

STELLA @ LNGS: status and update

Dr. Matthias Laubenstein

CELLAR Community Meeting 2022

HZDR Rossendorf (Germany)

28-30 November 2022

Upgrade STELLA laboratory

- Planned since 2018;
- Funding available ca. 700 k€;
- Hold-ups due to pandemic and administrative problems;
- Hopefully done and working by the end of 2023;
- New laboratory space.

STELLA

(NOW)



STELLA

(FUTURE)

B3

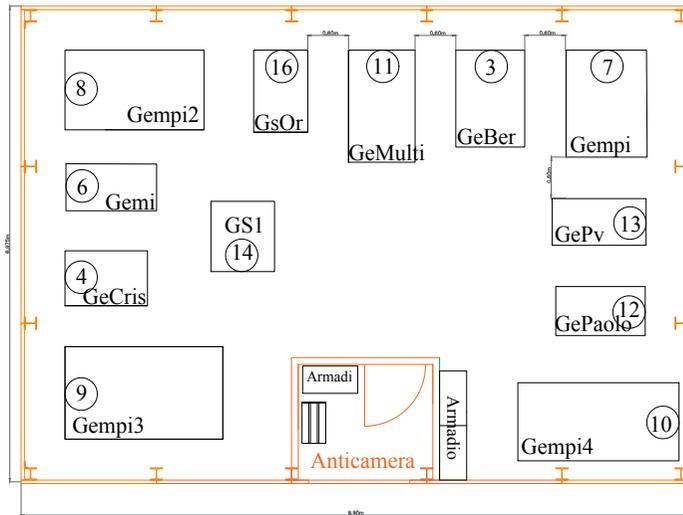
B2

B1

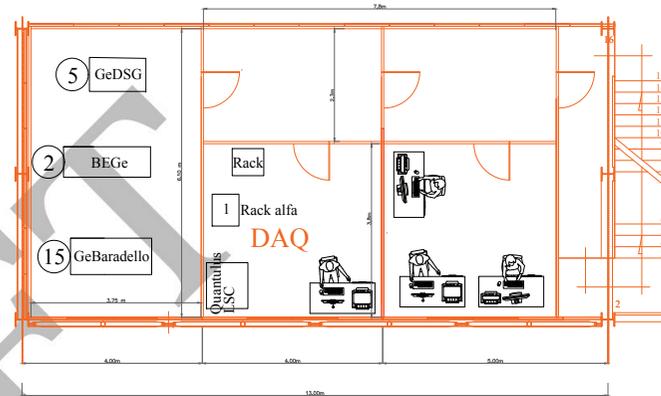
28/11/2022

CELLAR Meeting - HZDR Rossendorf

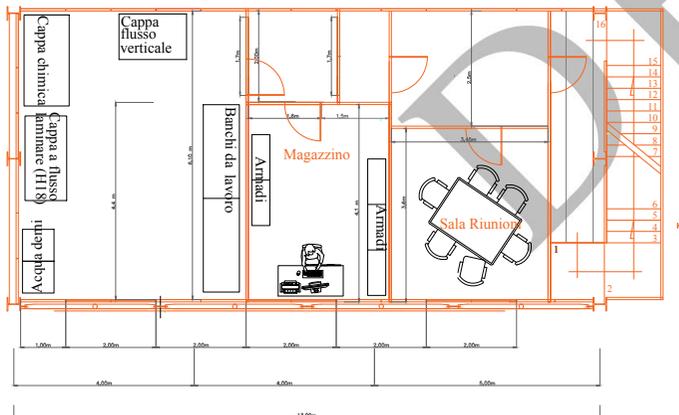
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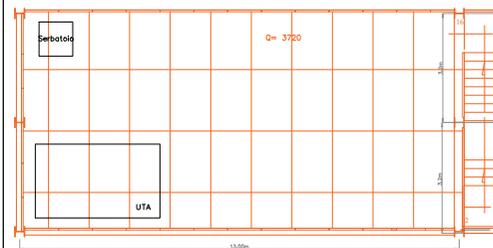
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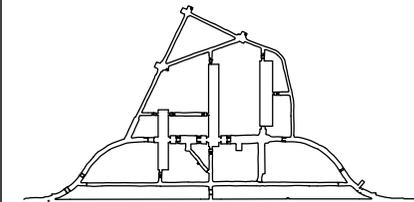
PIANO SECONDO



