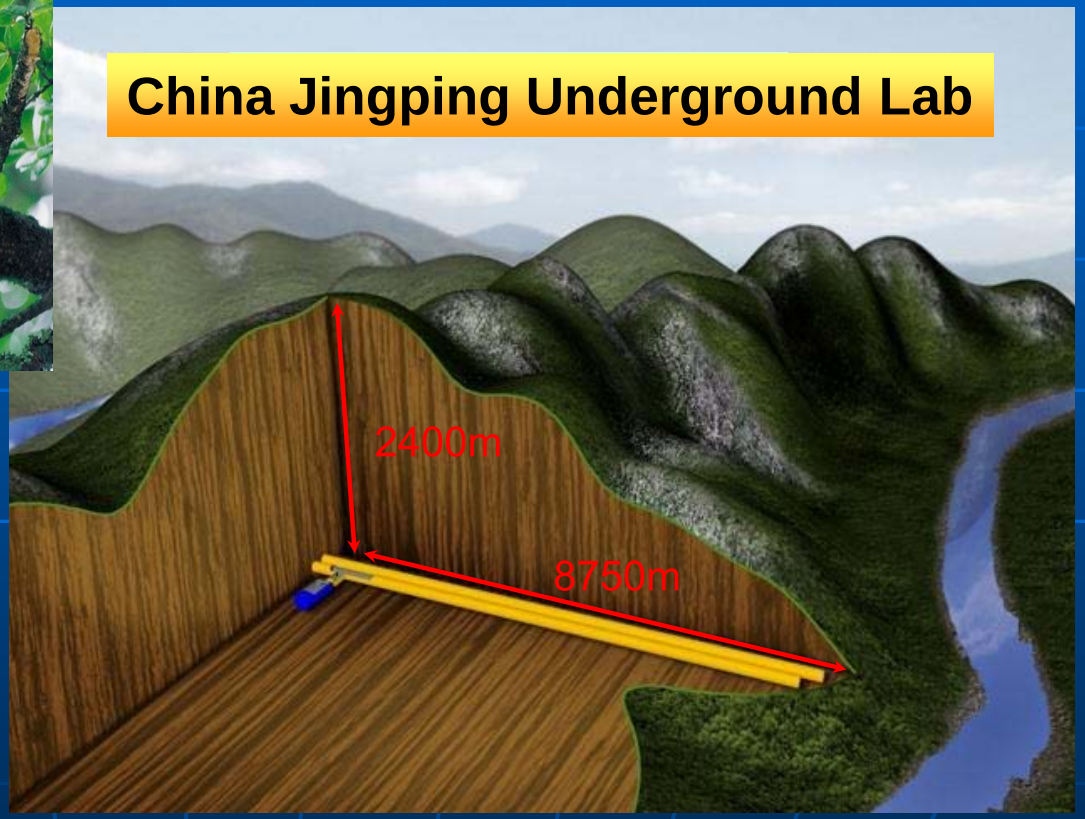
New Progress of JPUL



Lian Gang *China Institute of Atomic Energy*

Starting-up the LUNA MV collaboration 02.2013

Contents

- **The Progress of JPUL**
  @ FuCB,TangXD,SunY
- **New Determination of the $^{13}C(\alpha, n)^{16}O$ Reaction Rate**
  @ GuoB
- **Collaboration with LUNA**

