

Status of Japanese Activities for Double Chooz experiment

Nu 2-WP2:
R&D of detectors for future high statistics, high precision experiment

**F.Suekane,
Tohoku Univ.**

**2008.5.15
FJPPL Workshop @ CEA**

Application for LIA Project (2007)

ID: Title	Nu2-WP2: R&D of detectors for future high statistics, high precision experiment (R&D for reactor anti-neutrino experiments.)					
Members	French Group			Japanese Group		
	Name	Title	Affiliation	Name	Title	Affiliation
	<u>Leader</u> H. de Kerret	Dr.	IN2P3	<u>Leader</u> F.Suekane	Assoc. Prof.	Tohoku U.
	Th. Lasserre	Dr.	DAPNIA/APC	N.Tamura	Prof.	Niigata U.
	M.Cribier	Dr.	DAPNIA/APC	T.Sumiyoshi	Prof.	Tokyo Metropolitan U.
	A.Tonazzo	Dr.	IN2P3	M.Kuze	Associ. Prof.	Tokyo Inst. Technology
	D.Motta	Dr.	DAPNIA			

4 members from Japan

	French Teams				Japanese teams			
	Item		Euro	Supported by	Item		k Yen	Supported by
Budget Plan	&travel+stay KEK		2300	DAPNIA	Travel+per-diem	400		
	1 travel+stay Sendai		2800	DAPNIA	# of travels	3	1200	JSPS
	1travel+stay Sendai		2800	IN2P3				
	Total		7900				1200	

3 travels:

5/29-6/1 Collaoboration meeting @Chooz, F.Suekane

12/11-12 Meeting @ Chooz

N.Tamura, M.Kuze

2008 proposal

Application Form for FJPPL Projects

2008 April 1st-2009 March 31st

(Examples or comments shown in red must be removed before submission)

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	D.Motta	Dr.	DAPNIA	T.Kawasaki	Dr.	Niigata U.

+1 Person

<p>Summary of Project</p>	<p>Measurement of neutrino mixing angle θ_{13} is one of the most important subjects of next-generation neutrino experiments. Reactor based θ_{13} measurement has good characteristics such as pure $\sin^2 2\theta_{13}$ is possible with a modest cost. The Double Chooz experiment is a world wide collaboration, within which Japan and France have together a leading part. The procurement detector components is under way, and its on site inside will start in March 2008. Data taking is expected to start in April 2009..</p> <p>In the year 2008, it is expected that the Japanese team will frequently visits the Chooz site in order to install PMT in the detector and to operate it.</p>							
<p>Budget Request</p>	<p>French Teams</p>				<p>Japanese Teams</p>			
	<p>Item</p>		<p>Euro</p>	<p>Supported by</p>	<p>Item</p>		<p>k Yen</p>	<p>Supported by</p>
	<p>&travel+stay KEK</p>		<p>2300</p>	<p>DAPNIA</p>	<p>Travel+per-diem</p>	<p>400</p>		
	<p>1 travel+stay Sendai</p>		<p>2800</p>	<p>DAPNIA</p>	<p># of travels</p>	<p>6</p>	<p>2400</p>	<p>JSPS</p>
	<p>1travel+stay Sendai</p>		<p>2800</p>	<p>IN2P3</p>				
	<p>Total</p>		<p>7900</p>				<p>2400</p>	

2x More Frequent trips

Japanese Tasks for DC

PMT System

Tohoku Univ.

F. Suekane

Tokyo Metropolitan U.

T. Sumiyoshi

PMT Simulation

Niigata Univ.

T. Kawasaki

Niigata Univ.

