

China Jinping Underground Laboratory

CJPL-I and CJPL-II

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THU/IHEP

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CJPL 

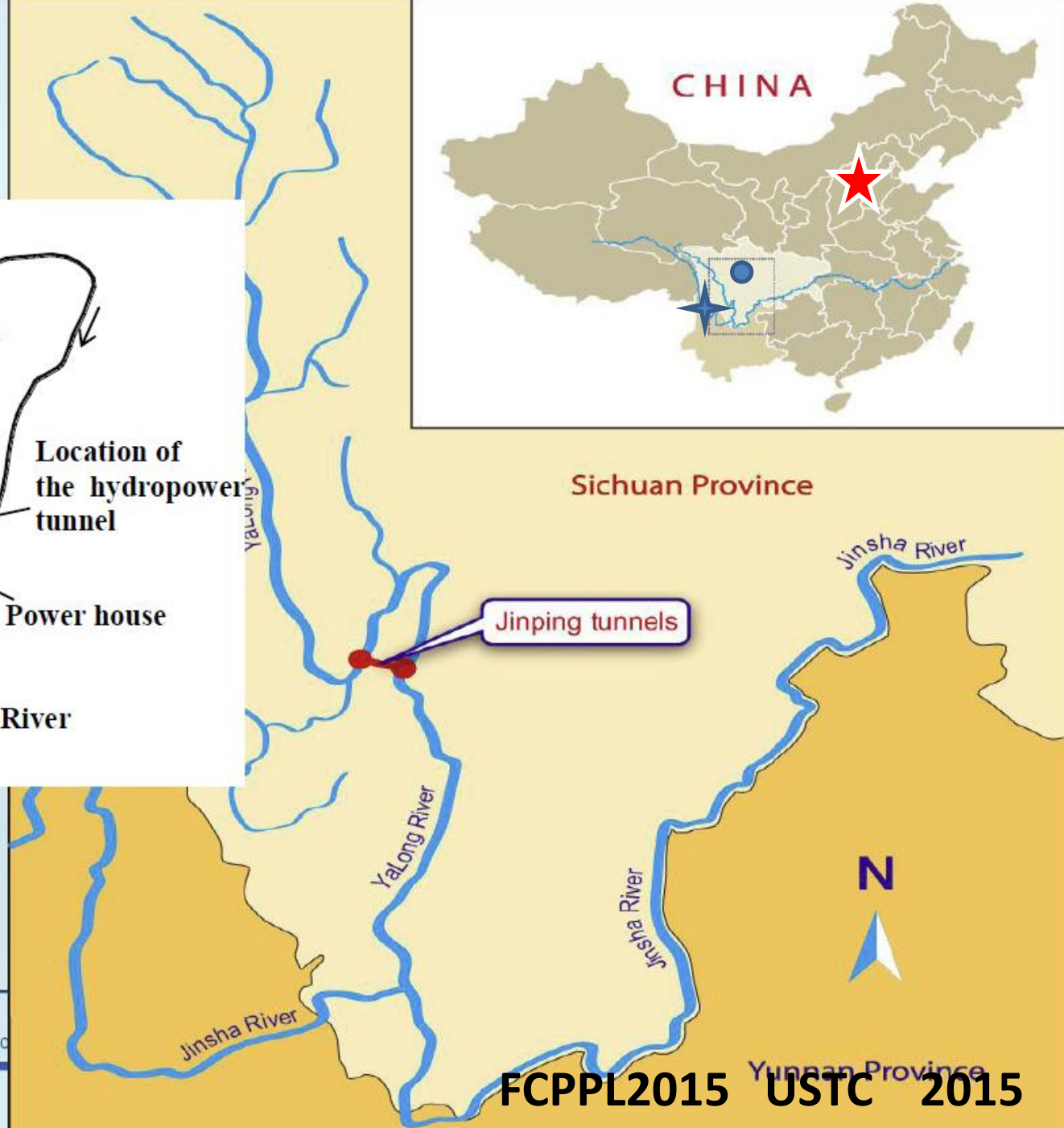
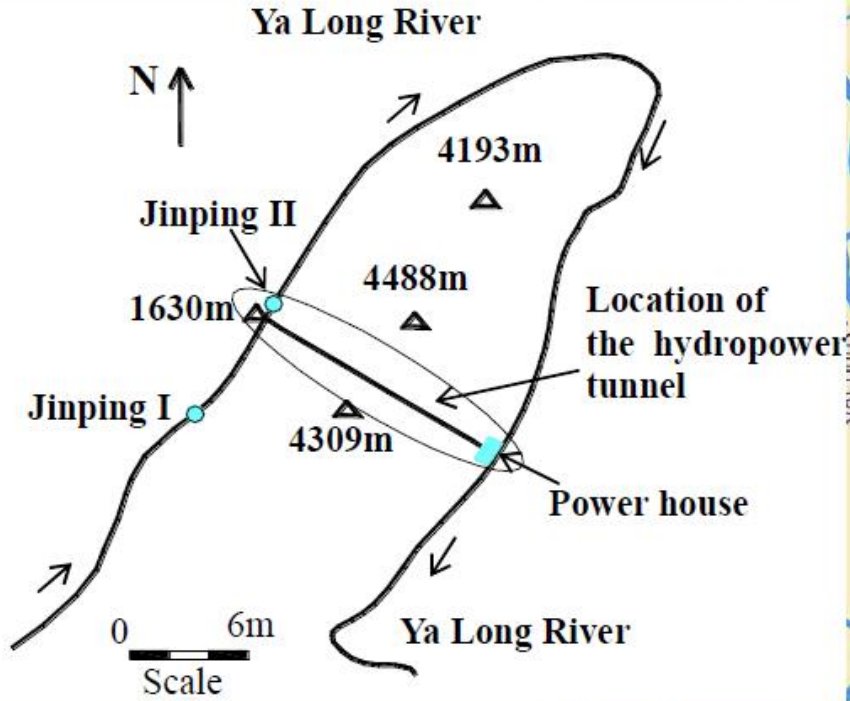
中国锦屏地下实验室
China Jinping Underground Laboratory