New Progress of JPUL

Location：

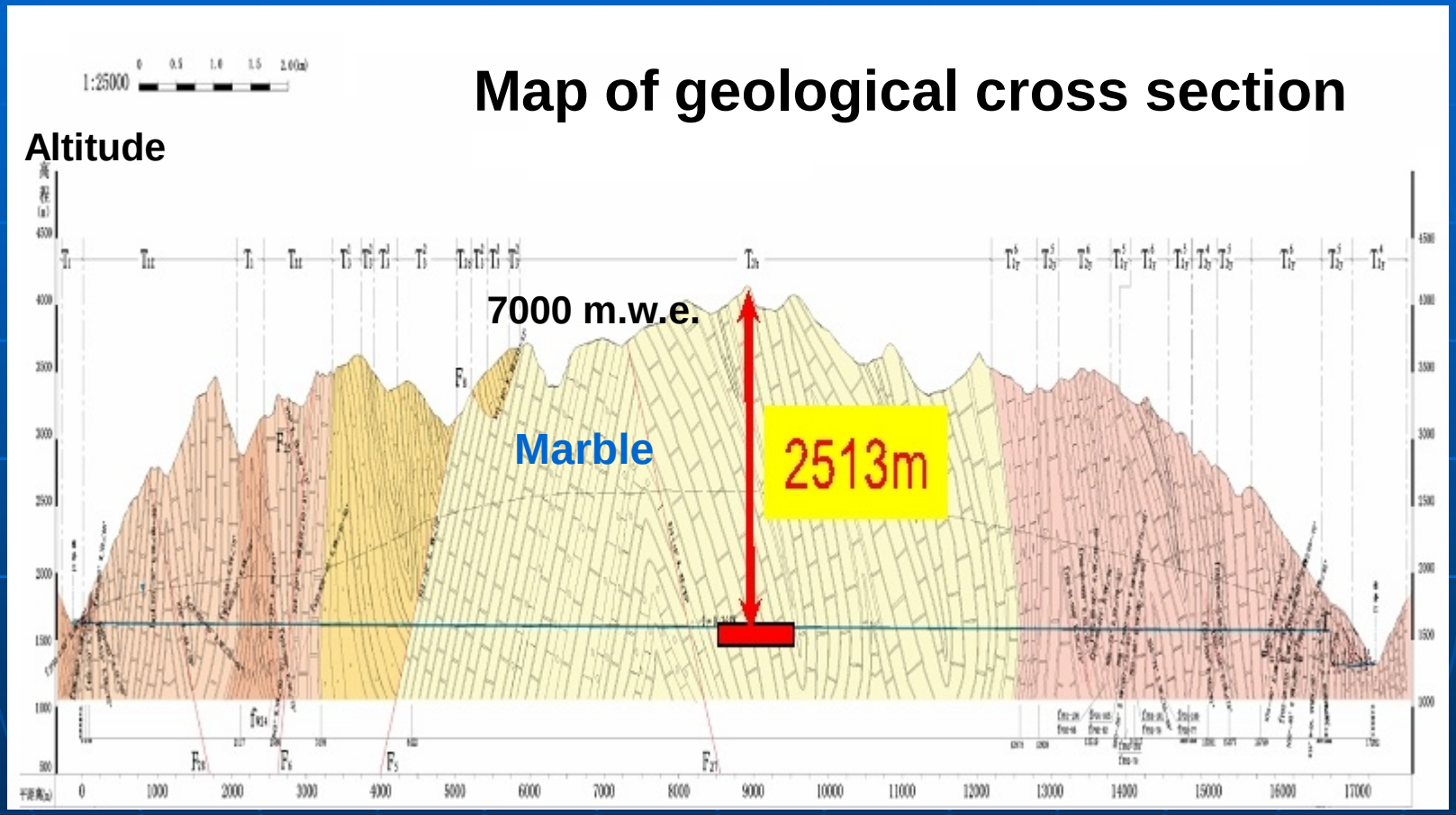
SiChuan Province

Yalong River

Branch of Jinsha River

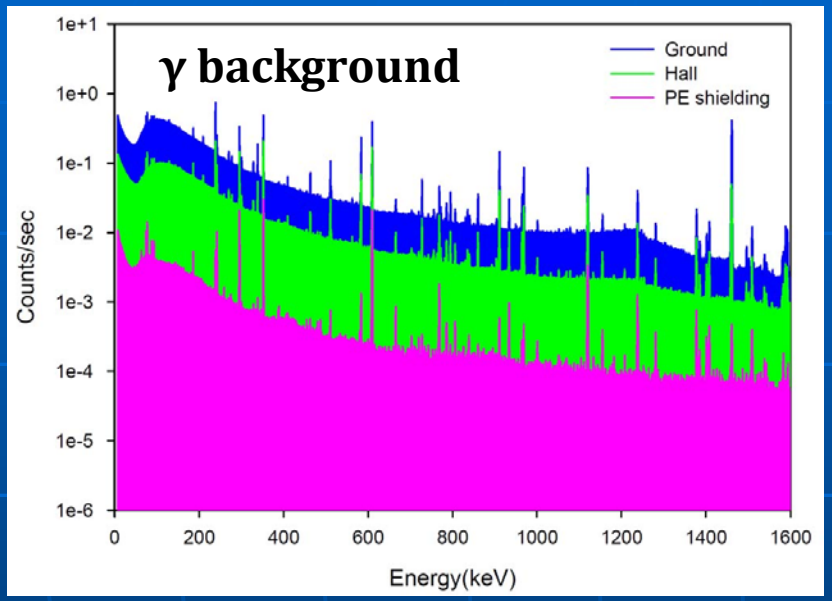
A tunnel (17.5 km) through Jinping Mountain for Ertan Hydropower Station