N. Tamura

DAQ/Monitor

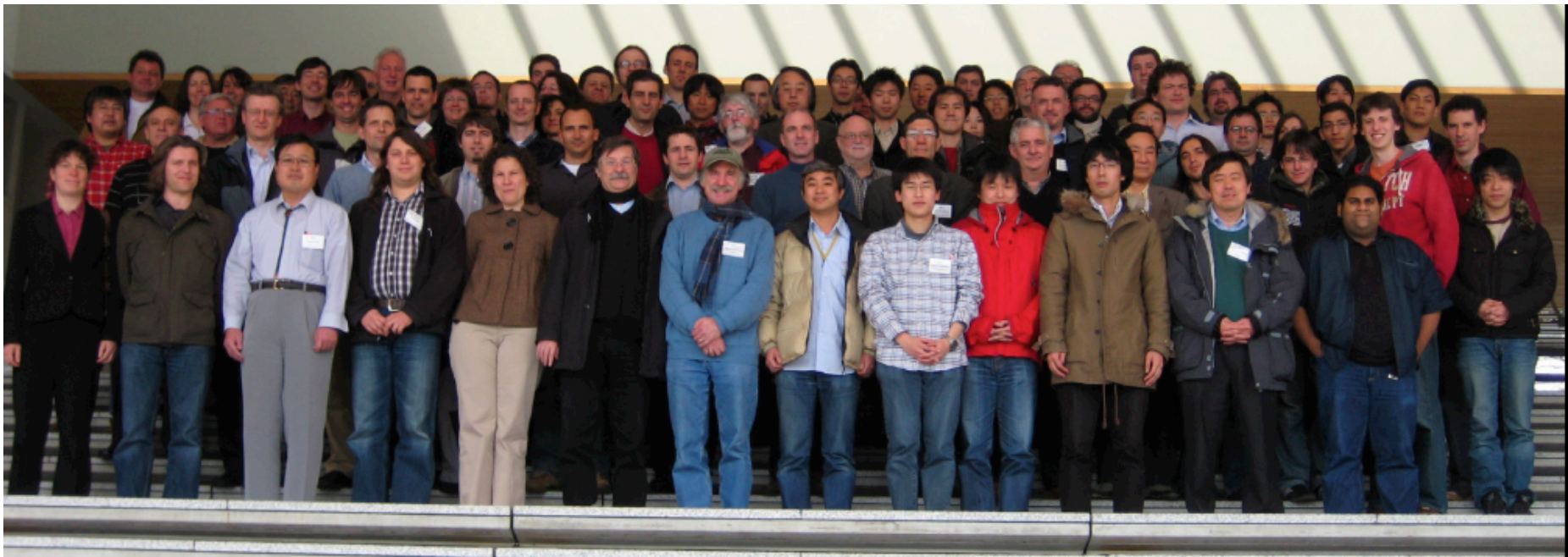
Tokyo Inst. Tech.

M. Kuze

+ DC/Japan Collaborators (~15)



& Hosted DC Collaboration Meeting @ Kobe Univ. 2008.3.3-5



2008.5.15

FJPPL Suekane

7

Double Chooz Inner PMT

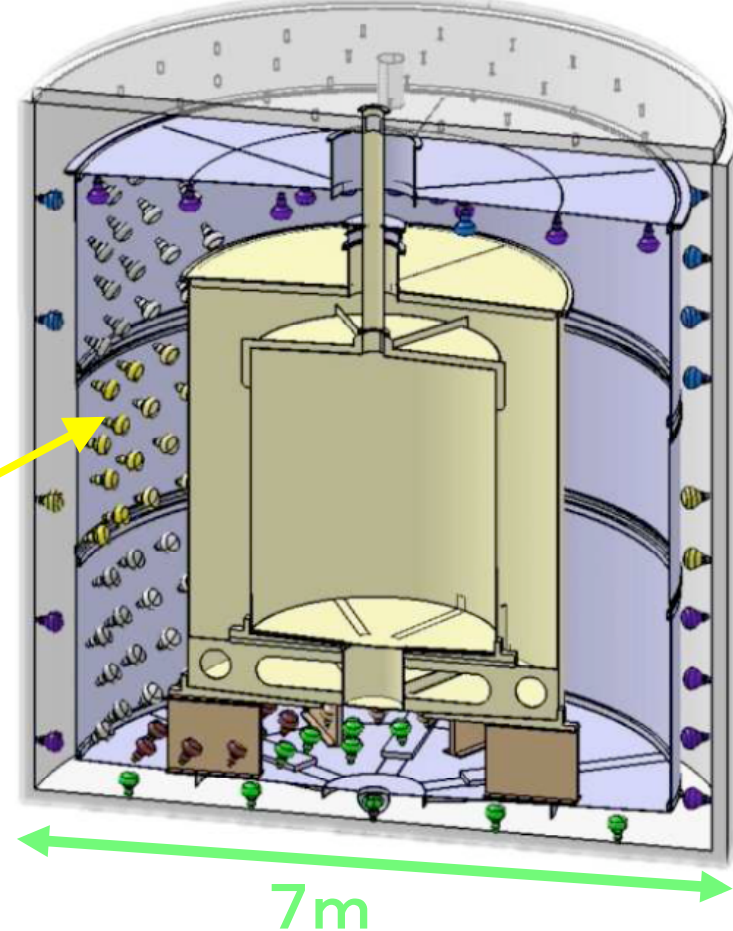
Japan: (Organizer)
R&D, Preparation, Tests,

Spain:
Mechanical Structure,
Magnetic Shield, ...

