDOM	575 000	202 000	762 000	1 539 000	
CERN	4 569 000	297 000	1 120 000	5 986 000	
A) Total Member States	**10 124 255**	**5 197 645**	**3 405 001**	**18 726 901**	
Non-Member States					
CROATIA	15 000	29 000	10 000	54 000	
CYPRUS	31 000	12 000	47 000	90 000	
ESTONIA	5 000	8 000	31 000	44 000	
IRELAND		4 000	16 000	20 000	
KOREA			405 000	405 000	
RUSSIA RDMS		300 000		300 000	
SERBIA	20 000	12 000		32 000	
TAIPEI	121 000	45 000	171 000	337 000	
TURKEY	47 000	74 000	280 000	401 000	
U.S.A	5 252 000	646 608		5 898 608	
B) Total Non-Member States	**5 491 000**	**1 130 608**	**960 000**	**7 581 608**	**0**
TOTAL (A+B)	**15 615 255**	**6 328 253**	**4 365 001**	**26 308 509**	**0**

2nd biggest among non-member states