



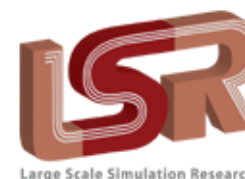
# ALICE Physics Analysis and Tier1/2 Workshop

March 3 to 7, 2014, Tsukuba, Japan.



## Operations in Thailand

Chinorat Kobdaj and Suriya U-ruekolan



6 March 2014

Tsukuba, Japan

[www.sut.ac.th](http://www.sut.ac.th)

Suranaree University of Technology



# Activities



# Her Royal Highness Princess Maha Chakri Sirindhorn



18 May 2000 DELPHI Detector,



9 Dec 2003 RSIS: Role of Science in



16 March 2009 CMS Detector, LHC



13th April 2010 LHC Briefing



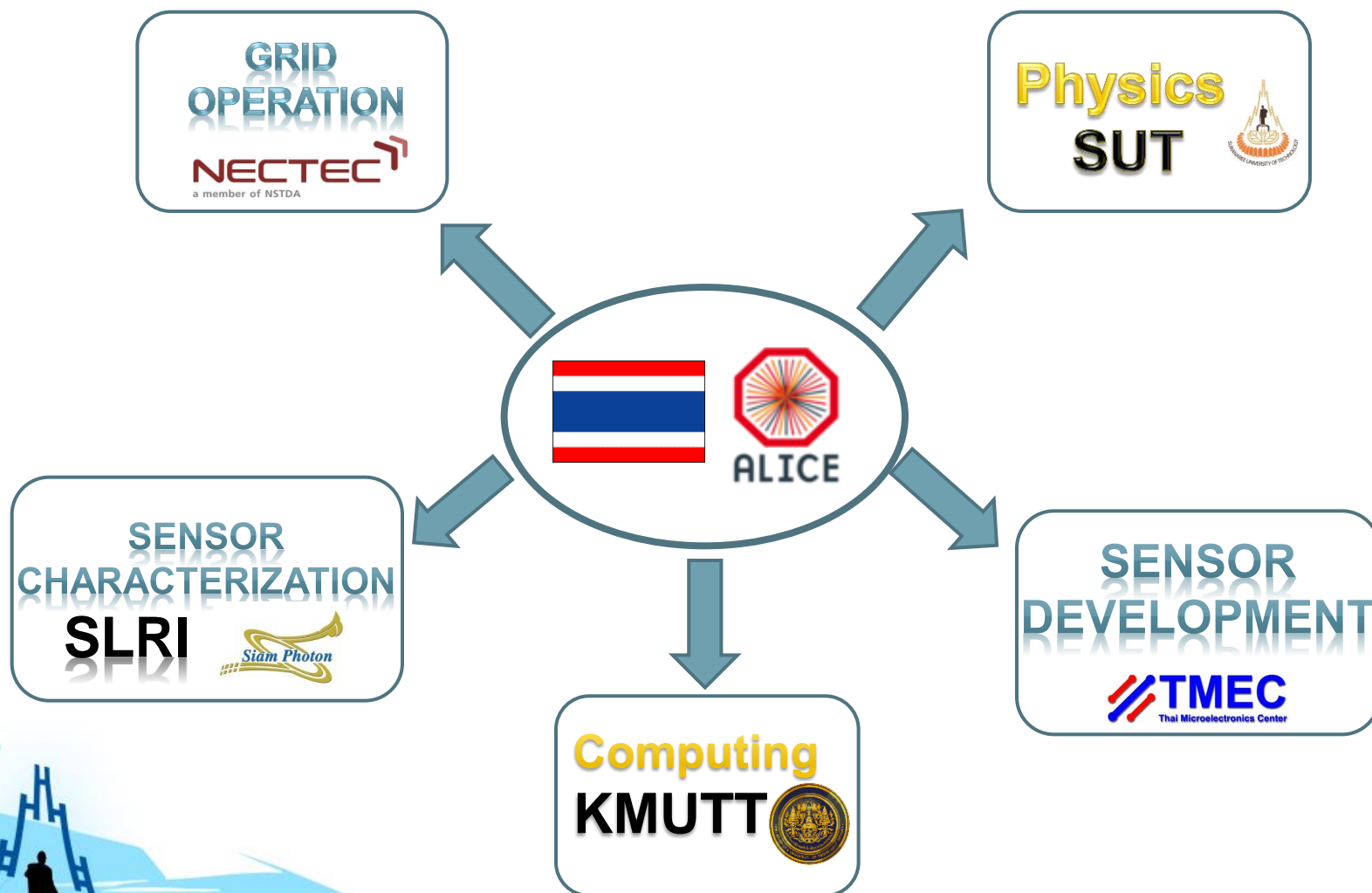
25<sup>th</sup> December 2009 The Thai-CERN subcommittee consisting of delegates from universities and related research organizations has been appointed and chaired by Prof. Pairash Thajchayapong



National Science and Technology Development



# ALICE-THAI COLLABORATION





# Thailand participates in ITS upgrade as a consortium effort



## ◎ Suranaree University of Technology (SUT)

- Geometry of the beam pipe and the inner barrel of ITS
- Physics Analysis
- Tier 2 site



## ◎ Thailand National Electronics and Computer Technology Center (NECTEC)

- GRID Operation



## ◎ King Mongkut's University of Technology Thonburi (KMUTT)

- Online-Offline operation ( $O^2$ )



[www.sut.ac.th](http://www.sut.ac.th)

Suranaree University of Technology



## ◎ Thai Microelectronics Center (TMEC)

- High resistivity wafer
- Dummy chip
- Silicon Micro-channel cooling
- Thinning and laser dicing



## ◎ Synchrotron Light Research Institute (SLRI)

- Characterization of prototype pixel chips using 1 GeV electron beam



# Suranaree University of Technology (SUT)

- ◎ The university campus is located at Nakhon Ratchasima province, only 250 km from Bangkok







Photo taken at Sra Patum Palace on December 13, 2012



# SUT is a full member of ALICE

On 13 December 2012 , there was a signing ceremony  
Memorandum of Understanding between SUT and ALICE.



# NECTEC Background

- NECTEC was established on 16 September 1986, initially as a project under the Ministry of Science, Technology and Energy (the former name of the Ministry of Science and Technology).
- In 1991, NECTEC was transformed into a specialized national center under the National Science and Technology Development Agency (NSTDA), a new agency following the enactment of the Science and Technology Development.
- NECTEC is located at Pathumthani province, 28 km from Bangkok.