Germany:
Preparation, Tests ...

USA:
On site test. Database

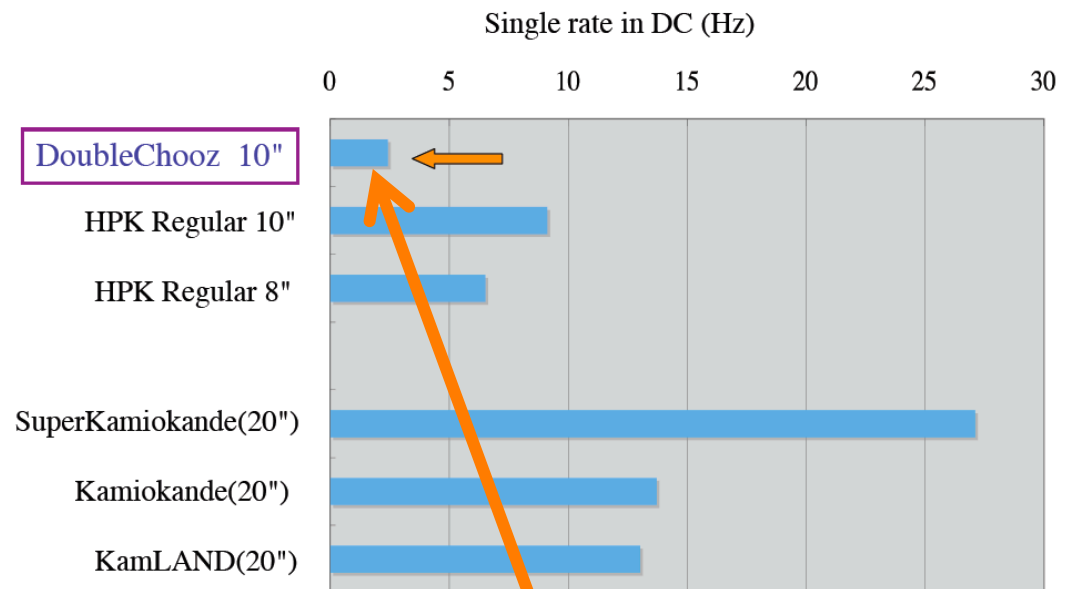
390 10 inch PMTs



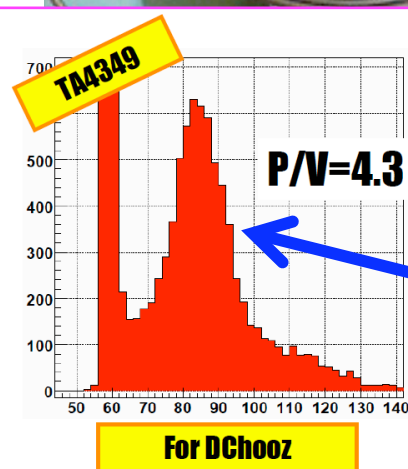
R&D for new 10" PMT



Background from PMT



1/10 of SuperK glass

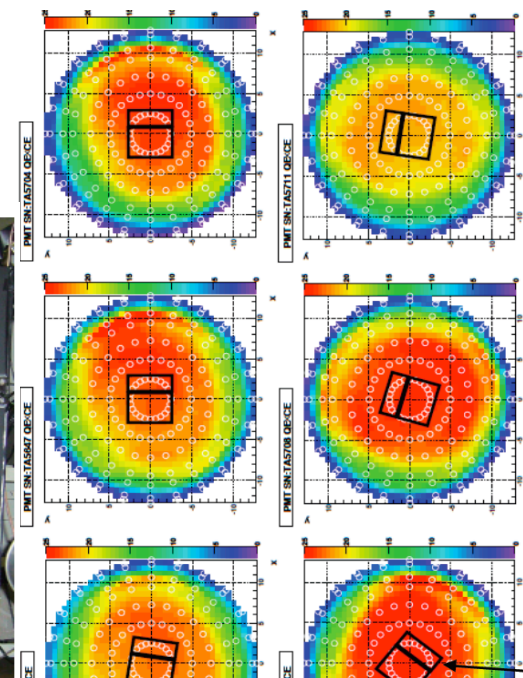
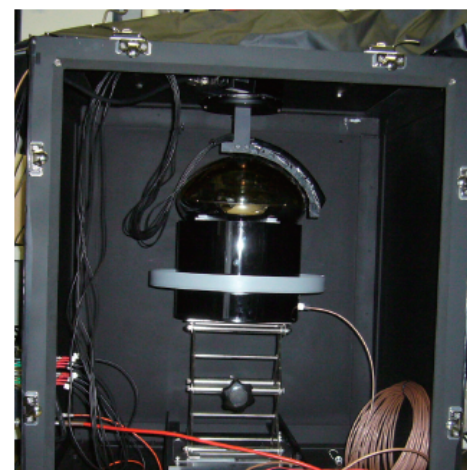