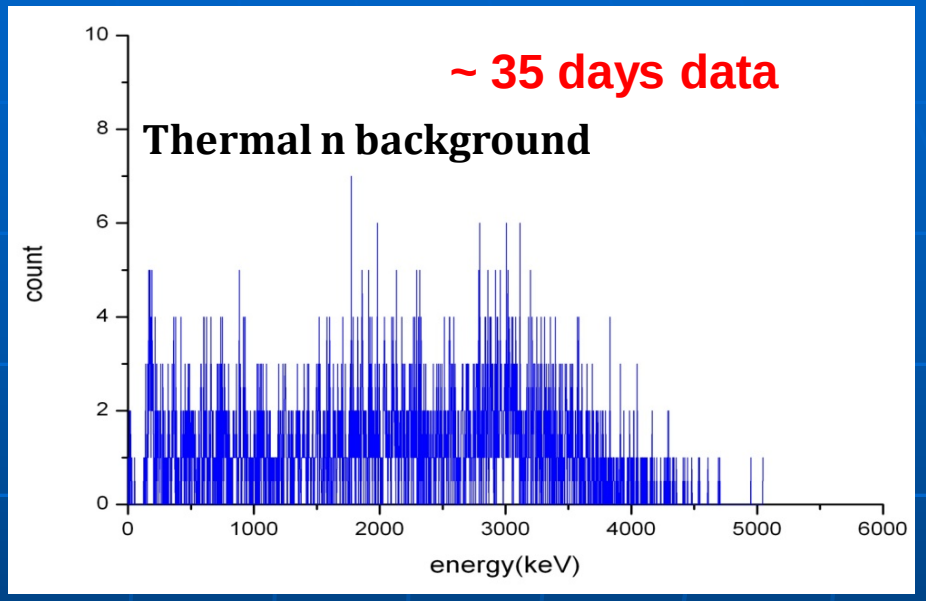
New Progress of JPUL



New Progress of JPUL

Ambient Radioactive Background

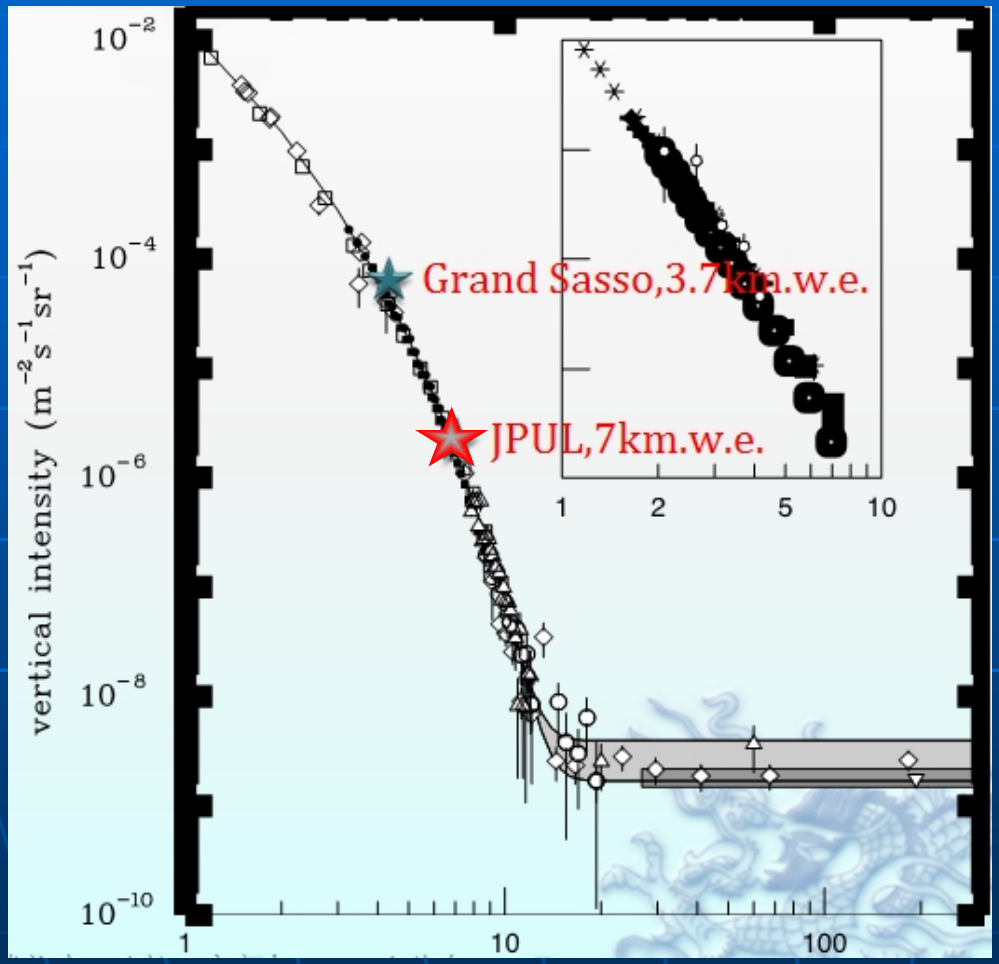




Radon: 20 Bq/m^3

Isotopes Bq/kg	K-40	Ra-226	Th-232
Samples @JPUL	<1.1	1.8(2)	<0.27
Samples@Beijing	600	25	50