FCPPL2015 USTC 2015

Outline

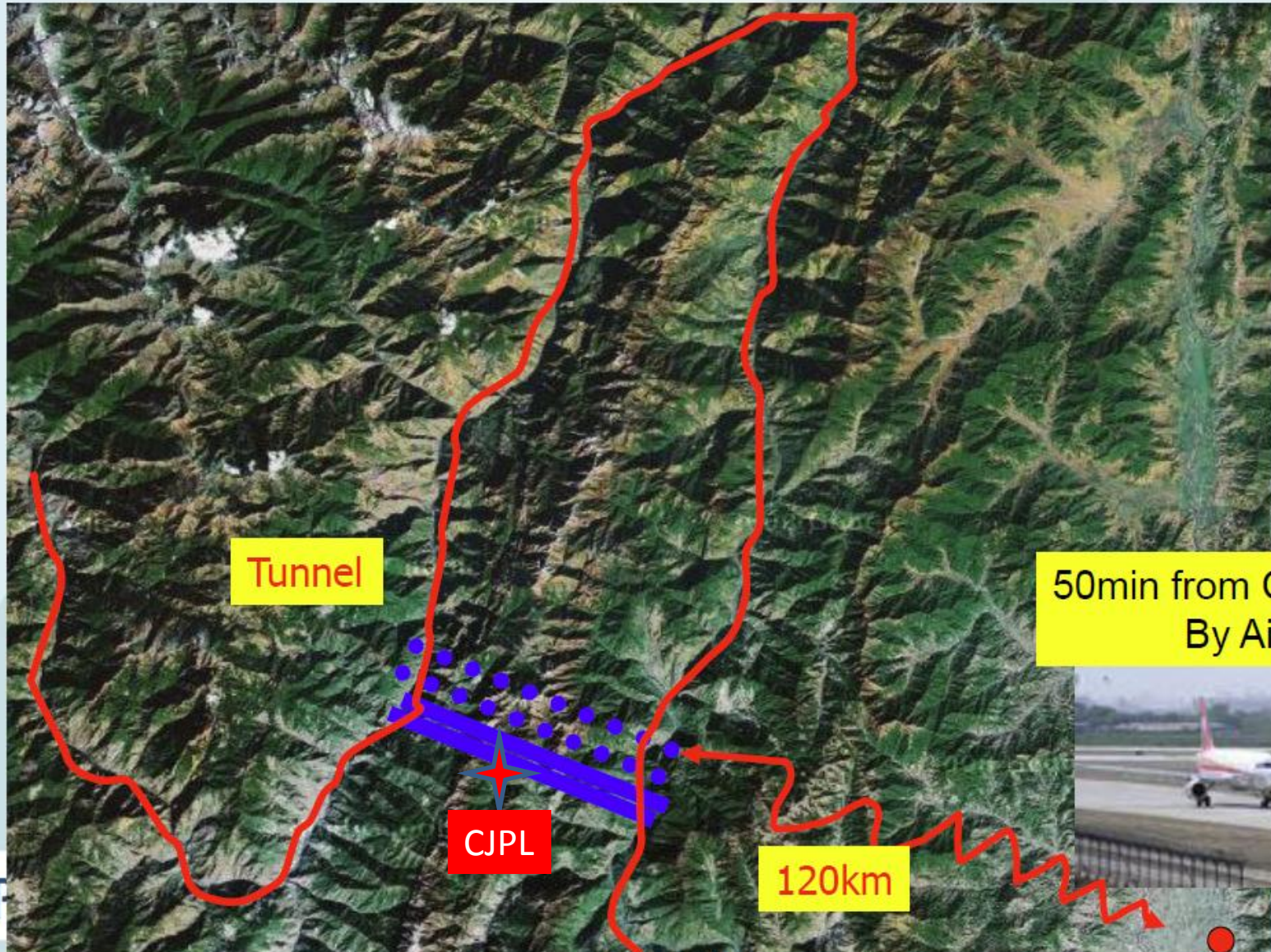
- Where is the CJPL
- How to go to CJPL
- What is status of CJPL-I
- The future of CJPL : CJPL-II

