

Sino-German Cooperation Group



Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)



EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN



Deutsch-Chinesische-Kooperationsgruppe

Development of High Purity Germanium Detector Techniques
for Applications in Fundamental Research

Finanziell unterstützt durch: Chinesisch-Deutsches Zentrum für Wissenschaftsförderung Peking, China

2012

中德合作研究小组

应用于基础研究的高纯锗探测器技术研发

资助者: 中德科学中心 / 中国 北京

2015

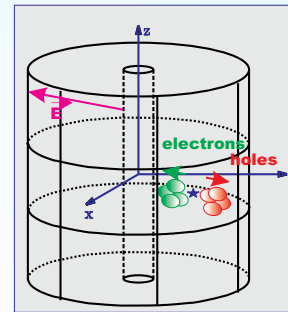
I.Abt, MPI für Physik, April 2016

Scale and Subjects

1 workshop 2011 \Rightarrow 3 years fixed period

\Rightarrow collaboration

- **Detector technology itself**
- **Electronics and readout**



**still
ongoing**



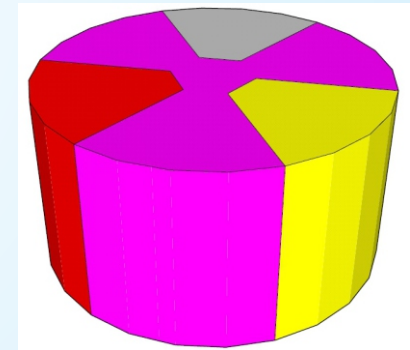
- **Testing**
- **Backgrounds: especially neutrons**
- **Experimental conditions**

- **Experiments to be planned**

EoI

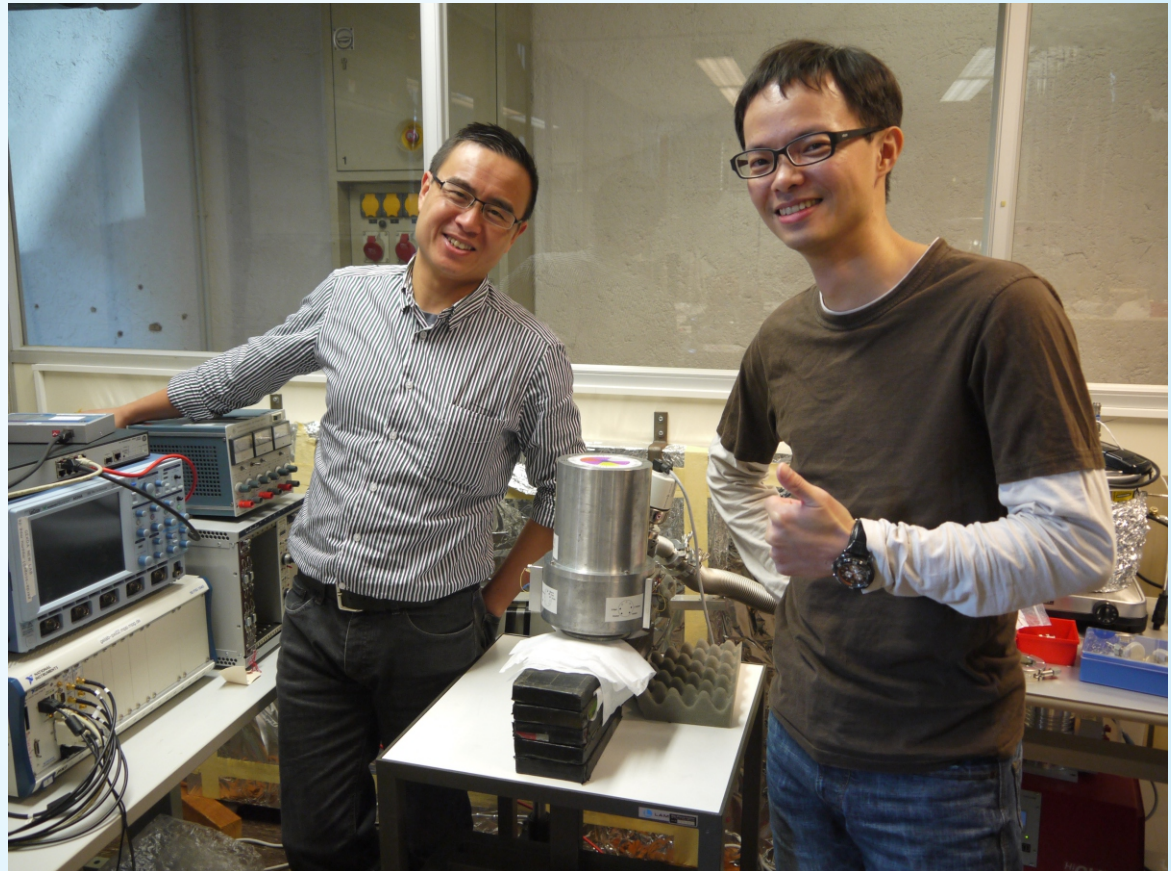
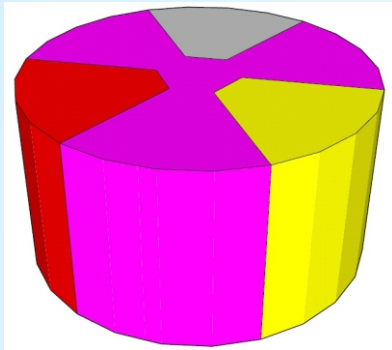
Projects of the Cooperation