The visit to NECTEC from O<sup>2</sup> project

7-9 October 2013







Photo taken at Sra Patum Palace on October 10, 2013







## WLCG signing Ceremony

10 October 2013



[www.sut.ac.th](http://www.sut.ac.th)

Suranaree University of Technology

# Resources

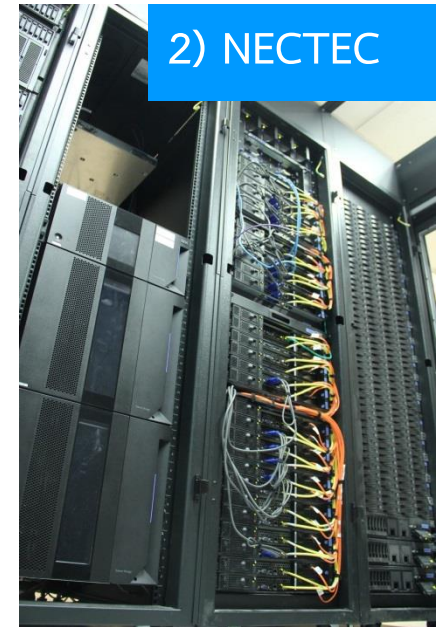


# ALICE Grid site in THAILAND

- Collaborate with National Electronics and Computer Technology Center (NECTEC) to setup a Grid site for ALICE@SUT as part of the Thailand National e-Science Infrastructure Consortium



128 Cores IBM x3755 M3  
100 TB IBM DCS 3700



60 Cores IBM iDataPlex d360 M3  
30 TB Storage IBM DS 3512



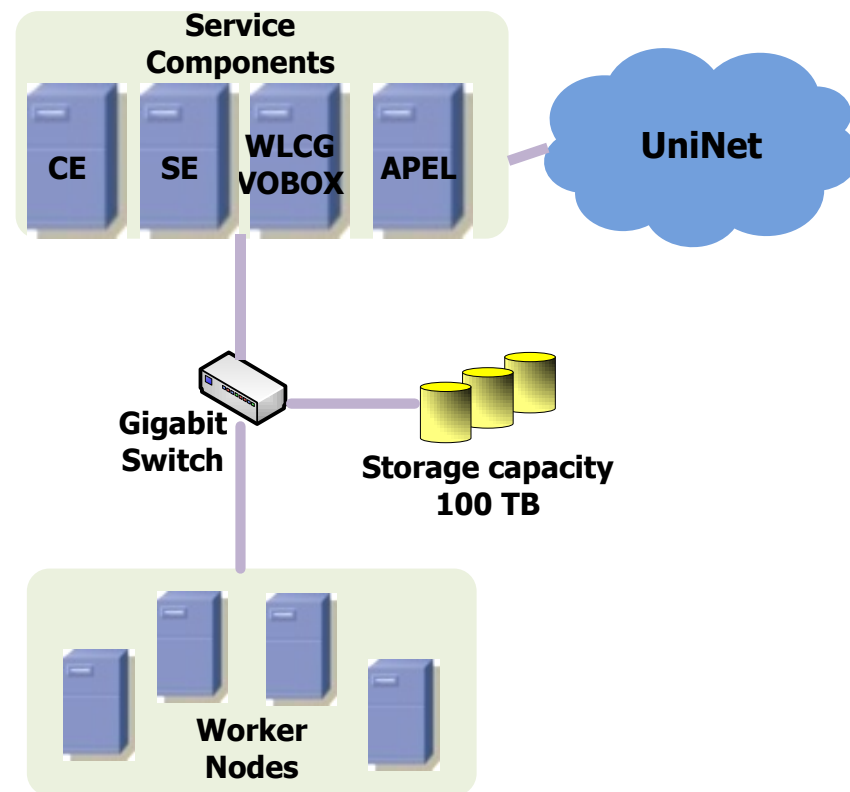
[www.sut.ac.th](http://www.sut.ac.th)

Suranaree University of Technology



# ALICE Grid resource at SUT

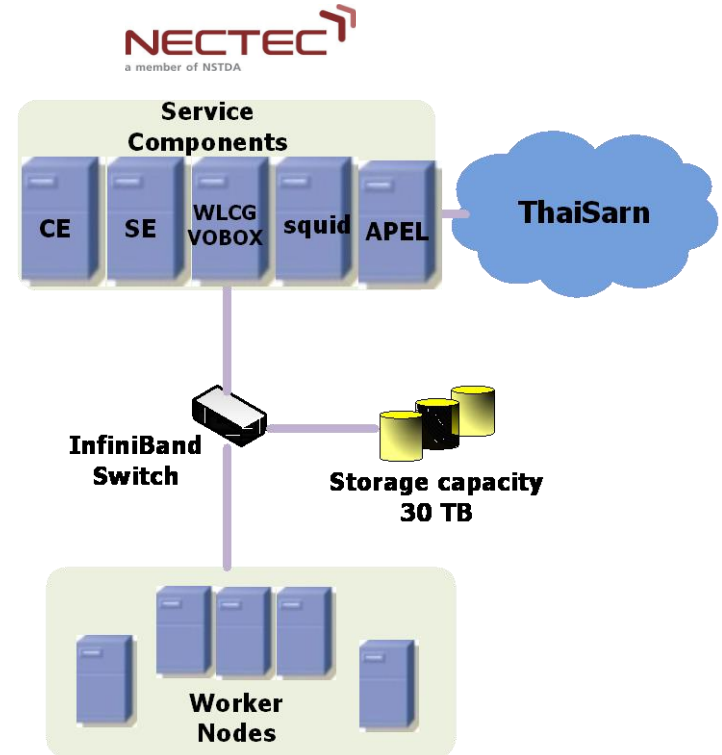
- 128 job slots, 2110 HEPSPEC06
- 4 nodes, 32 cores 96 GB RAM per node
- AMD Opteron 2.3 GHz
- Gigabit Ethernet switch
- OS SLC 6.4 with EMI-2 middleware
  - CE, SE, WLCG-VOBOX and Worker Nodes
  - CVMFS 2.1.15, installed on WLCG-VOBOX and all worker nodes
  - Pure Xrootd 3.1.0
  - AliEn software v2-19.218





# ALICE Grid resource at NECTEC

- 60 job slots, 912 HEPSPEC06
- 5 nodes, 12 cores 42 GB RAM per node
- Intel Xeon 2.6 GHz
- Gigabit Ethernet and InfiniBand switch
- OS SLC 6.4 with EMI-2 middleware
  - CE, SE, WLCG-VOBOX, squid frontier and Worker Nodes
  - CVMFS 2.1.15, installed on WLCG-VOBOX and all worker nodes
  - Pure Xrootd 3.1.0
  - AliEn software v2-19.218



Large-Scale Simulation Research Laboratory  
National Electronics and Computer Technology Center