CJPL Site



中国锦屏地
China Jinping Undergro

Going to Jinping Mountain and CJPL

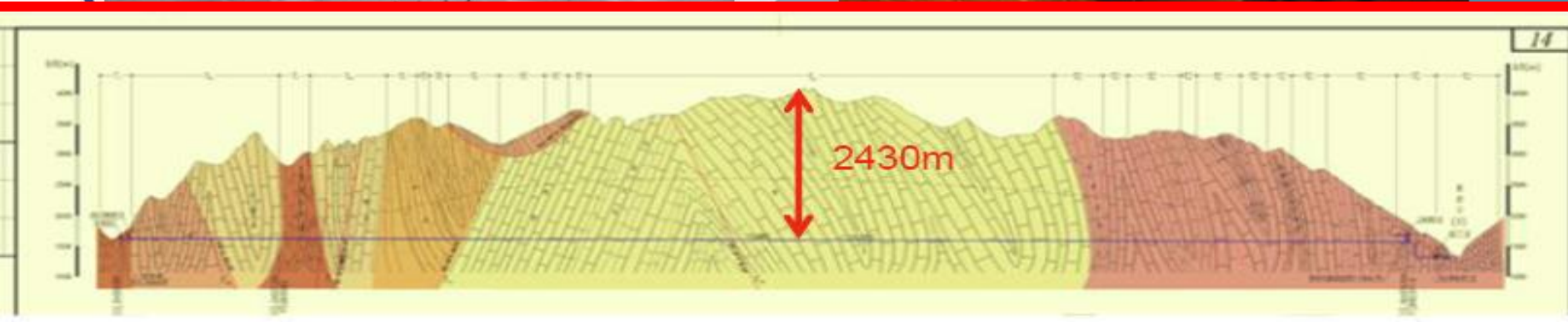


CJF

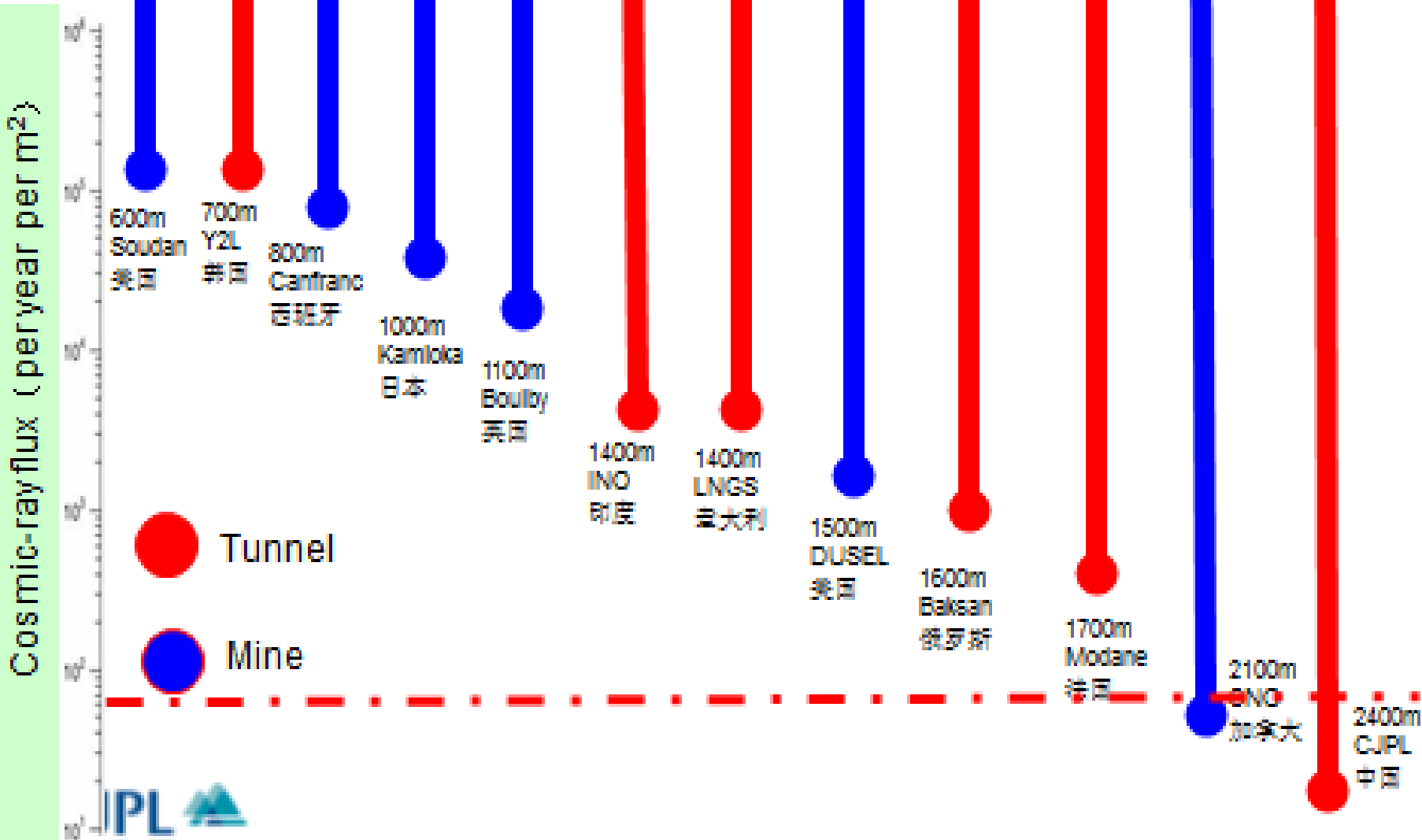
1st meeting of CJPL
international advisory

XiChang

Road and Tunnel



CJPL is Deepest Underground Laboratory for Physics Study



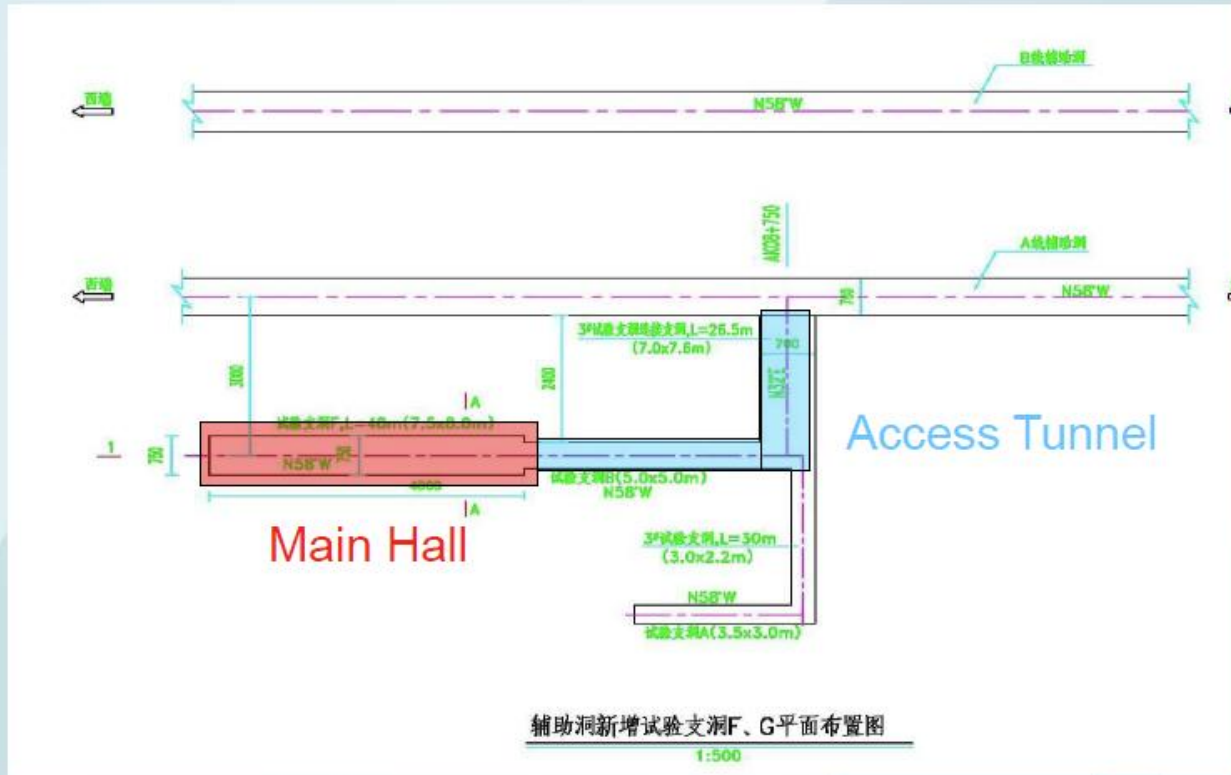
Living Condition near CJPL



Office Building



The Layout of CJPL-I



- Main hall: 6.5*6.5*40m
- Total Volume: ~4000m³

CJPL – Status - Ventilation System (2011)