New Progress of JPUL

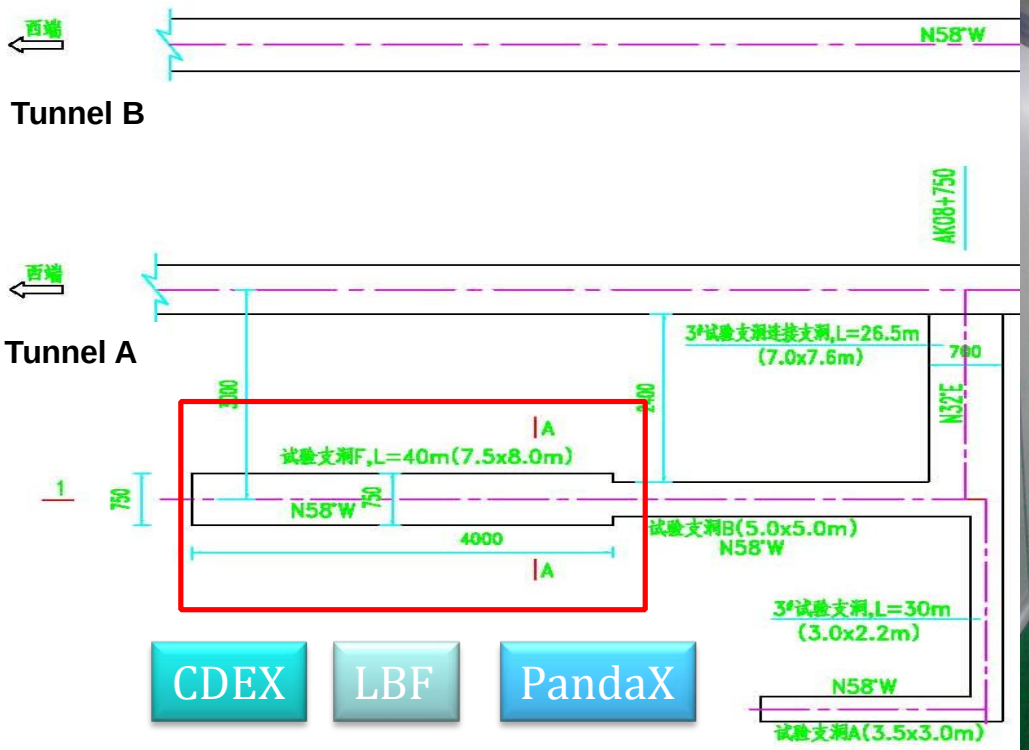


Muon Flux Under Ground

Only muons and neutrinos penetrate to significant depths underground

New Progress of JPUL

Main Lab Hall: 40m(L) x 6m(W) x 6m(H)



Layout of JPUL

1:500

New Progress of JPUL

Experiments **Feb.2012**

CDEX China Darkmatter EXperiment

10kg HPGe Detector

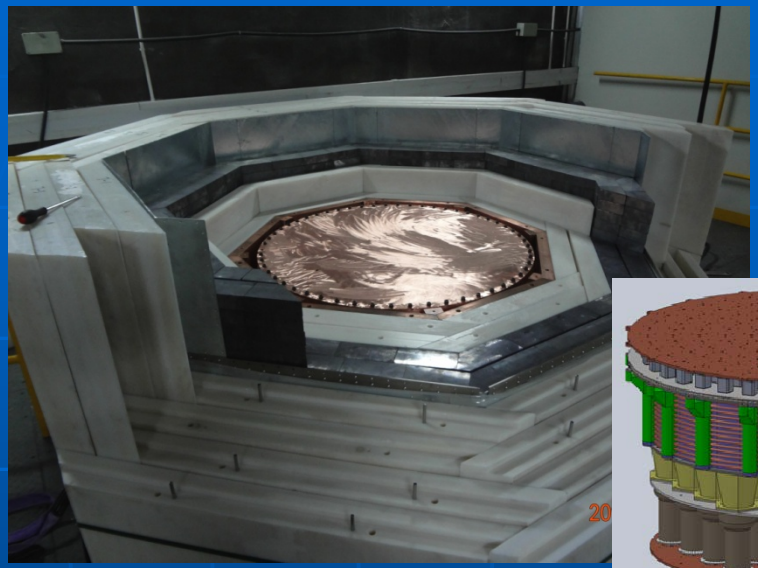
PandaX Particle AND Astroparticle Xenon detector

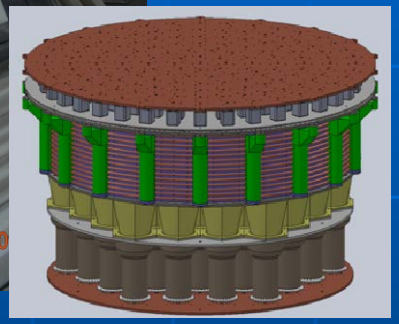
25 kg (Second-period： 200 kg**) liquid ultra-pure Xenon**