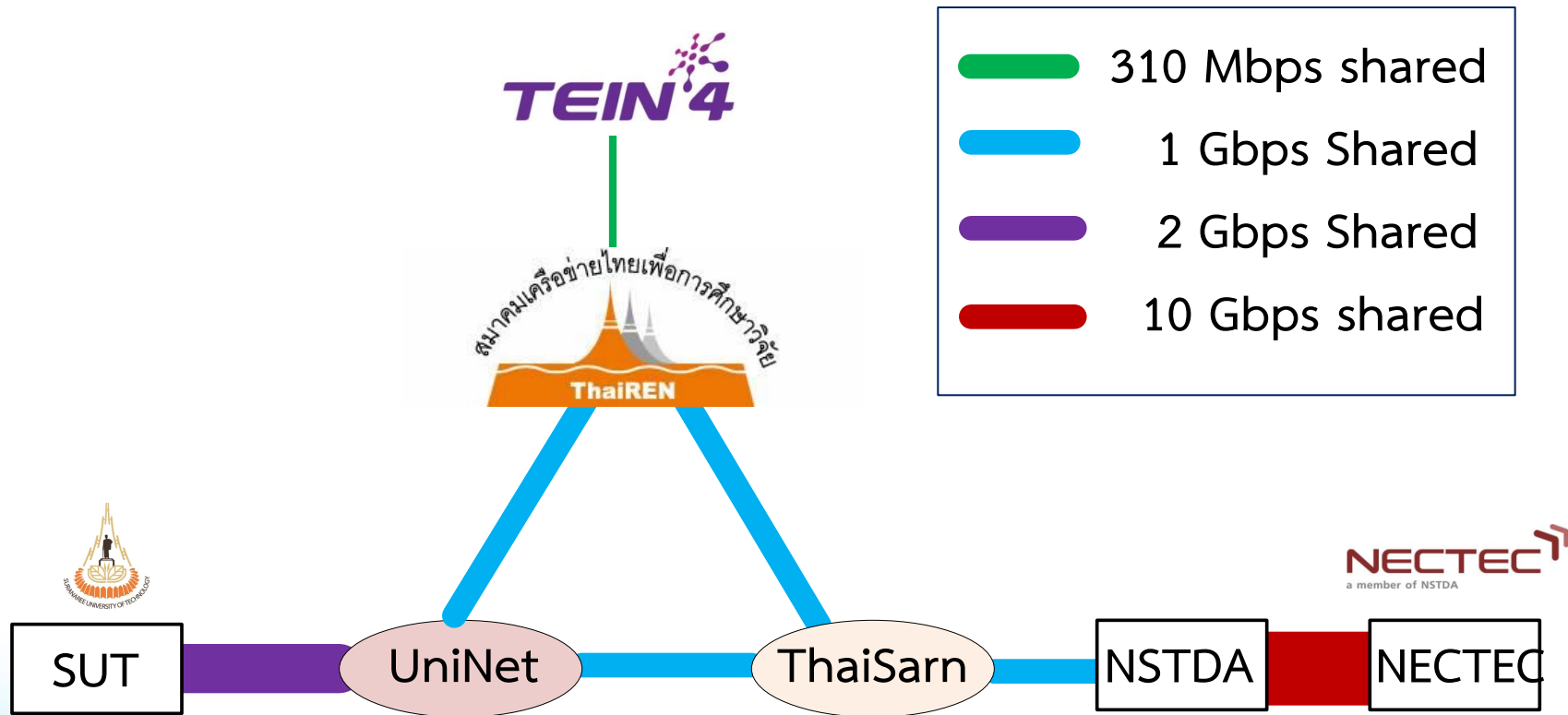




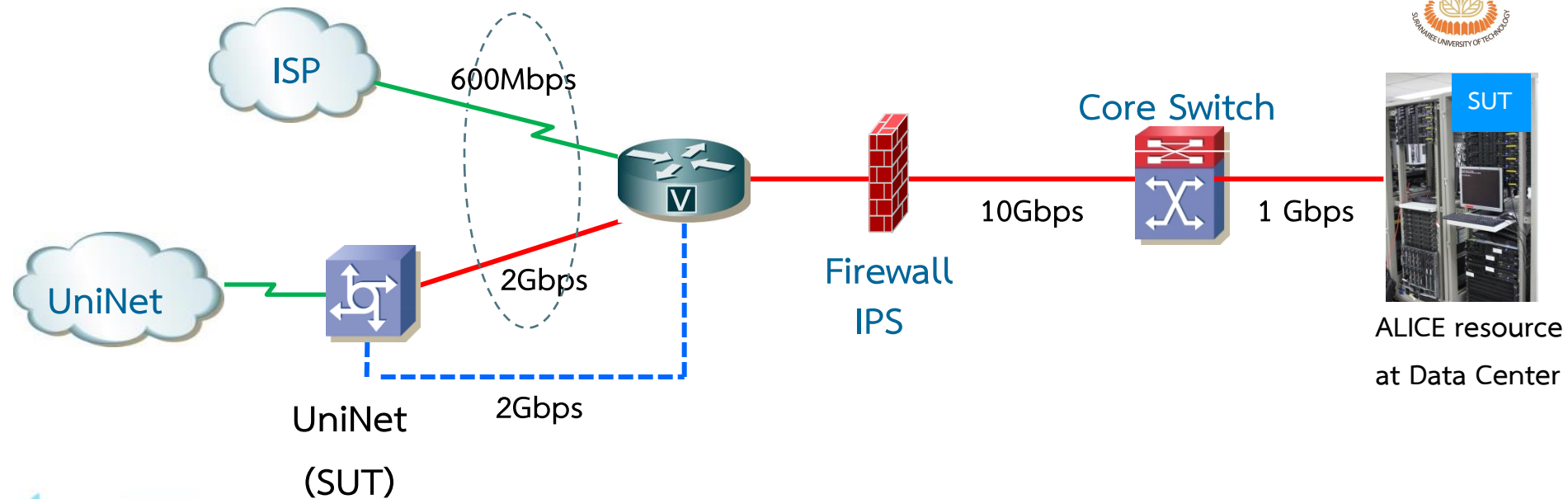
# Network



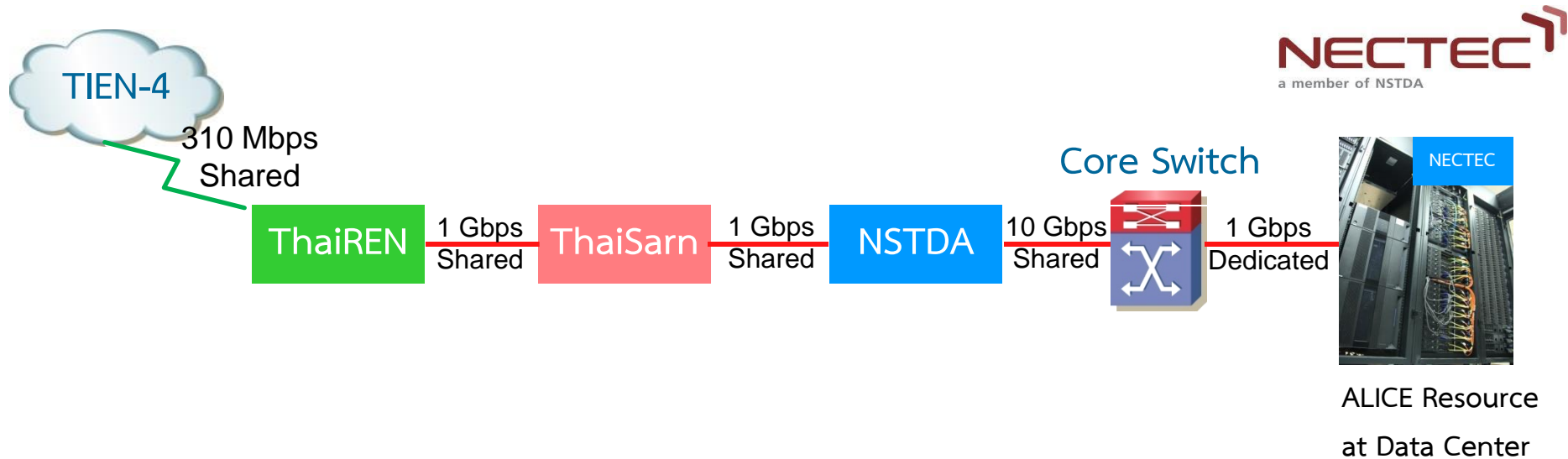
# Network Diagram Overview of THAILAND



# Network topology at SUT



# Network topology at NECTEC



# Network