Three Projects in CJPL – I

PE room

✓ CDEX

✓ CJPL LBF

✓ PandaX :



Muon Flux Measurement

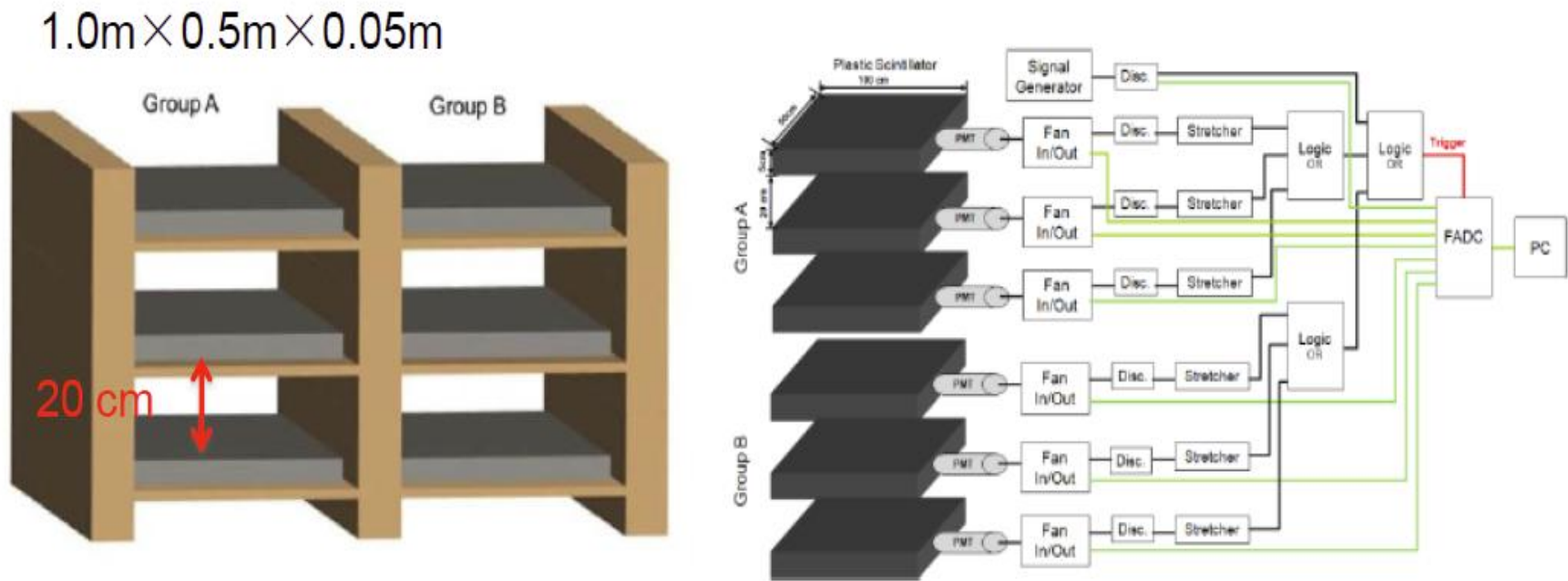
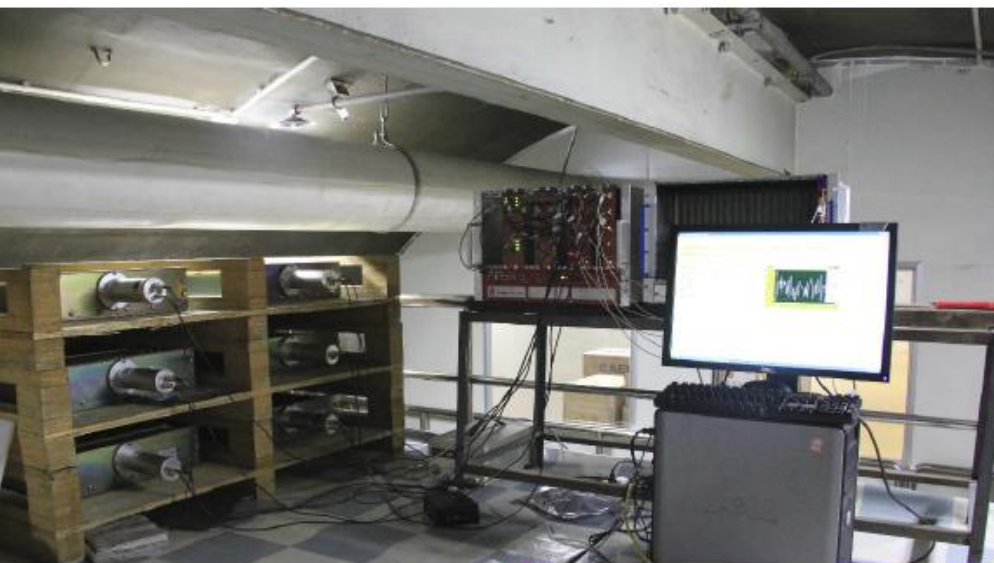


Fig. 2 Schematic layout of cosmic ray muon detector system. The left figure depicts the plastic scintillation detectors on a wooden shelf; the right figure illustrates the schematic diagram of electronics system.

A telescope system consisting of **2 groups**, both of them is composed of **3 plastic scintillation detectors**.