**Clear 1pe
Signal**

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PMTs Production

Arriving 50PMT/mo



Characterizations for all PMTs are in progress

Online Data Acquisition

Japanese tasks:

- Run Control (interface to Event Builder, human interface and monitoring processes)
Y. Nagasaka (Hiroshima IT),
Y. Sakamoto (Tohoku Gakuin) + students
- Data Quality Monitoring (interface with all sub-detectors)
M. Kuze (Tokyo Tech) + students

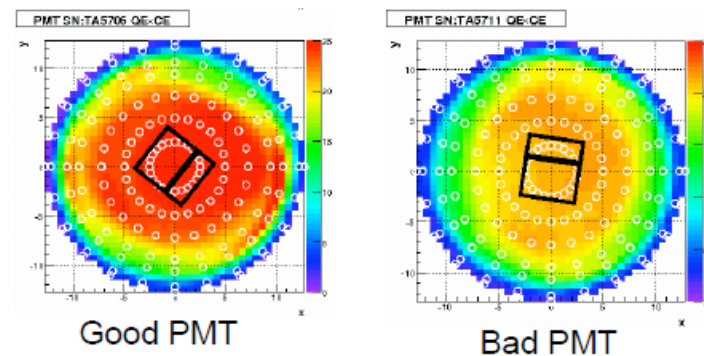
Both developments in close contact with
APC/Paris DAQ team

Software/Monte Carlo

Japanese tasks:

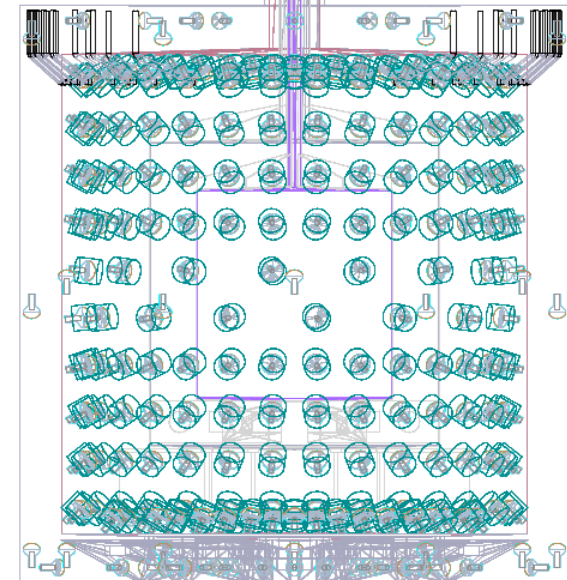
- Since DC-Japan group has important role on PMT development/delivery.
 - Contribute to the PMT related part in Detector/DAQ simulator development
 - Check the performance and develop software tools related to PMT.
- T.Kawasaki(Niigata) leads Japanese activity on Software/Monte Carlo with students in Kobe, Tokyo metro, Niigata, Tokyo-IT, Tohoku