Provider for SUT is UniNet

## *Thailand Education and Research Network*

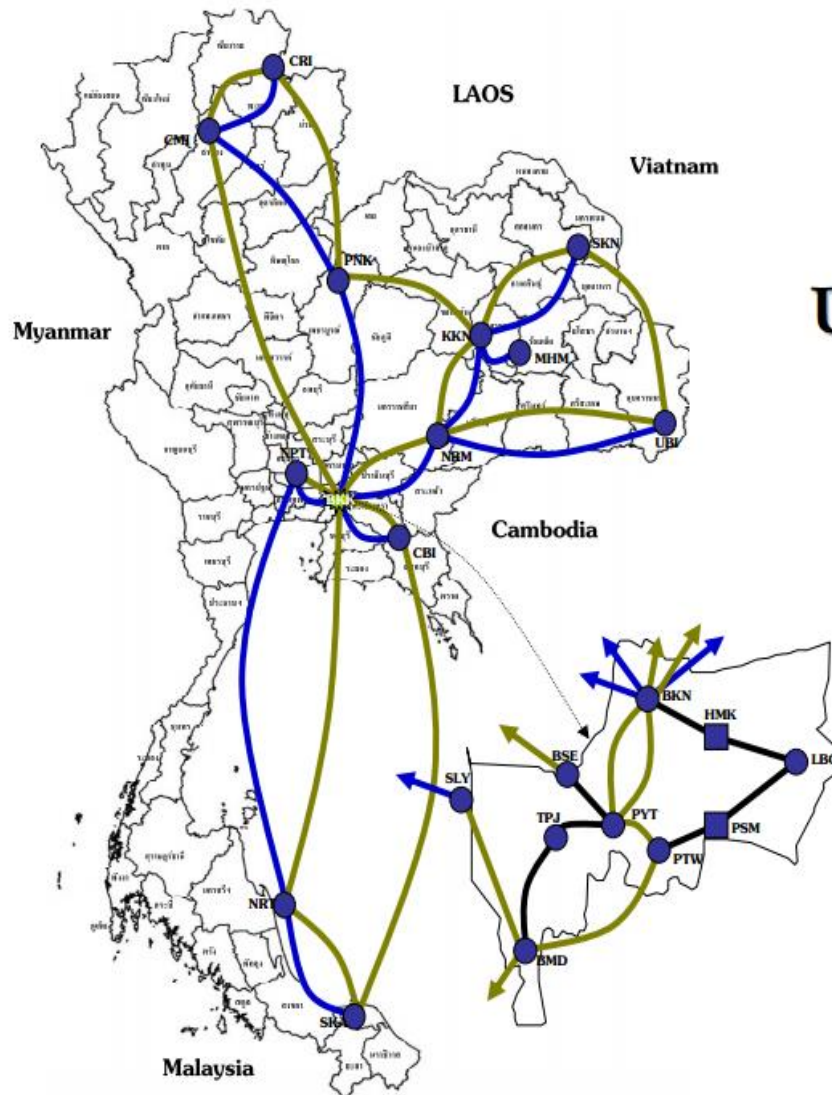
### Objectives

- internet access for Universities
- network infrastructure for research
- Facilitate IT campus for Distance Learning