PIANO COPERTURA



ISTITUTO NAZIONALE DI FISICA NUCLEARE
Laboratori Nazionali del Gran Sasso



LABORATORI SOTTERRANEI LNGS

DocID: - Rev.: 0.0 Validità: Valido

Riferimento: LNGS-U-DWG-STELLA-Sala_B

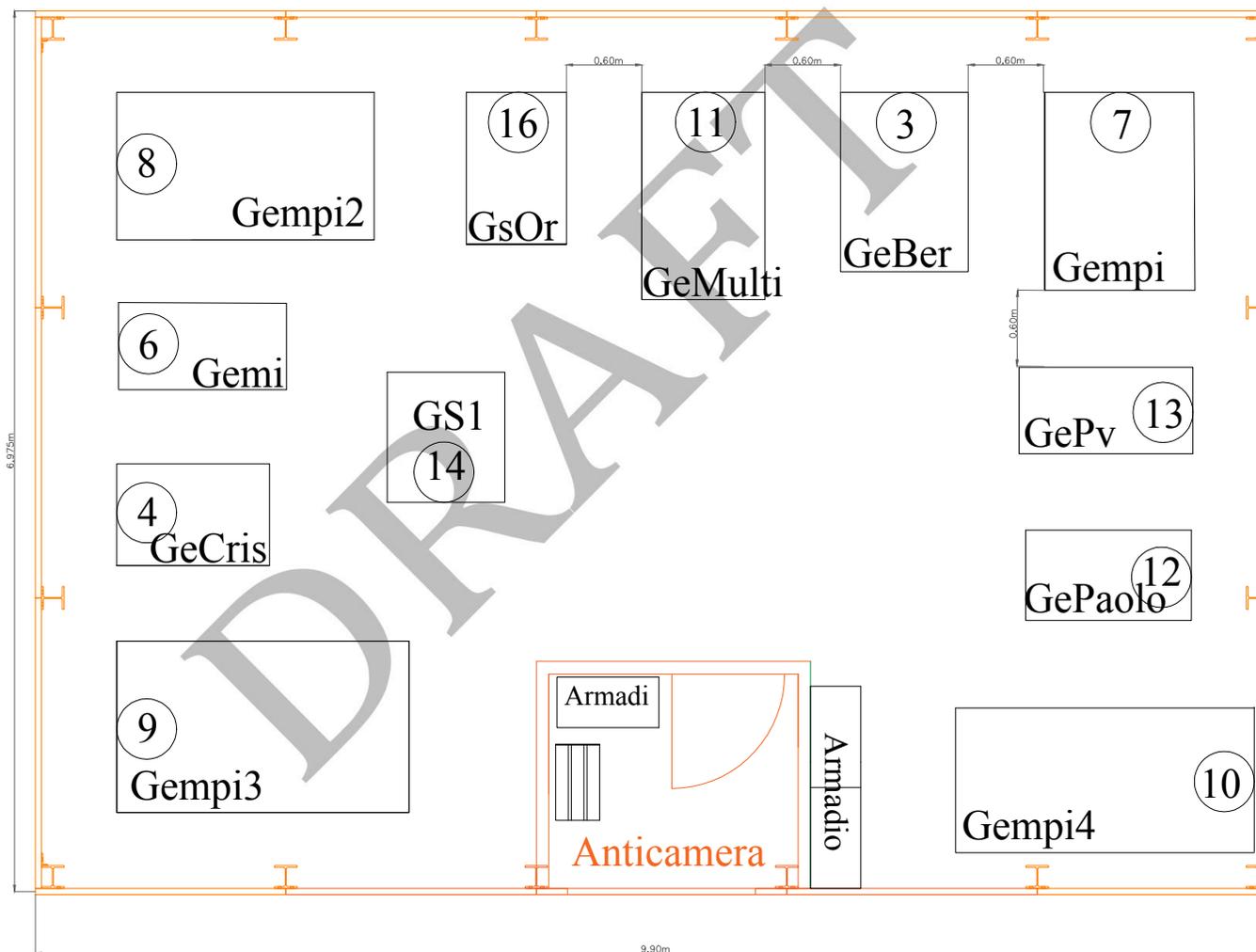
TITOLO:
**Planimetrie ingombri Laboratorio STELLA
presso la Sala B dei Laboratori sotterranei**