- **Detector technology itself**
 - **n-type segmented BeGe [Canberra]**
 - * **60 k€ from cooperation, rest MPI**
- **Design**
 - Bela Majorovits [MPI]**
 - Burcin Donmez [MPI at Tsinghua]**
- **Testing**
 - HengYe Liao [MPI]**
 - Ma Hao [Tsinghua]**
 - Xiang Liu [Jiatong, MPI]**
- **Publication soon to come**



Projects of the Cooperation

▪ n-type segmented BeGe



Projects of the Cooperation

- **Electronics and readout**
 - **Try an ASIC from Tsinghua
on a segmented detector at the MPI**
- **ASIC**
 - Deng Zhi [Tsinghua]**
- **Integrate at MPI**
 - Oliver Schulz [MPI]**

**This is a typical case of “things take longer”.
I still hope it will happen.**

Projects of the Cooperation

- **Backgrounds: especially neutrons**

- **MINIDEX**

An Experiment to measure muon induced neutrons

Matteo Palermo [MPI]

Raphael Kneissl [MPI]

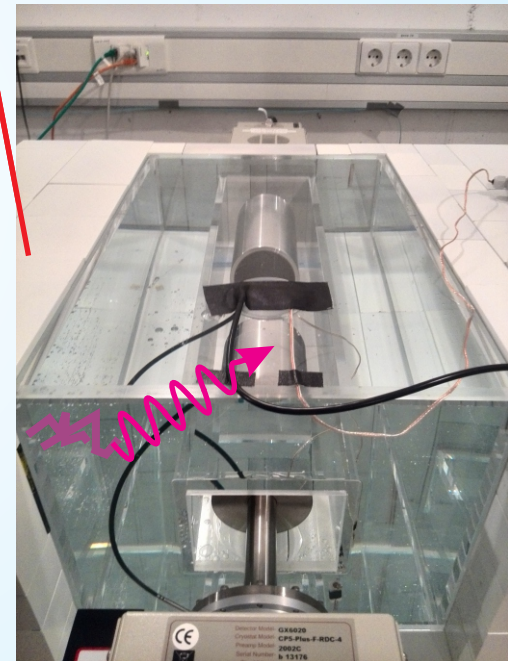
Oliver Schulz [MPI]

Chris Gooch [MPI]