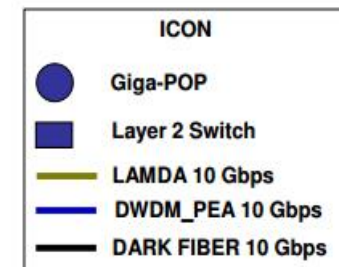
Dr. Wanchai Rivepiboon







## UniNet2 Network Topology



Dr. Wanchai Rivepiboon

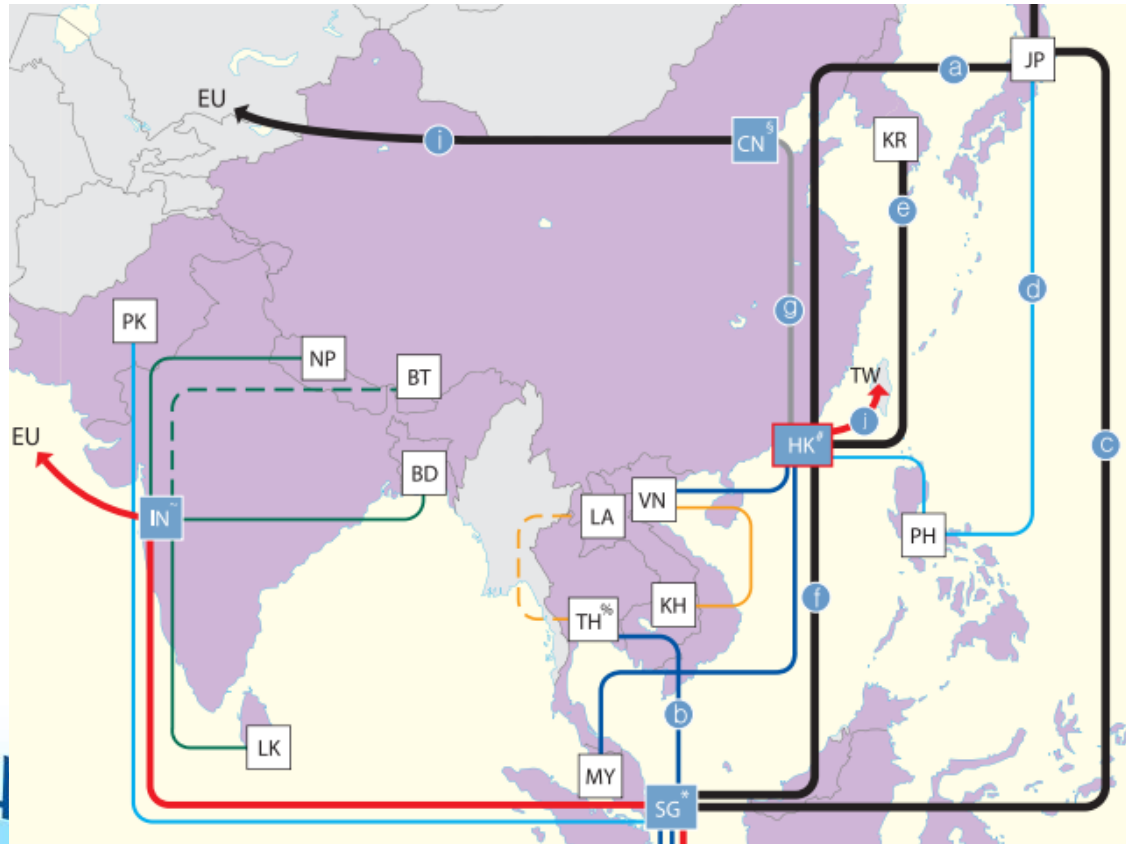


# Network provider for NECTEC is ThaiSarn

- ◎ The National Electronics and Computer Technology Center ( [NECTEC](#) ) setup a national-wide network called Thai Social/Scientific Academic and Research Network ([ThaiSarn](#))



# TEIN<sup>4</sup>



10Gbps	155 Mbps
2.5 Gbps	45 Mbps
1 Gbps	10Mbps
622 Mbps	Planned
TEIN PoPs	TEIN NOC

\* SingAREN connected to TEIN  
SG PoP at 90 Mbps

# HARNET connected to TEIN  
HK PoP at 90 Mbps

~ NKN connected to TEIN  
IN PoP at 10 Gbps

§ CERNET connected to TEIN  
CN PoP at 2 x 1 Gbps

° ThaiREN Connected to TEIN  
SG PoP at 310 Mbps

[www.tein.asia](http://www.tein.asia)

# Monitoring



# Perfsonar Toolkit

- ☉ The Perfsonar toolkit has been deployed on both SUT and NECTEC site for throughput measurement

- SUT, <http://perfsonar-alice.sut.ac.th>
- NECTEC, <http://mercury-2.lsr.nectec.or.th>

**ps-Performance Node For NECTEC In Bangkok**

**Host Information**

Organization Name	NECTEC
City, State, Country	Bangkok, BKK, TH
Zip Code	12120
Latitude, Longitude	14.082552, 100.609500
Administrator Name	Anupong Banjonglan
Administrator Email	<a href="mailto:anupong.banjonglan@nectec.or.th">anupong.banjonglan@nectec.or.th</a>

**User Tools**

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping
- Reverse Tracethrough

**Service Graphs**

- Throughput
- One-Way Latency
- Traceroute
- Ping Latency
- SNMP Utilization
- Cacti Graphs

**Toolkit Administration**

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests
- Cacti SNMP Monitoring
- perfsONAR Logs

**Performance Toolkit**

- Configuration Help
- Frequently Asked Questions
- About
- Credits

**Communities This Host Participates In**

CMS LHCONE ALICE LHC

**Host Status**

Primary Address	203.185.96.101
MTU	9000
NTP Status	Sync'd
Globally registered	Yes

**Services Offered**

- Bandwidth Test Controller (BWCTL) **Running**
  - [tcp://mercury-2.lsr.nectec.or.th:4823](http://mercury-2.lsr.nectec.or.th:4823)
  - [tcp://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:4823](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:4823)
- Network Diagnostic Tester (NDT) **Running**
  - [tcp://mercury-2.lsr.nectec.or.th:3001](http://mercury-2.lsr.nectec.or.th:3001)
  - <http://mercury-2.lsr.nectec.or.th:7123>
  - [tcp://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:3001](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:3001)
  - [http://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:7123](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:7123)
- Network Path and Application Diagnosis (NPAD) **Running**
  - [tcp://mercury-2.lsr.nectec.or.th:8001](http://mercury-2.lsr.nectec.or.th:8001)
  - <http://mercury-2.lsr.nectec.or.th:8000>
  - [tcp://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:8001](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:8001)
  - [http://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:8000](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:8000)
- One-Way Ping Service (OWAMP) **Disabled**
  - [tcp://mercury-2.lsr.nectec.or.th:861](http://mercury-2.lsr.nectec.or.th:861)
  - [tcp://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:861](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:861)
- perfsONAR-BUOY Regular Testing (Throughput) **Running**
- perfsONAR-BUOY Measurement Archive **Running**
  - [http://mercury-2.lsr.nectec.or.th:8085/perfsONAR\\_PS/services/p5B](http://mercury-2.lsr.nectec.or.th:8085/perfsONAR_PS/services/p5B)
  - [http://\[2001:f00:dfff:ffff:5054:ff:fe2c:ac07\]:8085/perfsONAR\\_PS/services/p5B](http://[2001:f00:dfff:ffff:5054:ff:fe2c:ac07]:8085/perfsONAR_PS/services/p5B)

**ps-Performance Node For Suranaree University of Technology**

**Host Information**

Organization Name	Suranaree University of Technology
City, State, Country	Nakhon Ratchasima, Northeast, TH
Zip Code	30000
Latitude, Longitude	14.876442, 102.021076
Administrator Name	Chinorat Kobdaj
Administrator Email	<a href="mailto:kobdaj@sut.ac.th">kobdaj@sut.ac.th</a>

**User Tools**

- Local Performance Services
- Global Performance Services
- Java OWAMP Client
- Reverse Traceroute
- Reverse Ping
- Reverse Tracethrough

**Service Graphs**

- Throughput
- One-Way Latency
- Traceroute
- Ping Latency
- SNMP Utilization
- Cacti Graphs

**Toolkit Administration**

- Administrative Information
- External BWCTL Limits
- External OWAMP Limits
- Enabled Services
- NTP
- Scheduled Tests
- Cacti SNMP Monitoring
- perfsONAR Logs