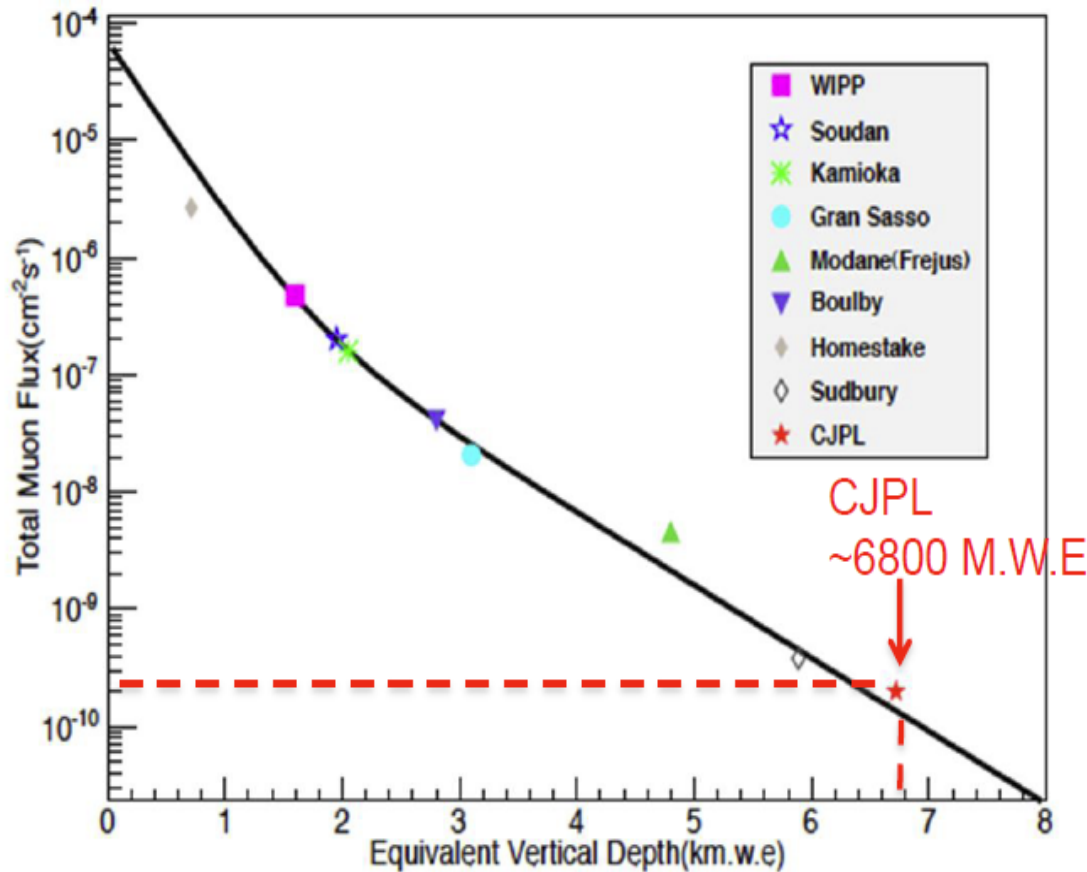
Testing on the ground



Measurement underground

From Nov. 2010 to Dec. 2011, 231 days measurement, Muon flux in CJPL:

$$(2.0 \pm 0.4) \times 10^{-10} \text{cm}^{-2}\text{s}^{-1}$$



In-situ Gamma Measurement



(a) Location point 1



(b) Location point 2



(c) Location point 3



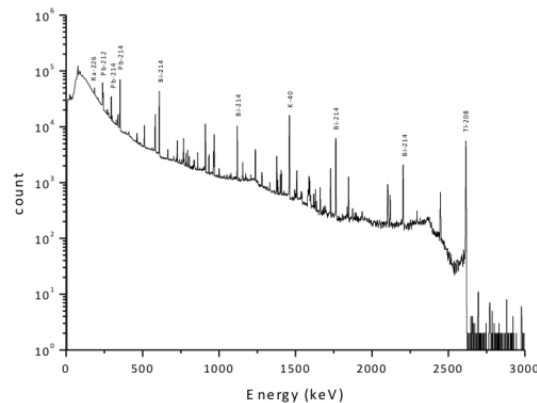
(d) Location point 4

In-situ Gamma Background

Gamma peak count rates (cps) of primordial radionuclides at CJPL and other laboratories

Laboratories	Country	Measurement point	352 keV	609 keV	911 keV	1461 keV	2615 keV
			^{214}Pb (^{238}U)	^{214}Bi (^{238}U)	^{228}Ac (^{232}Th)	^{40}K	^{208}Tl (^{232}Th)
Gran Sasso	Italy	Hall A	0.425	0.332	0.060	0.195	0.036
Modane	France	gamma detectors' hall	0.731	0.601	0.150	0.466	0.103
Boulby	UK	Main Lab	0.162	0.110	0.047	0.509	0.020
<u>CJPL</u>	China	tunnel cave	0.219	0.186	0.008	0.021	0.007
		experimental hall	0.845	0.698	0.105	0.165	0.092

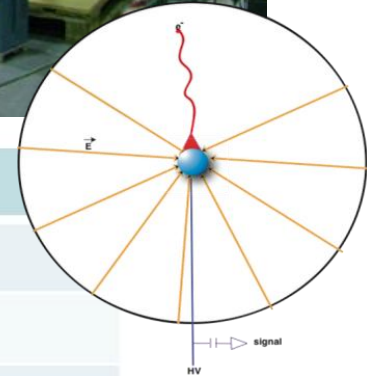
REF: J Radioanal Nucl Chem, 2014, 301:443-450