plus fast neutrons

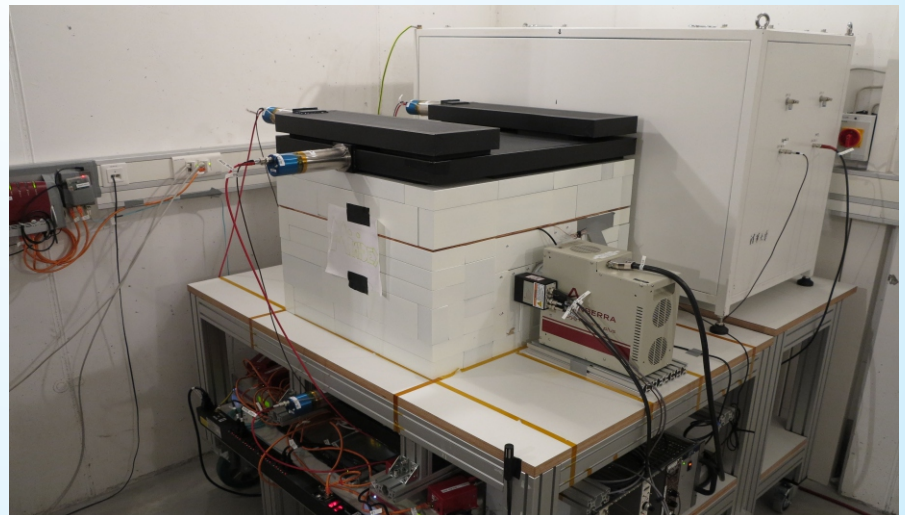
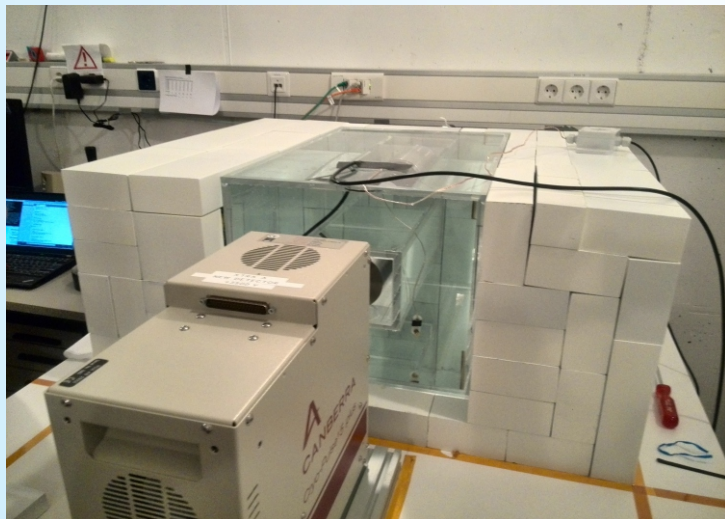
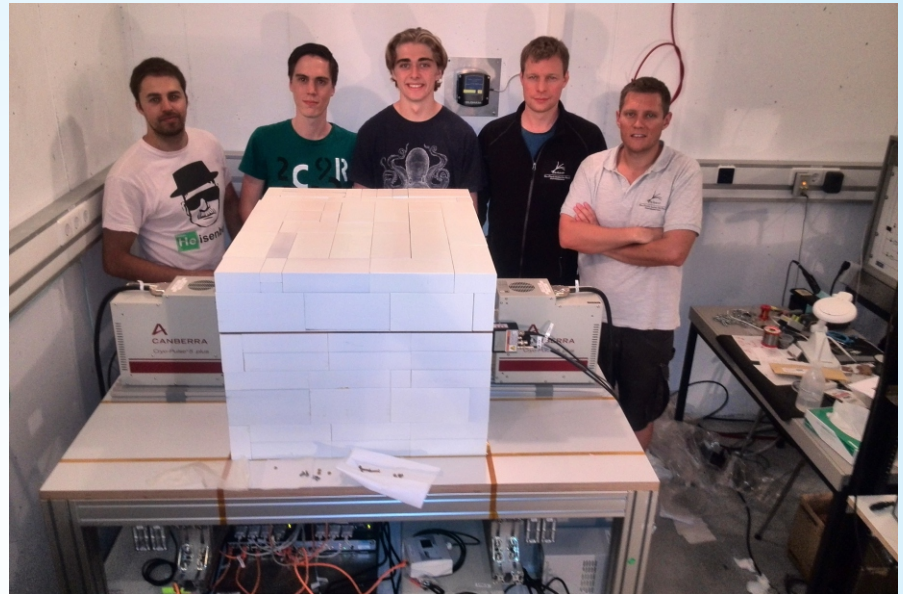
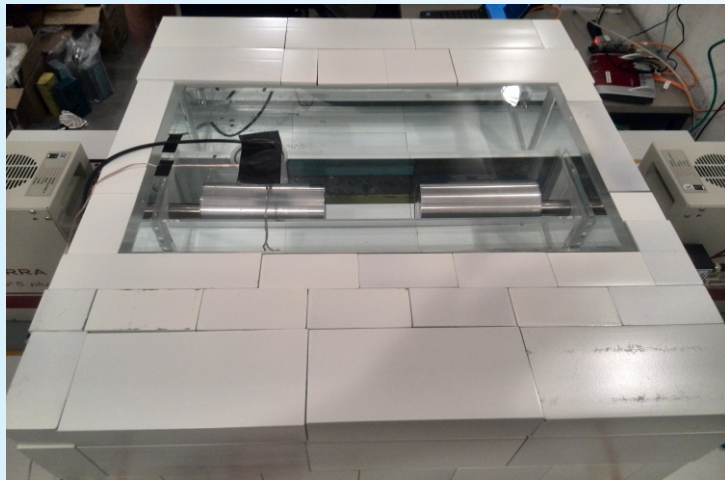
Wang Li [Tsinghua]