Formato: - Scala: - Data: 10-06-2021

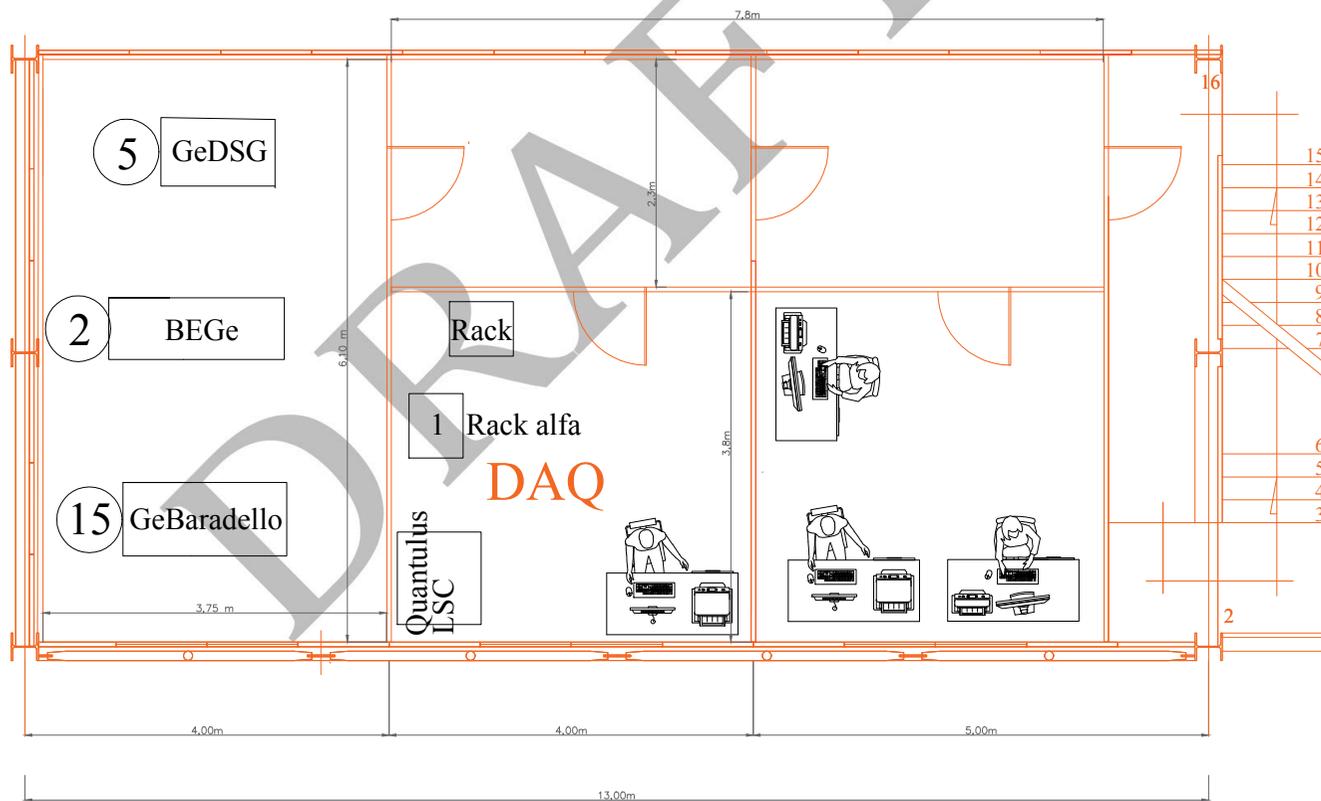
Autore Maria Teresa Ranalli	Verificato da: Matthias Laubenstein Maria Teresa Ranalli Roberto Tartaglia	Approvato da: Matthias Laubenstein Maria Teresa Ranalli Roberto Tartaglia
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Rev.	Data	Descrizione delle modifiche	Autore/Editore
1.0	10-01-2022	Revisione ingombri	M.T.Ranalli