Thermal Neutron Measurement

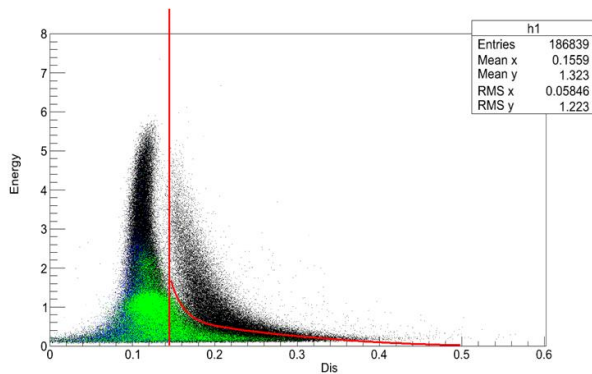
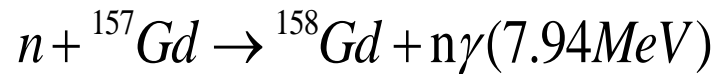
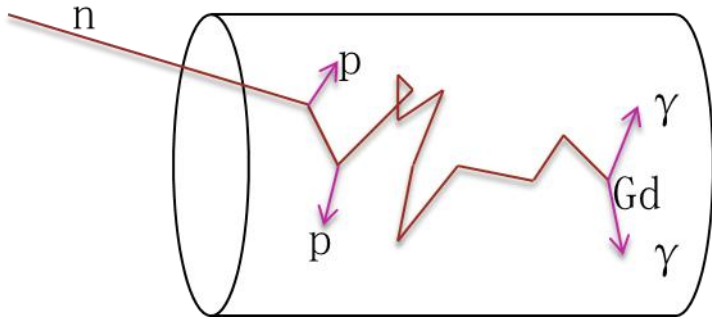


LPSD prototype



	Main hall	PE room
ROI cps	34.11 cpd	3.71 cpd
A cps in ROI	4 cpd	4.4 cpd
Thermal neutron cps	~30 cpd	< 1 cpd
Thermal neutron flux	$4.34 \times 10^{-6} \text{ n/cm}^2/\text{s}$	$< 1.45 \times 10^{-7} \text{ n/cm}^2/\text{s}$

Fast Neutron Measurement (liquid scintillation + Gd)



F-S coincidence + PSD

Very Preliminary Result

Total time	237.71 d
Live time (%)	99.48
Coincidence counts	23.7 ± 0.5
Final neutron counts	1877 ± 44
Detect efficiency(%)	1.52 ± 0.06
Total number of neutron	$(1.241 \pm 0.057) \times 10^5$
Detector section	$(1546.3 \pm 1.4) \text{ cm}^2$
Flux of neutron	$(3.91 \pm 0.18) \times 10^{-6} \text{ n cm}^{-2} \text{ s}^{-1}$

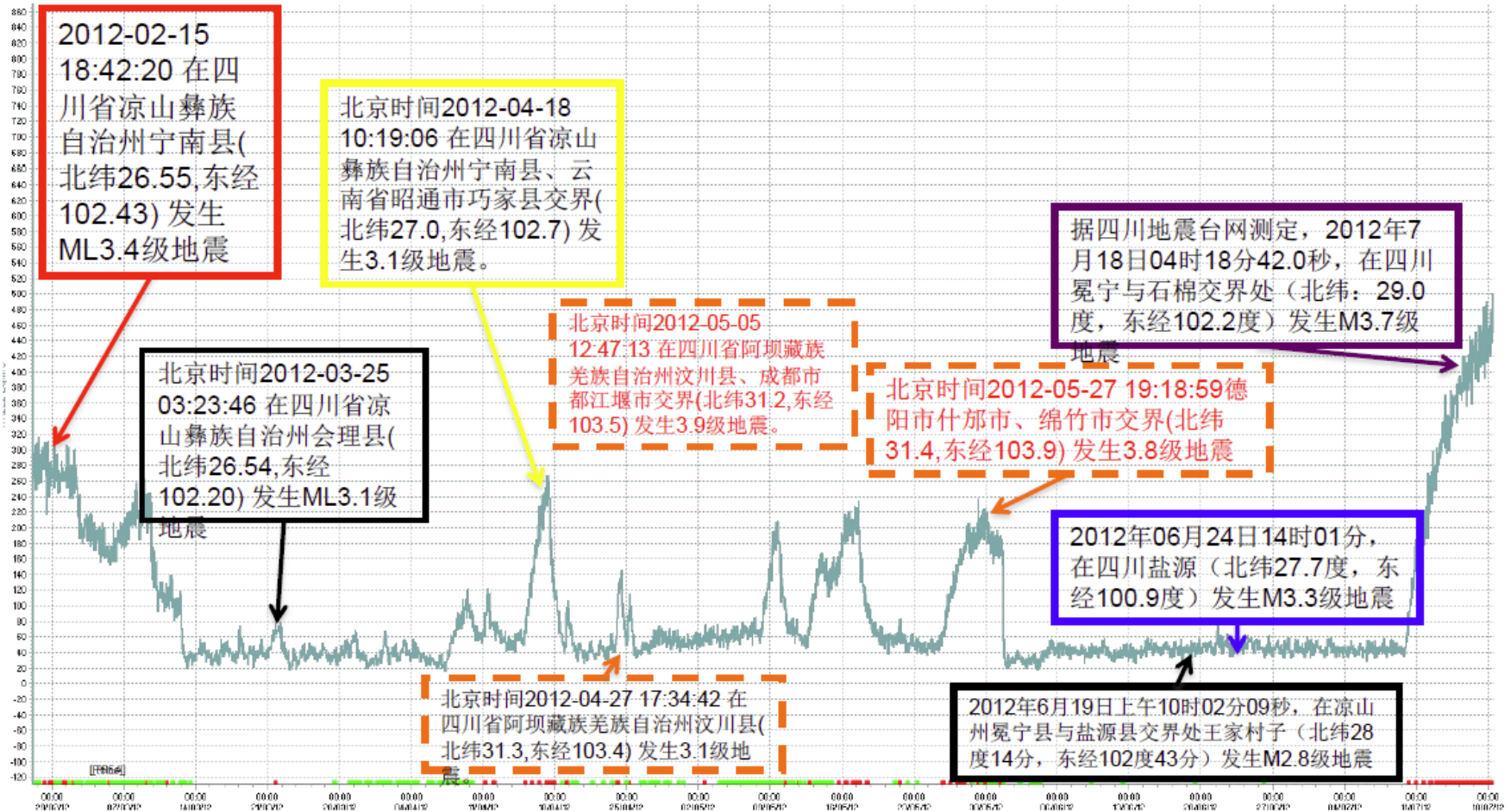
Air Radon concentration



	2010 (12.10-12.31)	2011 (01.01-09.25)	2012 (02.27-12.31)	2013 (01.01-08.04)
Average (Bq/m³)	101.03	88.42	56.72	120.93
Standard var. σ (Bq/m³)	14.23	25.19	16.46	25.72
X+3σ	143.73	164.00	106.09	198.09
X-3σ	58.34	12.85	7.36	43.77
Maxium(Bq/m3)	140	164	106	198
Minium(Bq/m3)	60	19	16	44