installed in Tübingen.



Projects of the Cooperation

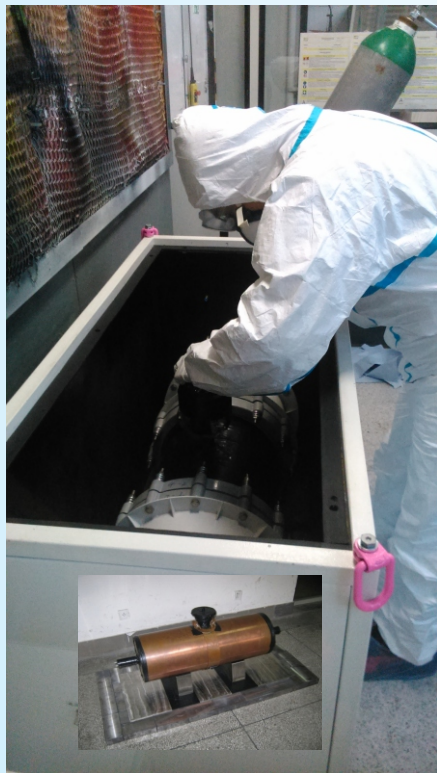
- MINIDEX



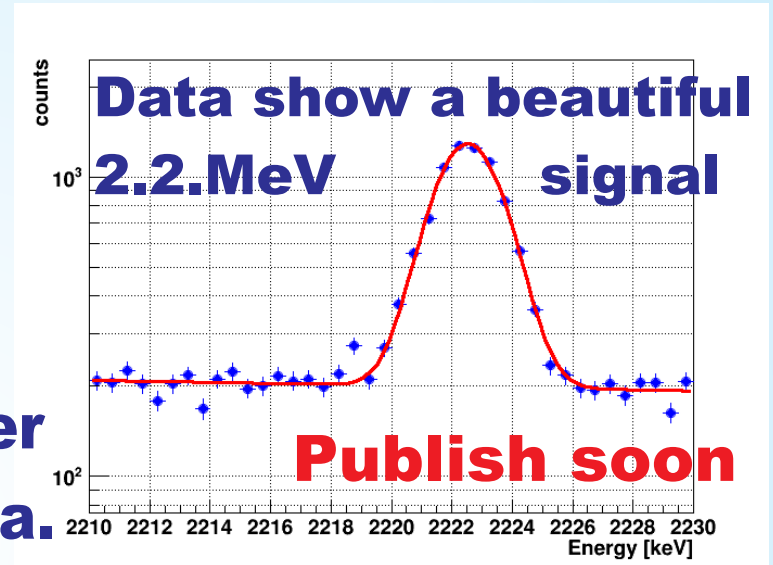
Projects of the Cooperation

MINIDEX run I

**70 - 100% neutron excess
compared to GEANT4**

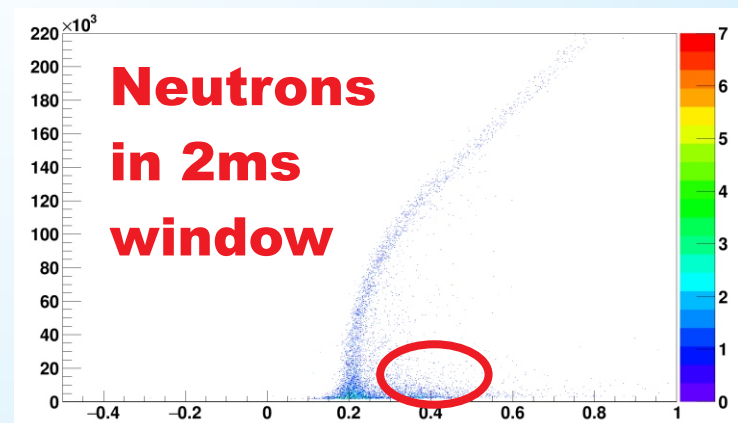


**predictions.
MC signal faster
signal than data.**



MINIDEX run II

**Improved
trigger
fast
neutrons**



Projects of the Cooperation

- Experiments to be planned
 - Expression of Interest

A large scale experiment based on germanium technology at CJPL

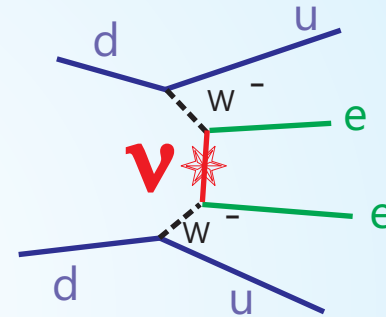
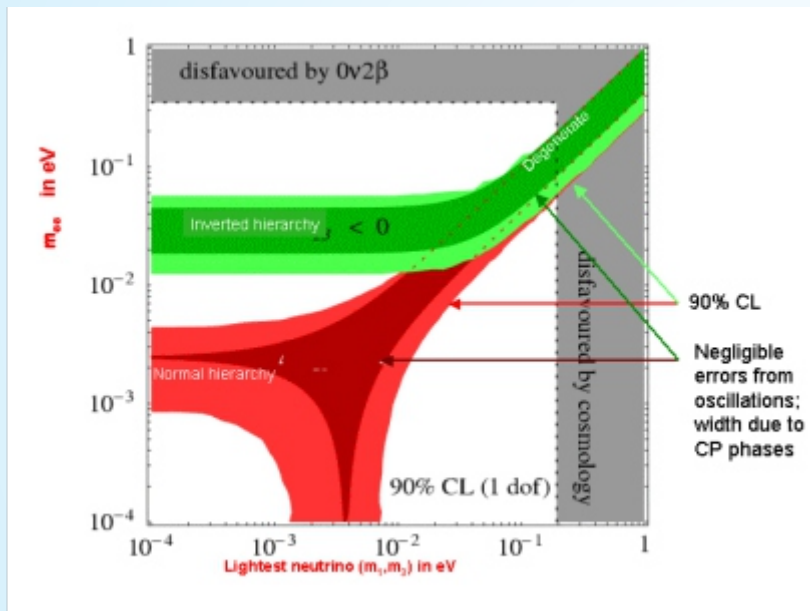