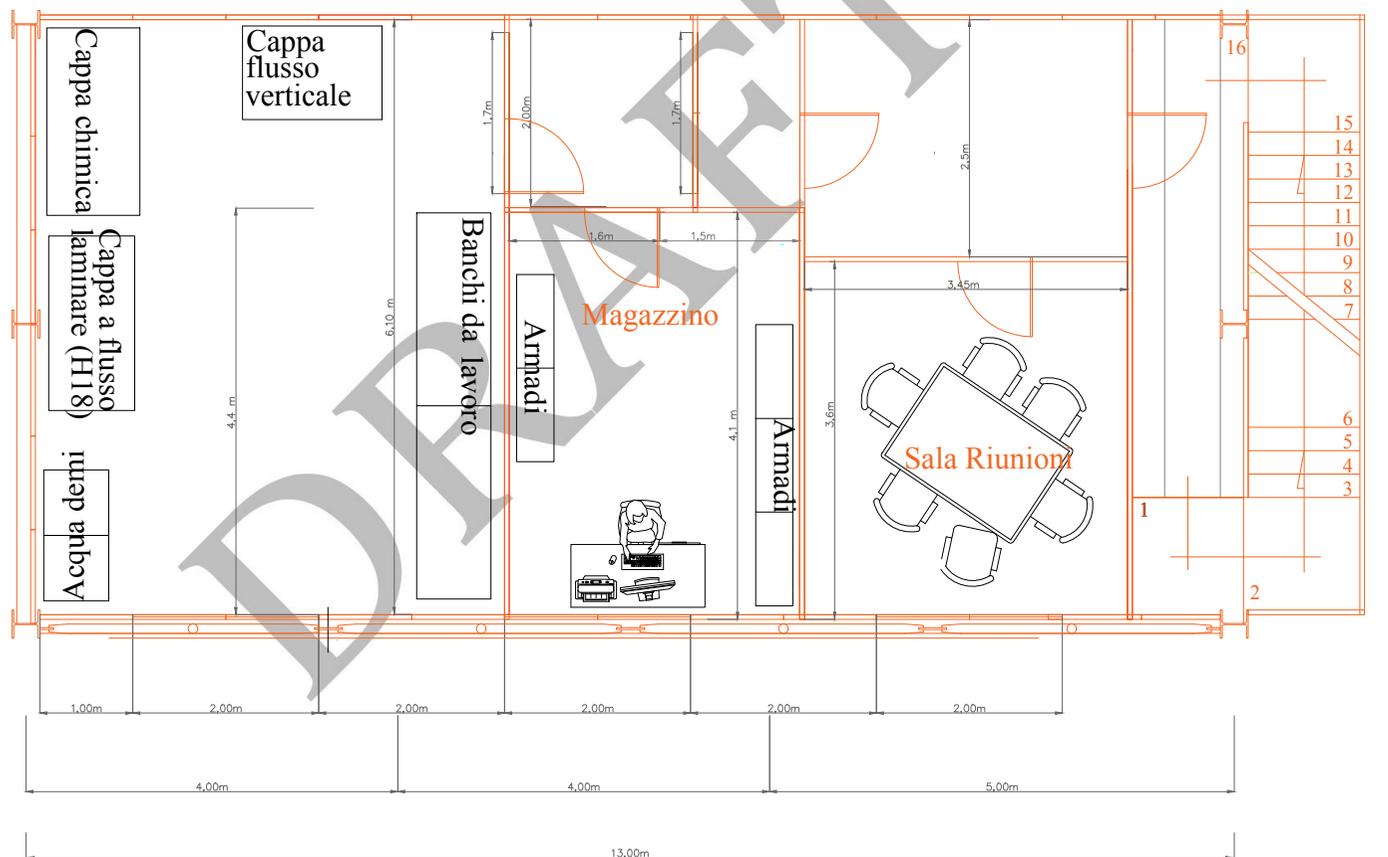
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