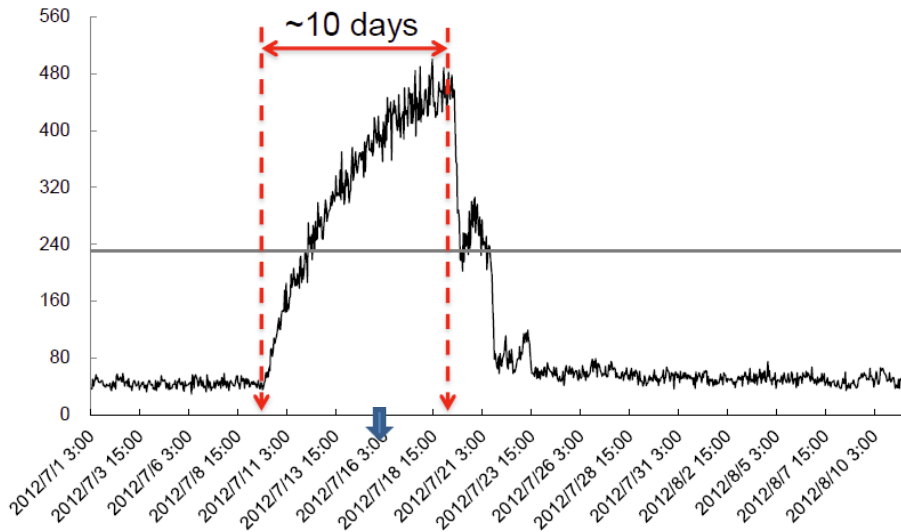
The Concentration is lower while ventilation system works

Radon variation VS earthquake

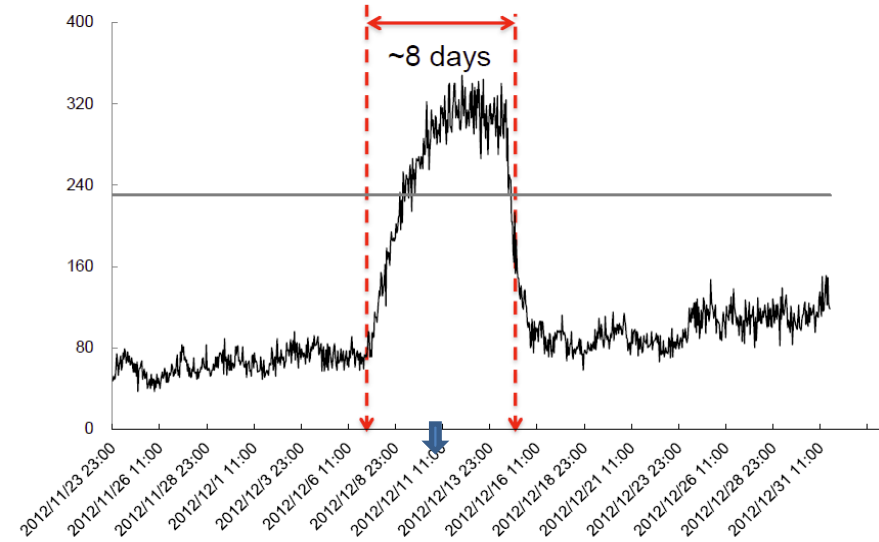


Radon variation VS earthquake

Rn222(Bq/m3)



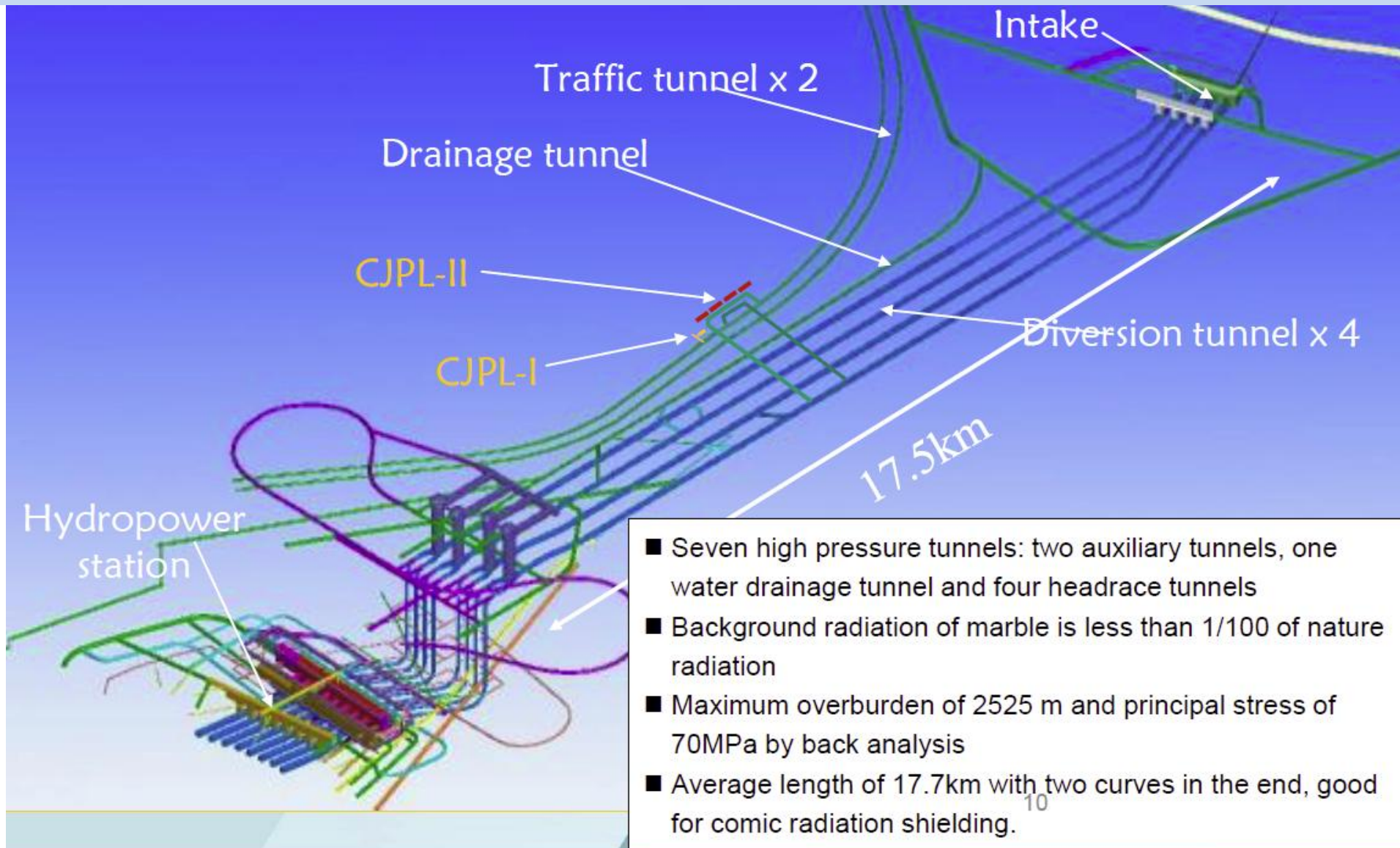
Earthquake M3.7, on 04:18:42, July 18, 2012