Iris Abt
Henry Wong
Qian Yue



EoI – Physics Case

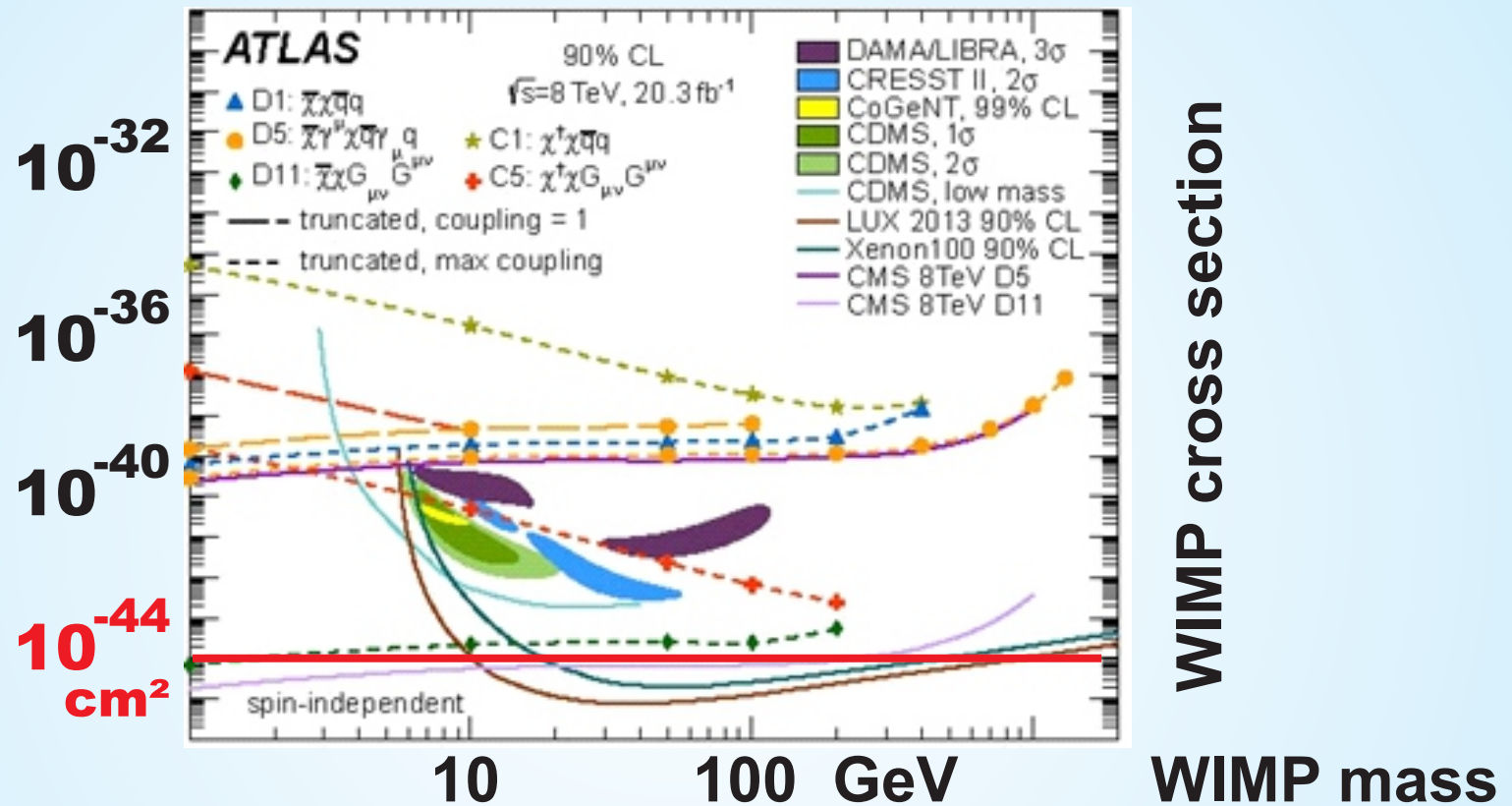
Neutrinoless Double Beta Decay



**old goal is 10 meV
related to inverted
hierarchy**

Look as far as you can....

EoI – Physics Case



Look for low mass dark matter, if it is a byproduct or if LHC finds something which should be surrounding us.