**Performance Toolkit**

- Configuration Help
- Frequently Asked Questions
- About
- Credits

**Communities This Host Participates In**

LHCONE ALICE LHC

**Host Status**

Primary Address	202.28.43.143
MTU	9000
NTP Status	Sync'd
Globally registered	Yes

**Services Offered**



- Bandwidth Test Controller (BWCTL) **Running**
  - [tcp://perfsonar-alice.sut.ac.th:4823](http://perfsonar-alice.sut.ac.th:4823)
- Network Diagnostic Tester (NDT) **Running**
  - [tcp://perfsonar-alice.sut.ac.th:3001](http://perfsonar-alice.sut.ac.th:3001)
  - <http://perfsonar-alice.sut.ac.th:7123>
- Network Path and Application Diagnosis (NPAD) **Running**
  - [tcp://perfsonar-alice.sut.ac.th:8001](http://perfsonar-alice.sut.ac.th:8001)
  - <http://perfsonar-alice.sut.ac.th:8000>
- One-Way Ping Service (OWAMP) **Running**
  - [tcp://perfsonar-alice.sut.ac.th:861](http://perfsonar-alice.sut.ac.th:861)
- perfsONAR-BUOY Regular Testing (Throughput) **Running**
- perfsONAR-BUOY Measurement Archive **Running**
  - [http://perfsonar-alice.sut.ac.th:8085/perfsONAR\\_PS/services/p5B](http://perfsonar-alice.sut.ac.th:8085/perfsONAR_PS/services/p5B)
- perfsONAR-BUOY Regular Testing (One-Way Latency) **Running**
- Pinger Measurement Archive and Regular Tester **Disabled**
  - [http://perfsonar-alice.sut.ac.th:8075/perfsONAR\\_PS/services/pinger/ma](http://perfsonar-alice.sut.ac.th:8075/perfsONAR_PS/services/pinger/ma)









# No SAM/SUM yet need GOCDB updated

**Site:** TH-SUT-NPP  
Edit

**Contact**

E-Mail	
Telephone	+66-4422-3306
Emergency Telephone	+66-8561-00160
CSIRT Telephone	+66-8561-00160
CSIRT E-Mail	kobdaj@g.sut.ac.th
Emergency E-Mail	
Helpdesk E-Mail	

**Project Data**

NGI/ROC	AsiaPacific
Infrastructure	Production
Certification Status	Closed Change
Scope(s)	EGI



# Ramp up



# To do lists in 2014

- ◎ Improve the network performance
- ◎ Update our data in GOCDB
- ◎ SAM/SUM monitor
- ◎ Upgrade to EMI-3



# Resource Roadmap 2015 and onwards



- Nothing changed
- Plan to upgrade in 2016 to either more CPUs, storage or network (subject to current performance evaluation)



- Nothing changed



# Outlook and plan

- ◎ Upgrade Network to IPV6
- ◎ Upgrade Xrootd with IPV6





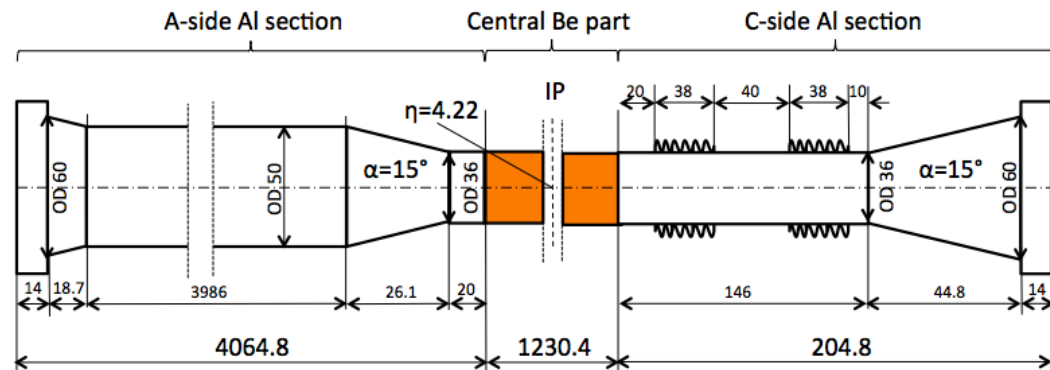
# Back Up



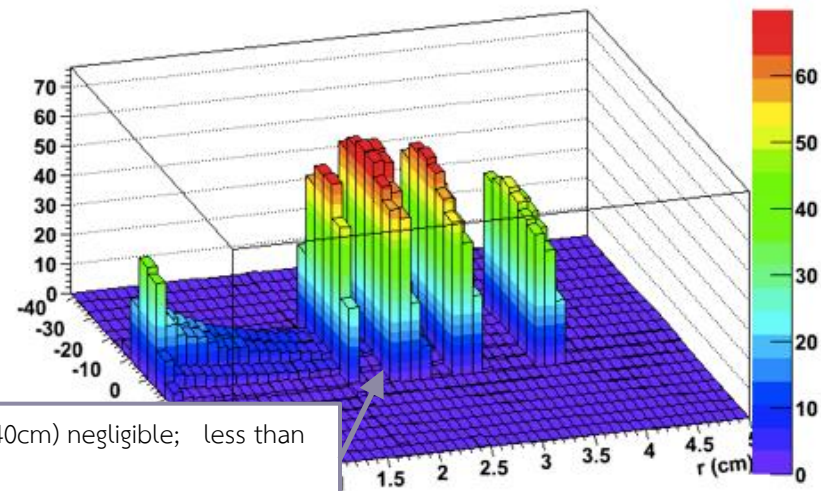
## Influence of new beampipe geometry (and material) on the induced background

➔ The technical design

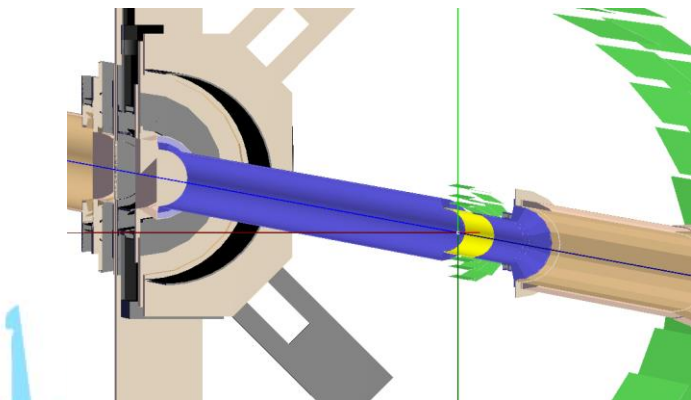
➔ AliRoot geometry



⇒ Particle Background study

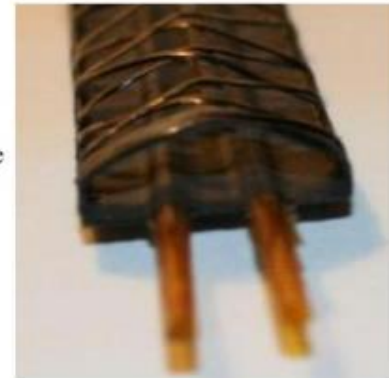
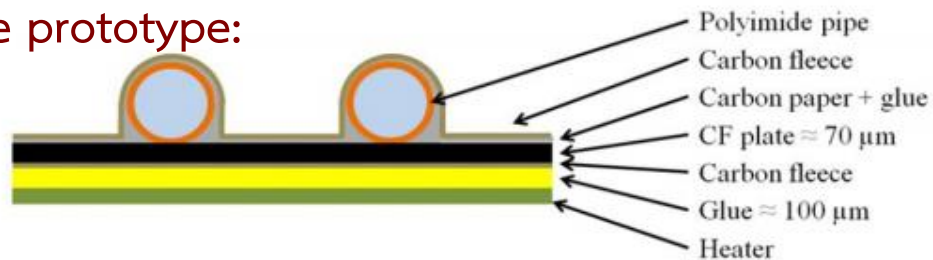