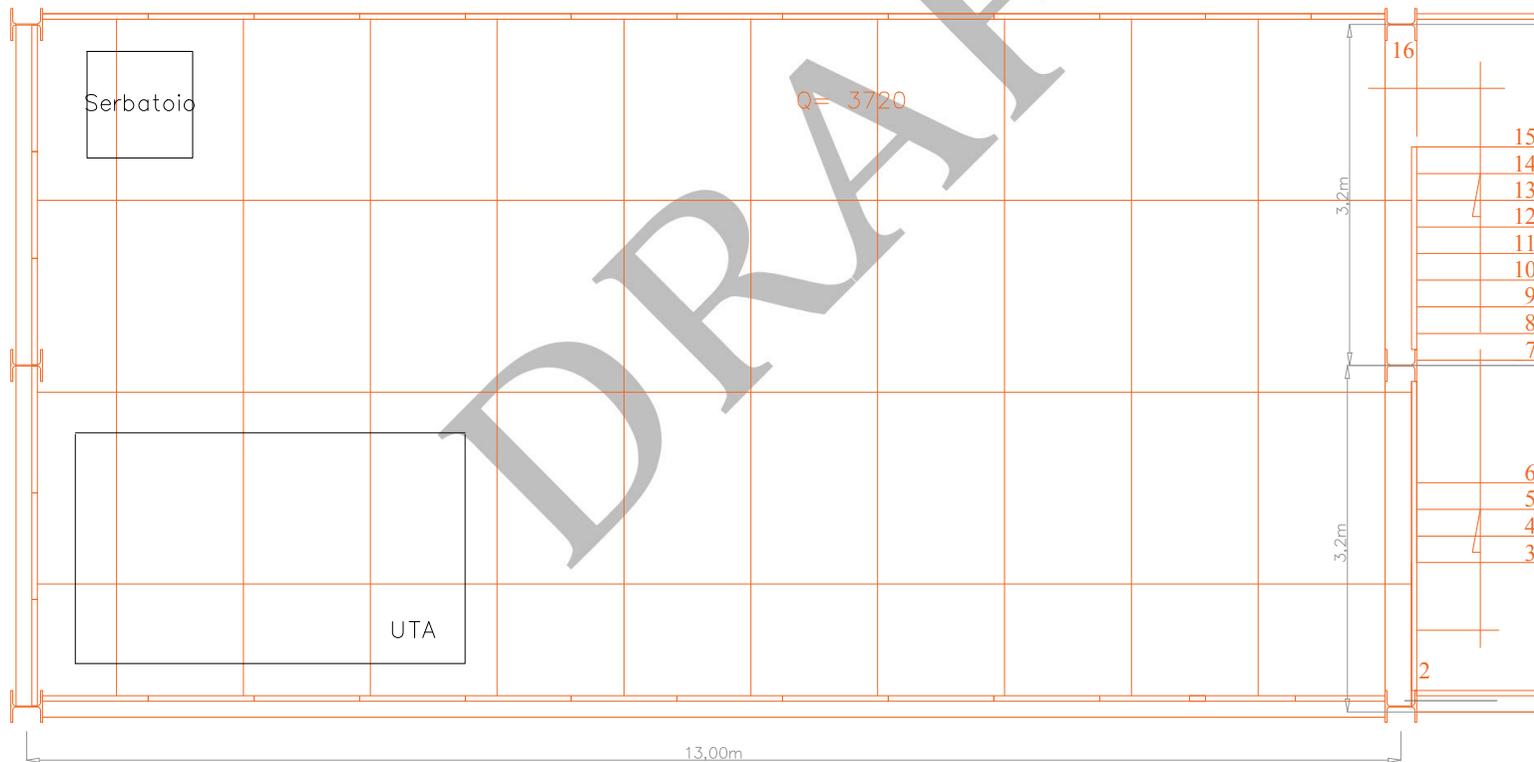
PIANO PRIMO