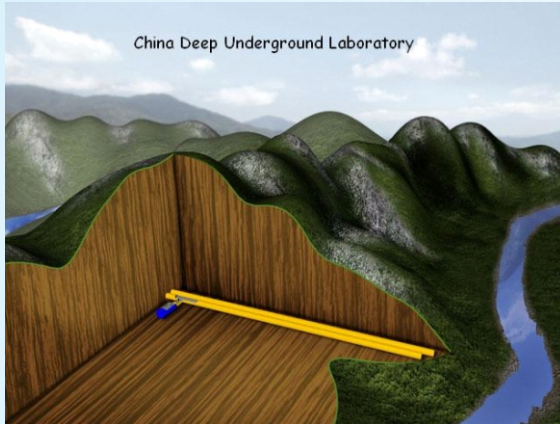
**10^{-44}
 cm^2**



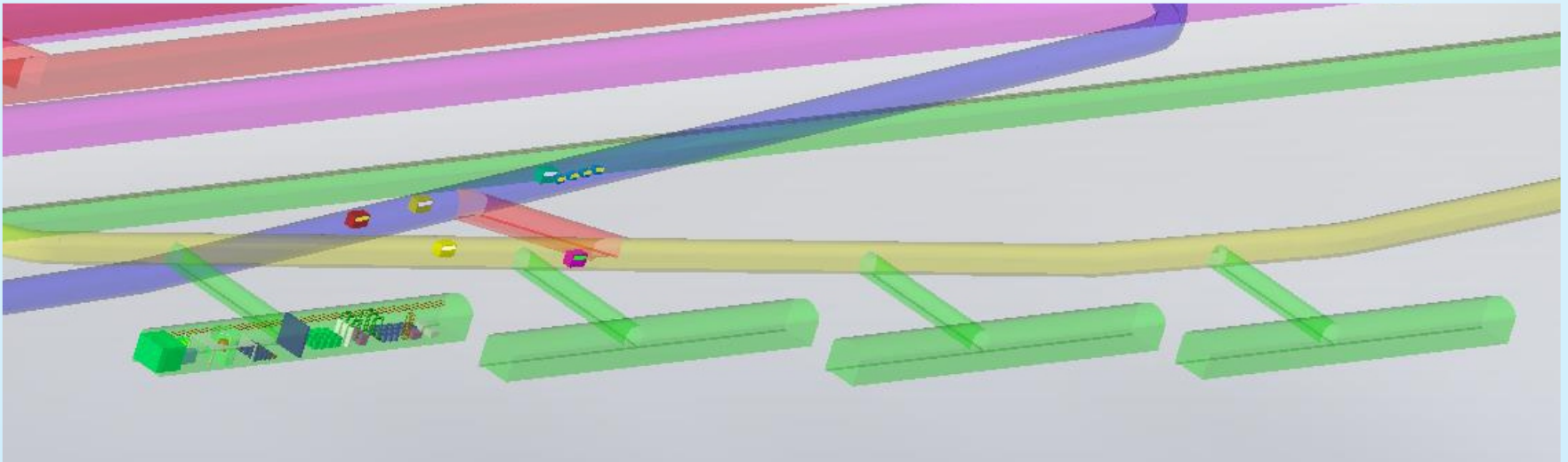
Axioms?