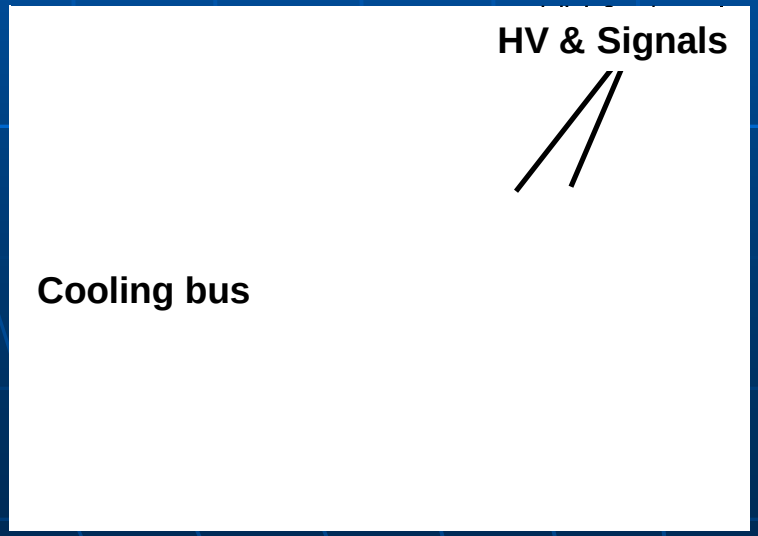
LBF Low Background Facility

measurement of material performance

New Progress of JPUL





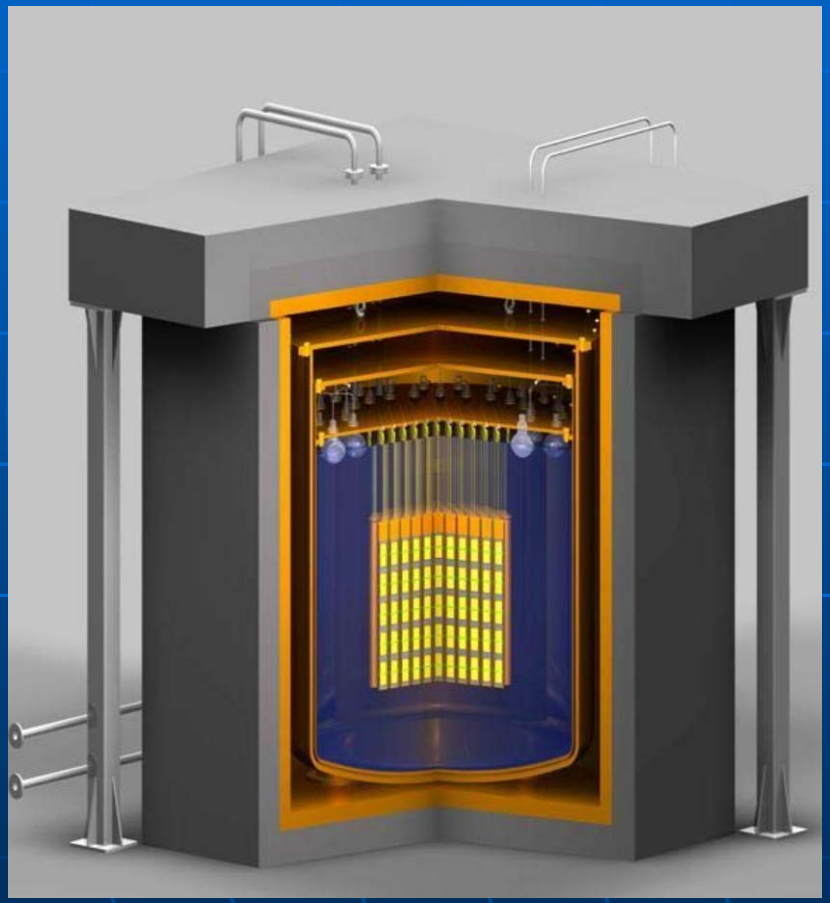


PANDA X

Particle AND Astroparticle Xenon detector

New Progress of JPUL

CDEX & LNL



New Progress of JPUL

The future plan

3 Lab Halls: 60m(L) x 12m(W) x 12m(H)

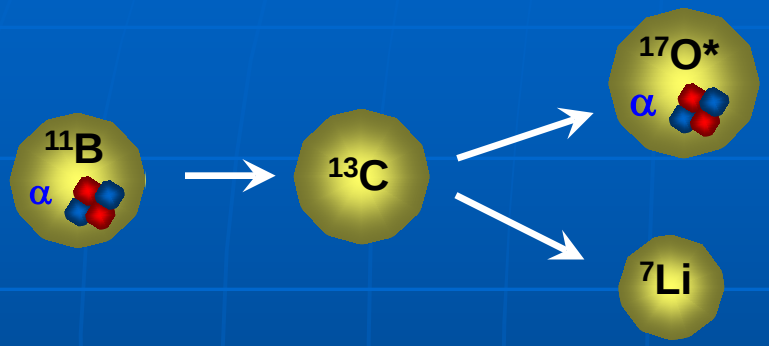
ure

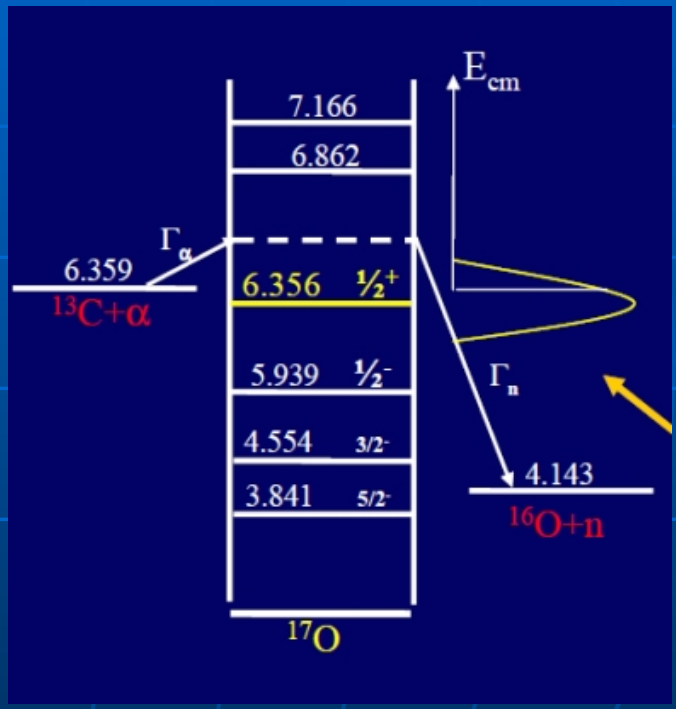
- Basic physics
- Geophysics
- Rock mass mechanics
- ……
- Nuclear astrophysics ?