PIANO SECONDO



PIANO COPERTURA



Collaboration MPI-K-HD & LNGS

New HPGe detector:

(see talk on Wednesday by Nicola Ackermann)

- Based on GeMPI design;
- Improved shielding;
- Increased efficiency;
- Location in new STELLA laboratory.

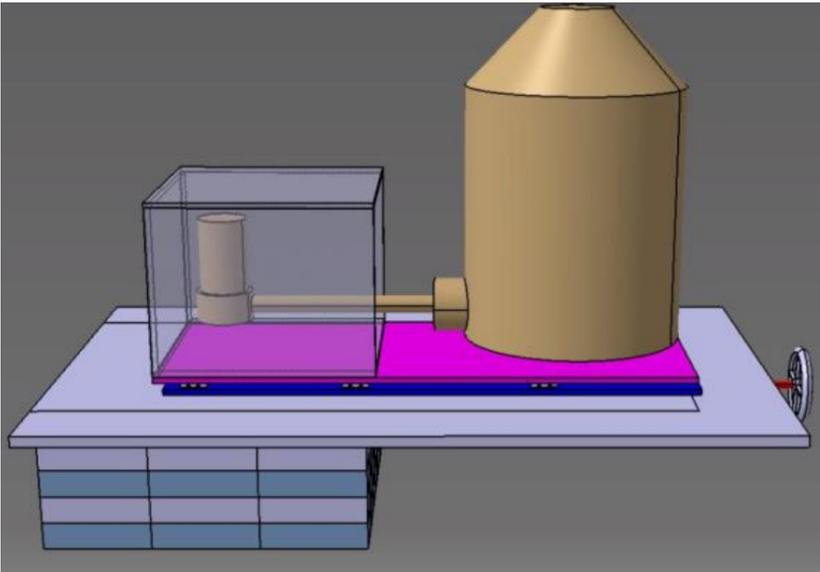
Scientific projects

- Meteorite measurements (*King et al.*, «*The Winchcombe meteorite, a unique and pristine witness from the outer solar system*» *Science Advances*, 8, eabq3925, 16/11/2022; *Shober P.M. et al.*, «*Arpu Kuilpu: An H5 from the outer main belt*», *Meteoritics and Planetary Science*, 57, Issue 6 (2022) pp. 1146-1157);
- Rare decay search (*Laubenstein, M. et al.*, «*Search for rare alpha and double beta decays of Yb isotopes to excited levels of daughter nuclei*», *European Physical Journal C*, 82 (2022) 58);
- New detector design (*Celi, E. et al.*, «*Development of a cryogenic In₂O₃ calorimeter to measure the spectral shape of ¹¹⁵In β -decay*», *Nuclear Instruments and Methods in Physics Research A*, 1033 (2022) 166682; *Nagorny, S. et al.*, «*Measurement of Pt-190 alpha decay modes with gamma emission using a novel approach with an ultra-low-background high purity germanium detector*», *Journal of Instrumentation*, 16, Issue 3 (2021) P03027).