Effect of Al-part ( $|z| > 40\text{cm}$ ) negligible; less than 1 per event

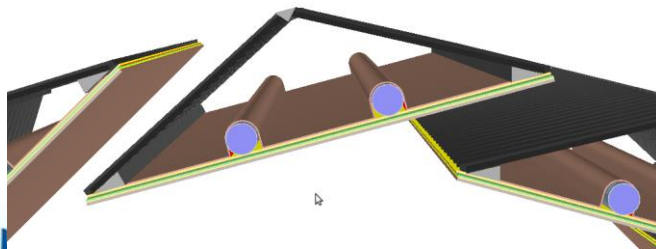


From the technical drawings to detailed material budget calculations

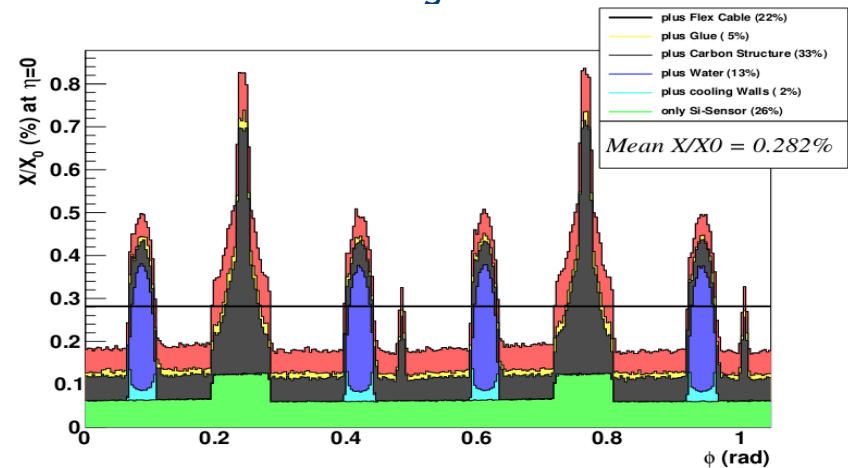
➔ Example prototype:



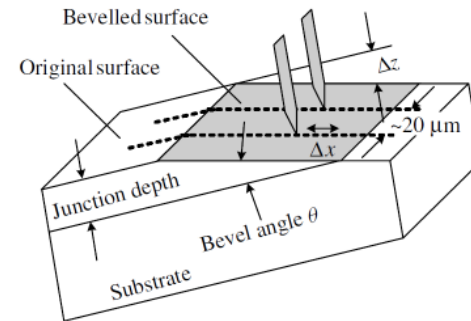
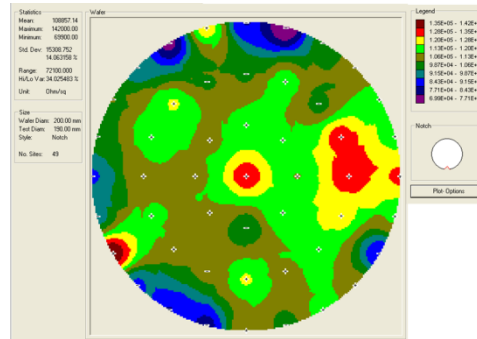
➔ AliRoot geometry



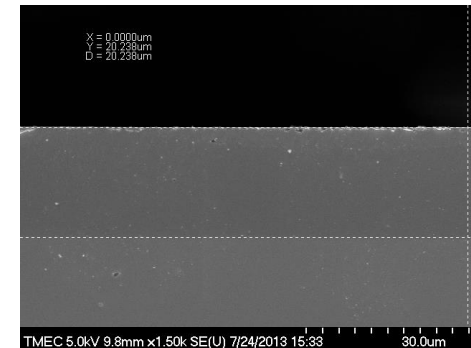
## Material Budget



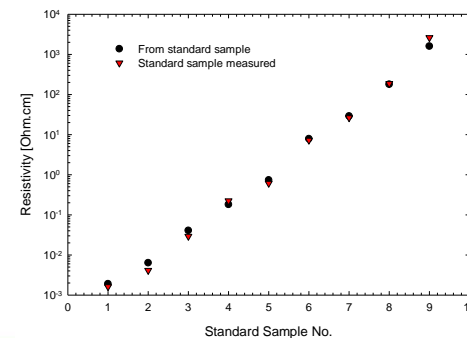
- Test of wafer resistivity (4-point probe measurement of the surface resistivity)



- SEM inspection and measurement of the epi layer thickness



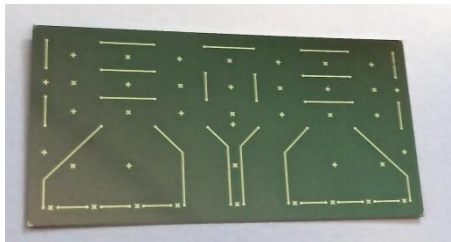
- SRP measurement in preparation



### Pad wafer production

Produce mechanical/electrical silicon dies resembling the final ALICE ITS chip

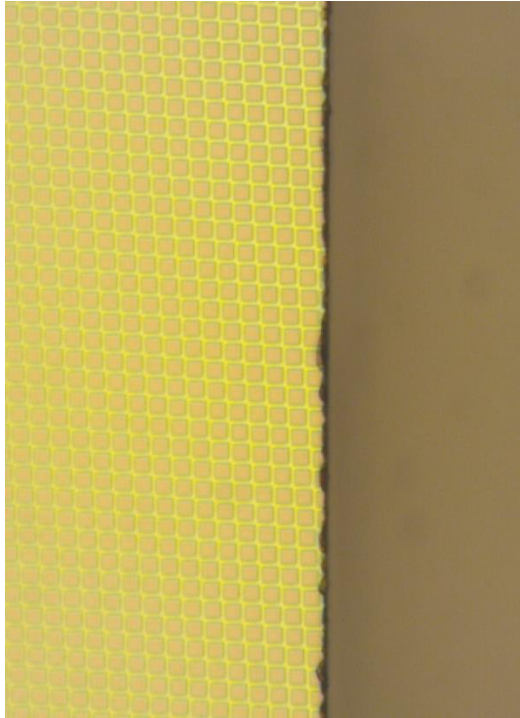
TMEC has produced wafers with the pad-pattern on 6" wafers in house with different metal finish