$^{13}C(\alpha, n)^{16}O$ Reaction Rate

Dr. GuoBing

idea: α transfer reaction $^{13}C(^{11}B, ^{7}Li)^{17}O^*$





$(d\sigma/d\Omega)_{exp} = S_\alpha * (d\sigma/d\Omega)_{DWBA}$

↓

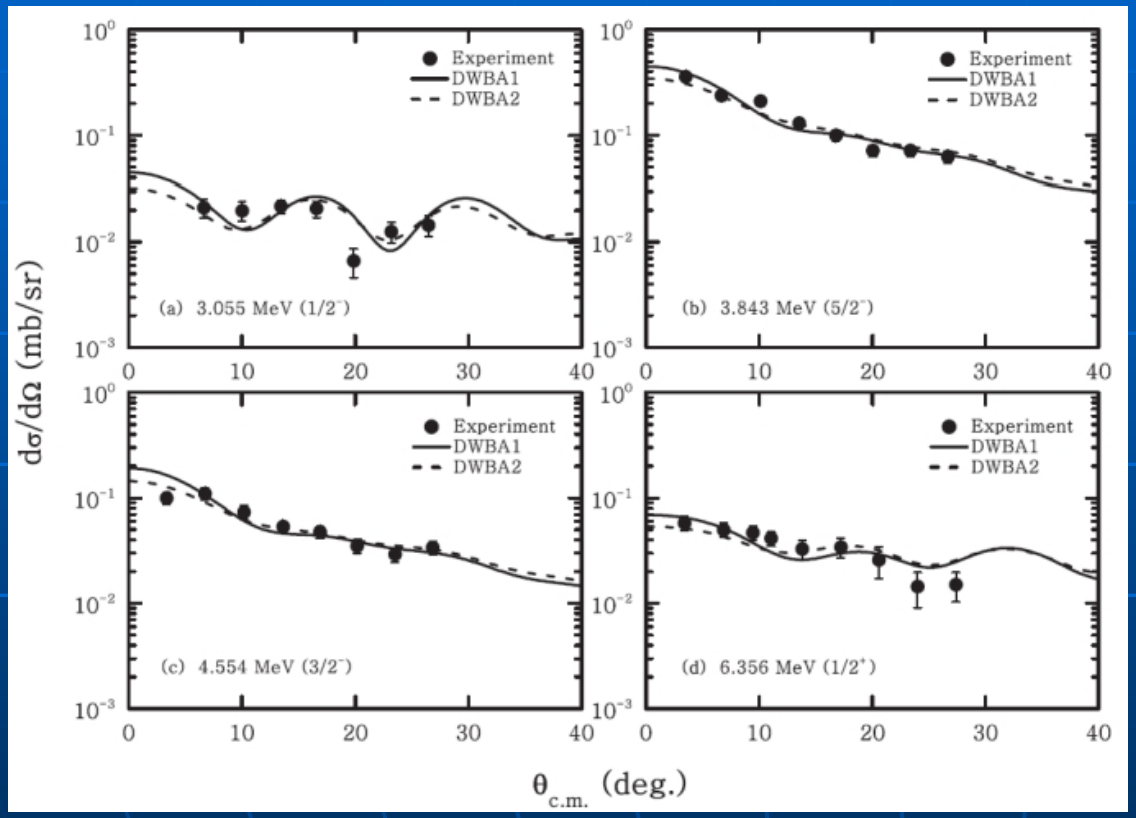
spectroscopic factor (S_α) and the ANC

↓

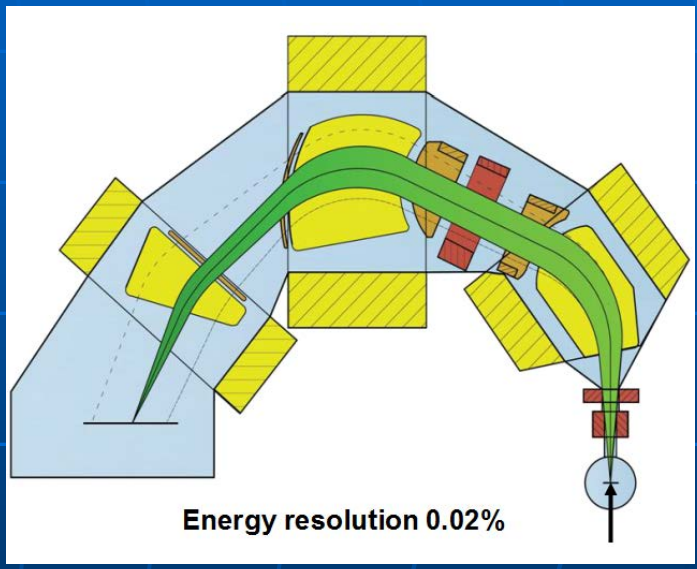
$^{13}C(\alpha, n)^{16}O$： S factor and reaction rate