Eol – Location

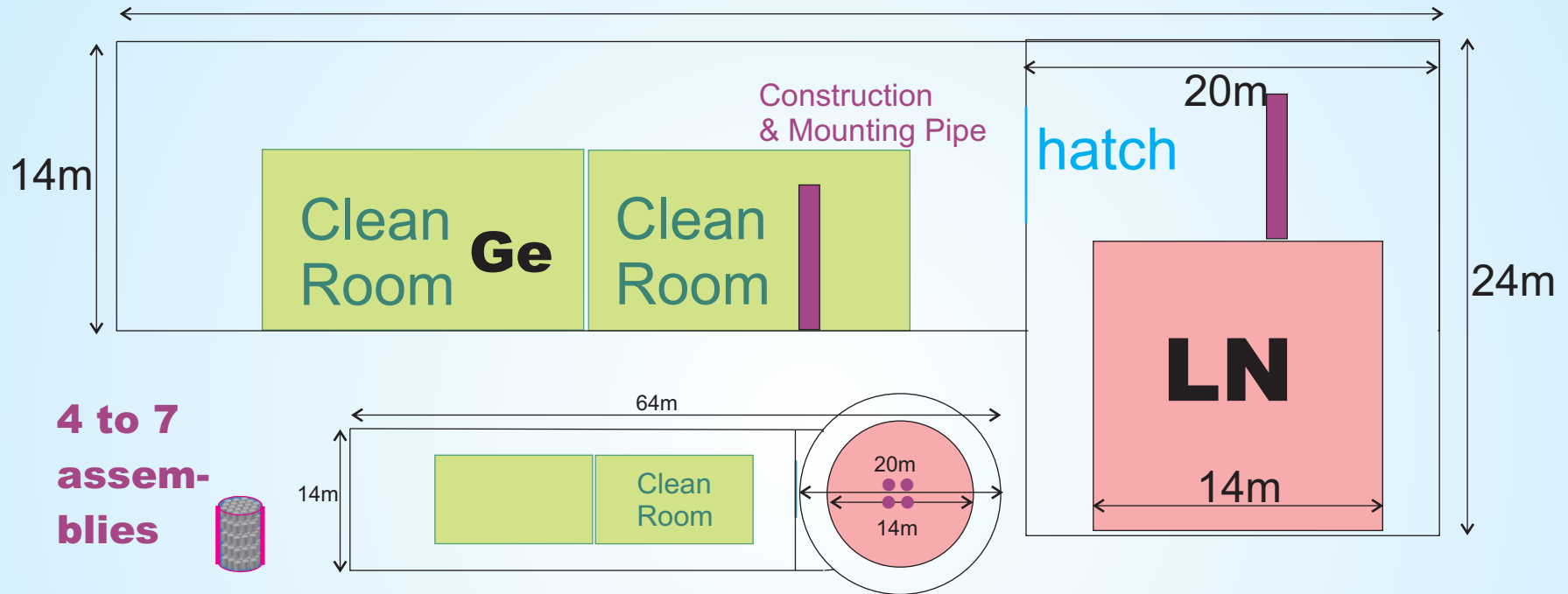
**really
deep
horizontal access**



CJPL would be a good place for a large scale experiment which needs a lot of space for itself and its support.



Eol – Concept



**Insert modular assemblies into
a large LN tank —or LAr or many other things.
That is what R&D is for [5 years foreseen].**

EoI – R&D

Detectors — reduce and identify background
— reduce threshold

→ **see low E reactor neutrinos**

Electronics — **ASICs**
— integrate on germanium

Cables — improve radiopurity and bandwidth

Holders — improve radiopurity

Shells — improve radiopurity with low Z
→ **build some PEN structures**

System integration and production