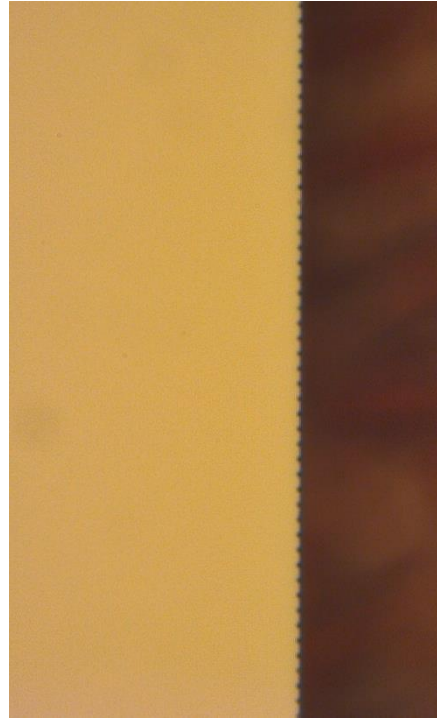
Mask layout (TMEC)



Thinning and laser dicing test using blank wafer done by TMEC partner (STARS



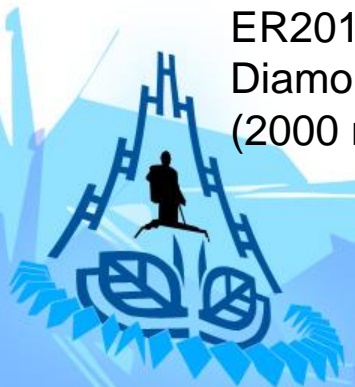
ER2013 wafer  
Diamond wheel dicing  
(2000 mesh wheel)



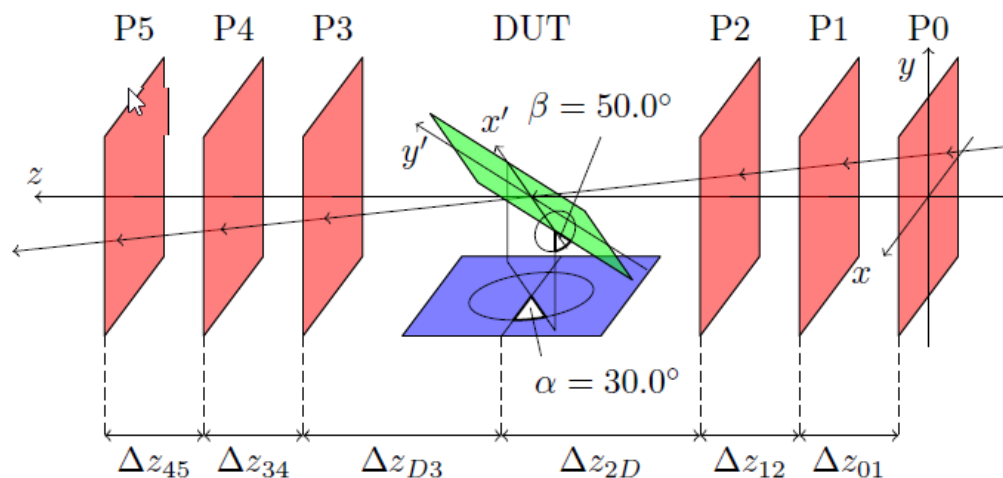
Blank wafer  
Laser diced  
(front view)



Blank wafer  
Laser diced by STARS

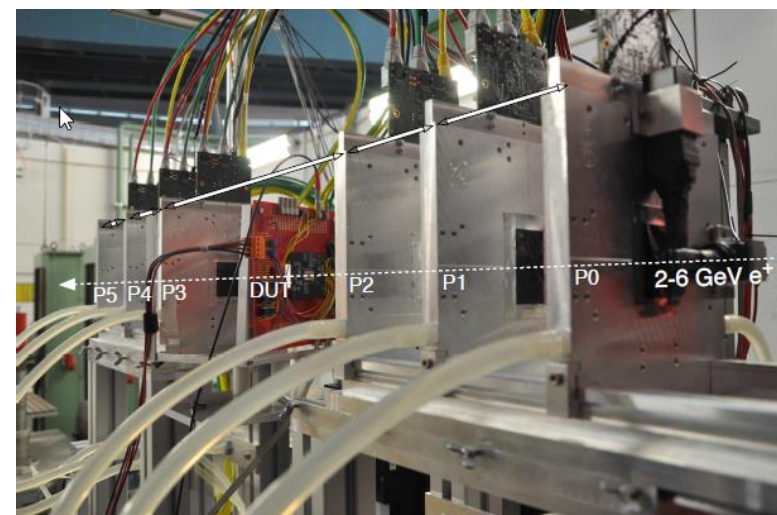


# Plan to setup similar to DESY beam test



DESY beam (4 GeV/c to 6 GeV/c  $e^+/e^-$ )

EUDET telescope (6 planes;  $\approx 5 \mu\text{m}$  resolution) + DUT



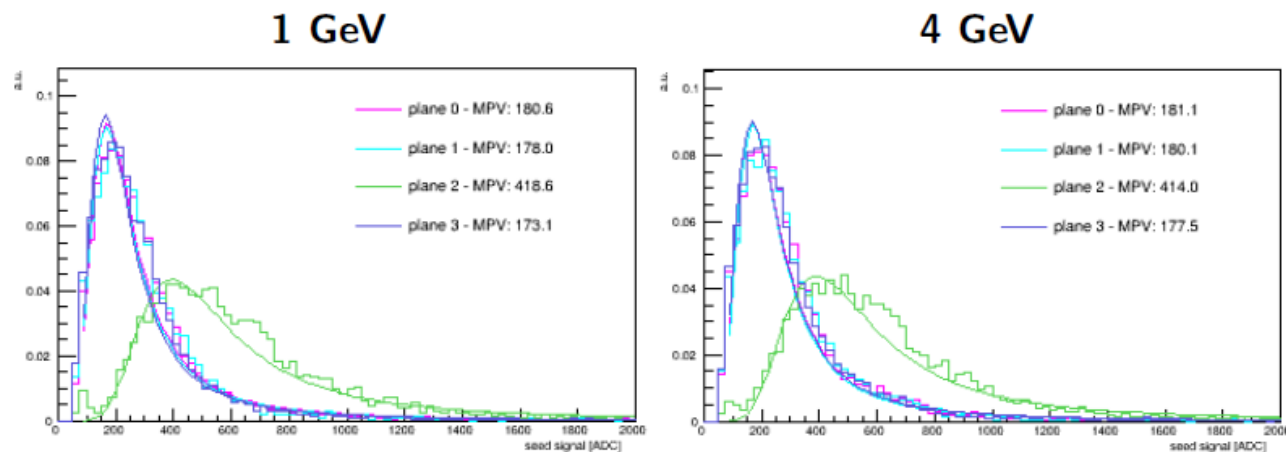
DESY beam (4 GeV/c to 6 GeV/c  $e^+/e^-$ )

EUDET telescope (6 planes;  $\approx 5 \mu\text{m}$  resolution) + DUT



## Explorer-1: 1 GeV beam

Study of feasibility of 1 GeV beam for Pixel Chip characterisation:



(plots by Narong Chanlek)

↪ First results look very promising, study ongoing!