$^{13}C(\alpha, n)^{16}O$ Reaction Rate

Angular distributions of $^{13}C(^{11}B, ^{7}Li)^{17}O^*$

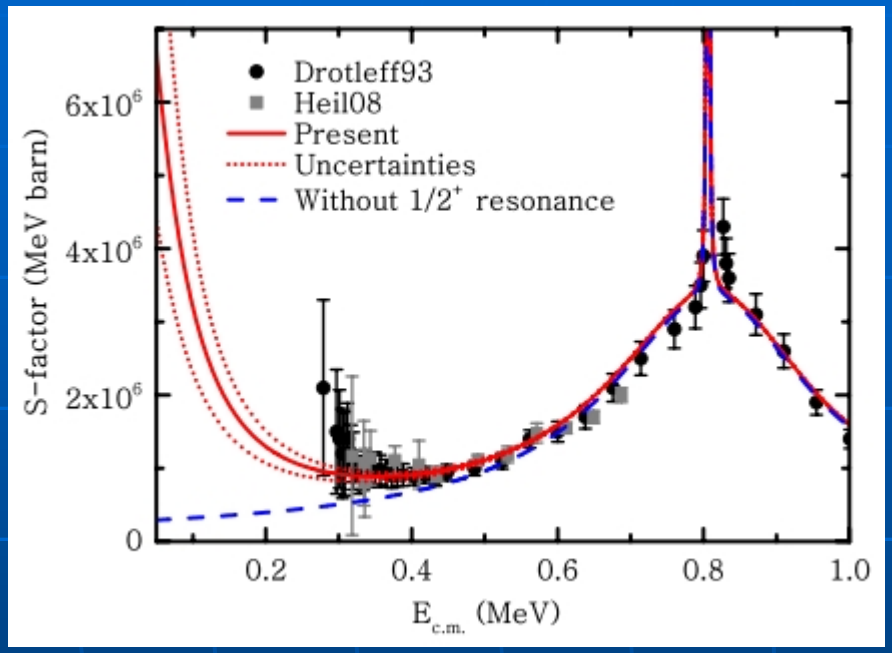


Q3D magnetic spectrograph



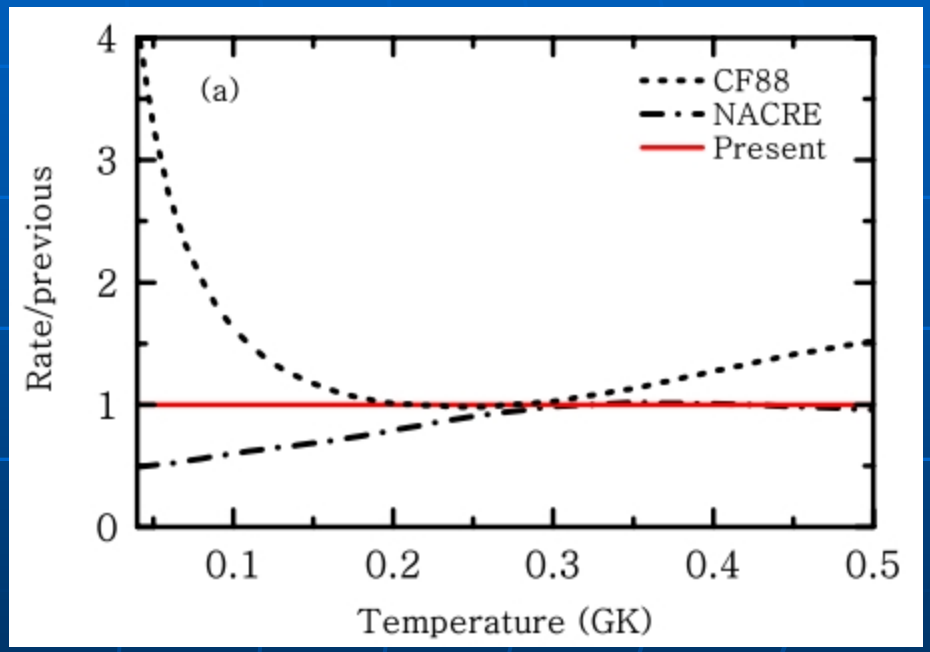
$^{13}C(\alpha, n)^{16}O$ Reaction Rate

The Astrophysical Journal, 756:193 (10pp), 2012 September 10



S factor for $^{13}C(\alpha, n)^{16}O$

Ratio of the present rate
to the CF88 and NACRE



New Experiment (*PRL 109, 232701 (2012)*)
is agreed with our result
with Trojan horse method to the $^{13}C(^{6}Li, n^{16}O)d$ quasifree reaction

LianGang *Starting-up the LUNA MV collaboration 02.2013*

Collaboration with LUNA

- The underground laboratory is highly valued in **China**

  It's a good time for us to participate in the LUNA's MV project

- A MoU to enhance cooperation and development **between LUNA and CIAE**

  - To boost further collaboration between LUNA and CIAE
    people, facility, experiment, fund
  - To be helpful to set up Nuclear astrophysics lab at JPUL

- LUNA's MV project is not only meaningful to INFN, but also to the international nuclear astrophysics.