**A lot has to happen before a proposal, TDR
become possible.**

Eol – What Next

Who will sign the Eol:

I.Abt

A.Caldwell

X.Liu

B.Majorovits

O.Schulz

Dongming Mei

Jing Liu



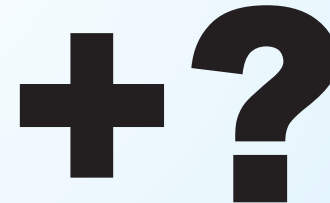
Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)

Keyun Kang

Qian Yue



Henry Wong



We need a structured effort for R&D !

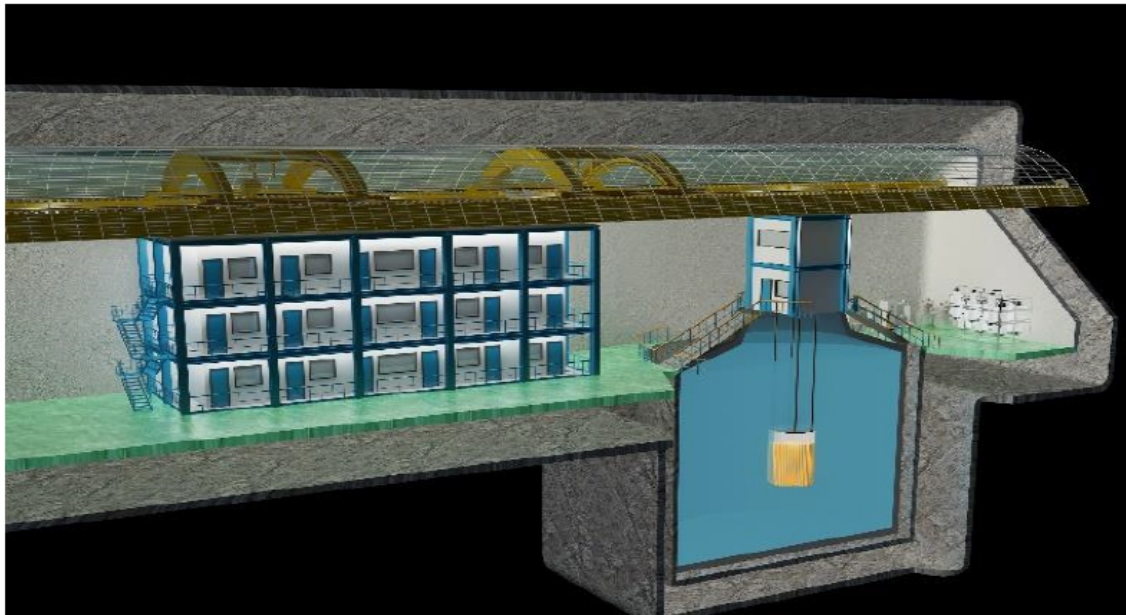
Are we willing to form a proto-collaboration for this?

Meanwhile at CJPL

Dark Matter

CDEX 200 at CJPL will establish capability for large scale structures at CJPL.

**Yue
Qian**



Many of the R&D activities can be shared.

Impressions



Impressions



2015

Impressions