PMT test in Japan

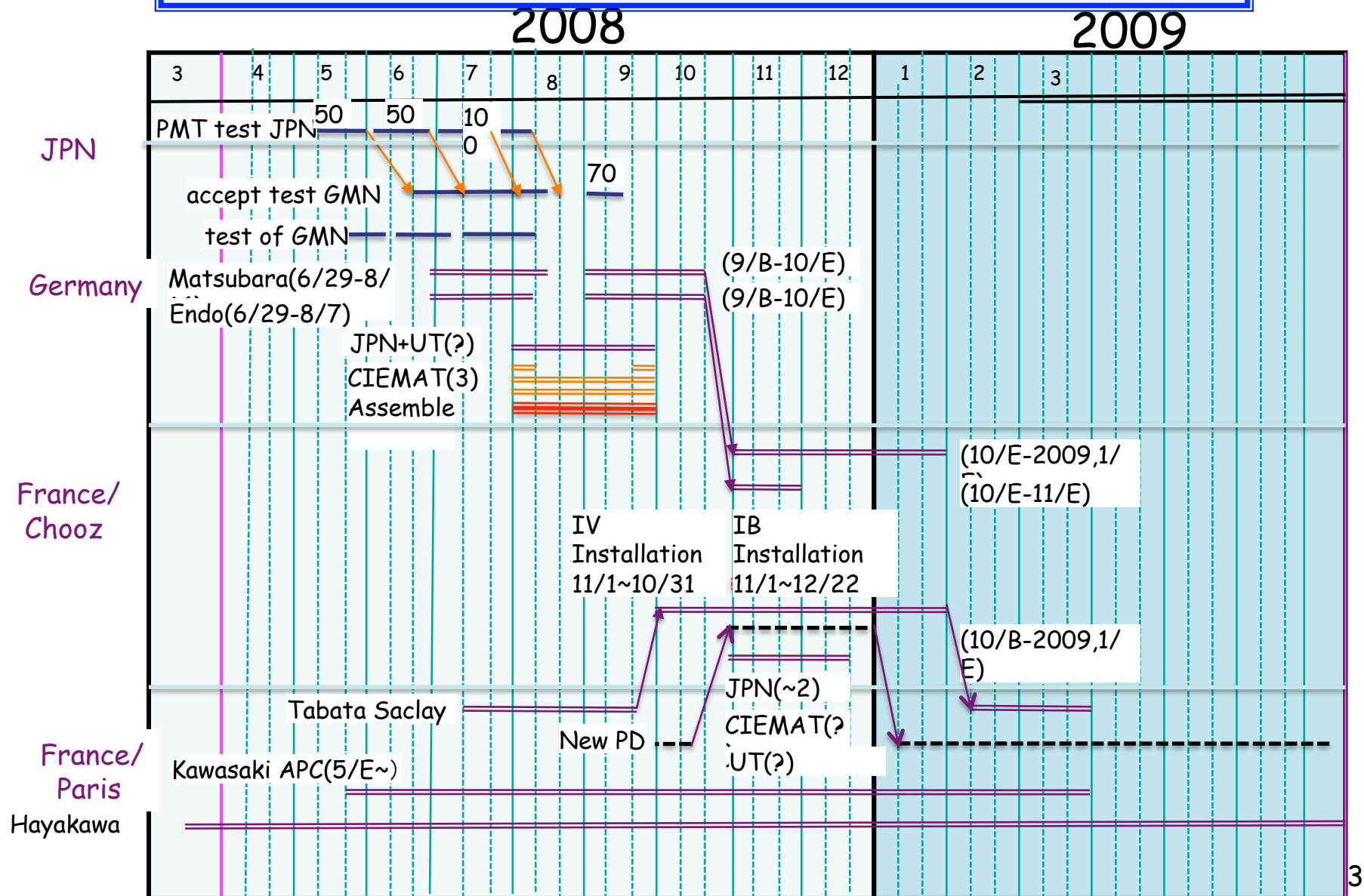


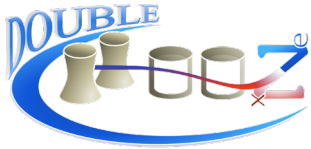
Implement Measured
PMT characters

Virtual Detector



2008 plan; The year of construction: A lot of travels & stays.





Conclusions & outlook

The whole DoubleChooz Activities:

Moving towards the construction phase ...

- may 2008 → Start of the detector integration
 - shielding the 5th of May
 - PMTS 6 months later
- summer 2009 → Start of phase I : Far 1 km detector alone - 1 km

$$\sin^2(2\theta_{13}) < 0.06 \text{ in 1,5 year}$$

World best sensitivity foreseen from end 2009

- End 2010 → Start of phase II : Both near and far detectors - 400 m + 1 km

$$\sin^2(2\theta_{13}) < 0.030 \text{ in 3 years}$$

Complementarity with Superbeam experiments: T2K, Nova

& Japanese Activities:

- High quality PMT is successfully developed.
Production & characterization are on going.
- Since 2007, Japanese group is involved in the Simulation & DAQ/Monitor.
- 2008 is the year of detector construction.