Earthquake M4.0, on 02:58:23, Dec. 13,

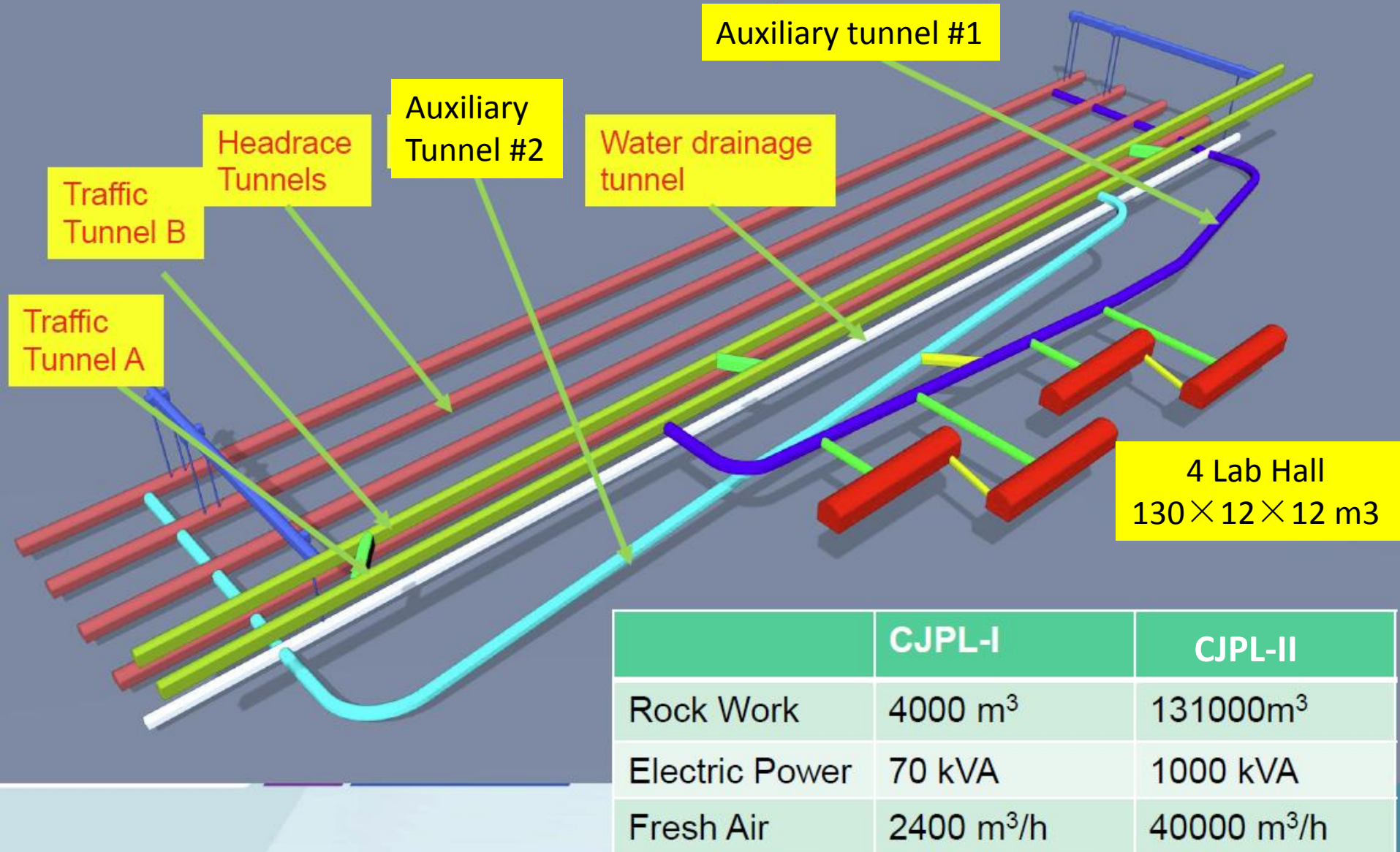
The future of CJPL

CJPL-II



- Seven high pressure tunnels: two auxiliary tunnels, one water drainage tunnel and four headrace tunnels
- Background radiation of marble is less than 1/100 of nature radiation
- Maximum overburden of 2525 m and principal stress of 70MPa by back analysis
- Average length of 17.7km with two curves in the end, good for comic radiation shielding.

Preliminary Design of CJPL-II





Render Picture of Lab Hall

Render Picture of Tunnel



CJPL management structure

**China JinPing underground Laboratory
administration committee**

CJPL

Advisory committee

Physics division

Engineering division

Logistics Department

CJPL

中国锦屏地下实验室
China Jinping Underground Laboratory

Welcome to CJPL