  More open attitude is expected especially to China

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LUNA Past & Present

- Invited talk - underground: twenty years of the LUNA project (00h45')
  Presenter: TRAUTVETTER, Hanns-Peter (Bochum University)
- The LUNA MV project at LNGS: overview of the present status (01h00')
  Presenters: GUGLIELMETTI, Alessandra (MI), Dr. JUNKER, Matthias Bernhard (LNGS)

Nuclei in the Cosmos I， 1990， Baden/Vienna, Austria

Why are we not going into the Gran Sasso?

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0 Claus Rolfs

Paolo Prati

1,4 Piero

Matthias

2 Carlo Broggini

3 Roberto Bonetti

Frank

Maria Luisa

Endre

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5	**Removal of Interferometer**
6	Evaluation of costs and possible returns
7	Oder to company for removal operations
8	Removal operations
9	Definition of the accelerator room dimensions
10	**Accelerator**
11	Preparation of technical requirements
12	Preparation of tender in INFN Administration
13	Call for offers
14	Assignment of tender and conclusion of contract
15	Accelerator production at supplier
16	Installation
17	**Site preparation inside LNGS undergrounds laboratories**
18	Preparation of detailed project
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45	**Gas Target Station**
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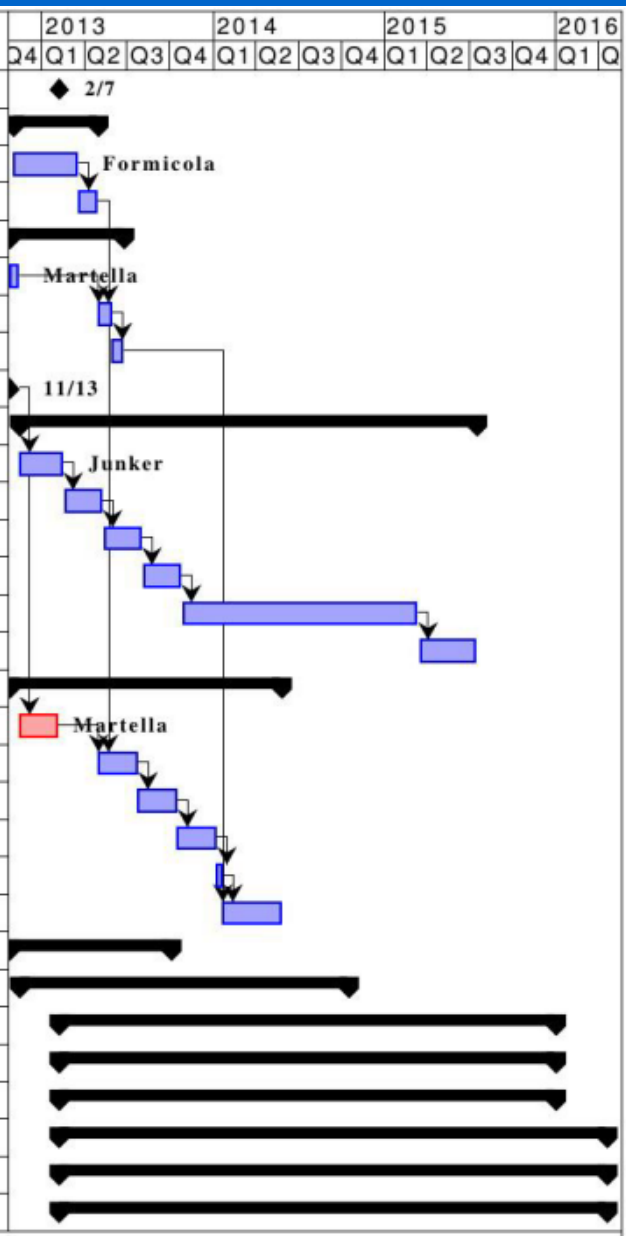
63	**Gamma Ray Detection System**
71	**Neutron Detector**
79	**Data Aquisition System**



LUNA-MV

- **Obtained 2,8 millions of euros for the LUNA MV project from the "Progetto Premiale" fund**

  site preparation, the accelerator and partly for the shielding

- **^{3}He(α,γ)^{7}Be , ^{22}Ne(α,n)^{25}Mg, ^{12}C(α,γ)^{16}O**

- **3 more millions of euros are needed**

- **by the end of March 2013**

This adhesion should be intended as the willingness of the involved group to apply soon to the financing agency of the respective country. If necessary, a further document preparatory to the real Memorandum of Understanding could be produced, where the physics cases will be illustrated in some detail and a first list of the possible collaborating Institutions will be drafted (and signed by the involved Institution Directors).

involved people will be called to participate to the drafting of the official MoU where the agreements among financial agencies will be included, and afterward to the constitution of working groups on specific scientific/technical issue related to the LUNA MV project.