Winchcombe

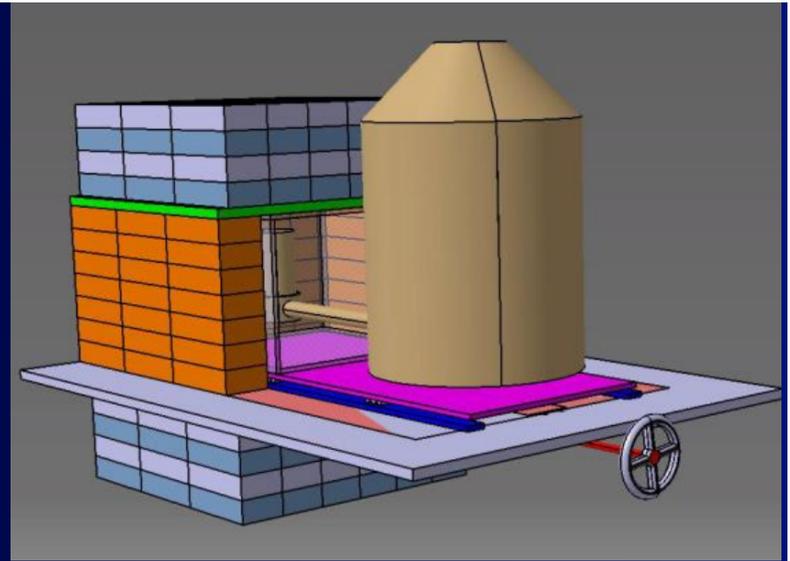
- The Winchcombe meteorite contains water similar to that found on Earth;
- New study shows that carbonaceous asteroids played a key role in delivering the ingredients needed to kickstart oceans and life on the early Earth;
- Winchcombe was blasted off an asteroid near Jupiter and travelled to Earth within the last million years;
- Samples of the meteorite are on display at the Natural History Museum;





GS1

Operated at
LNGS
(3800 m w.e.)



S.S. Nagorny
M. Laubenstein



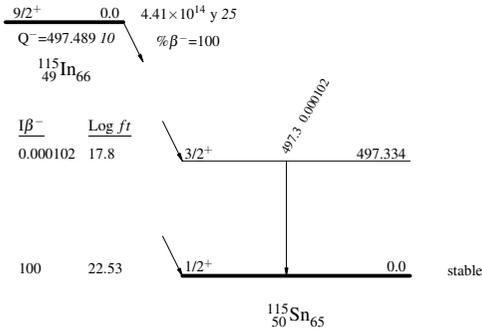
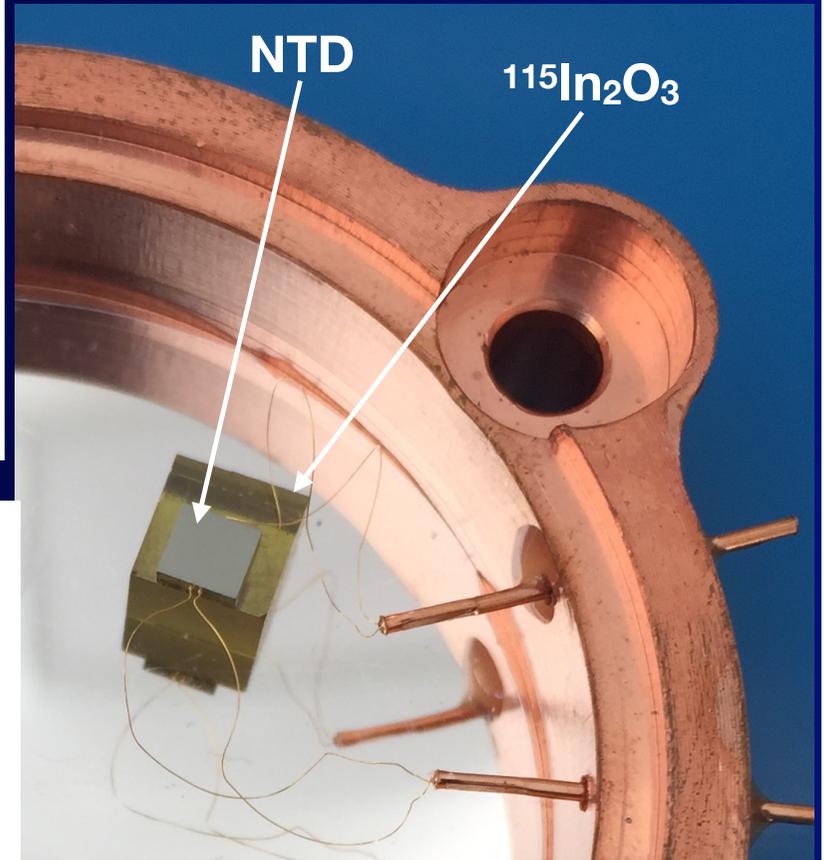
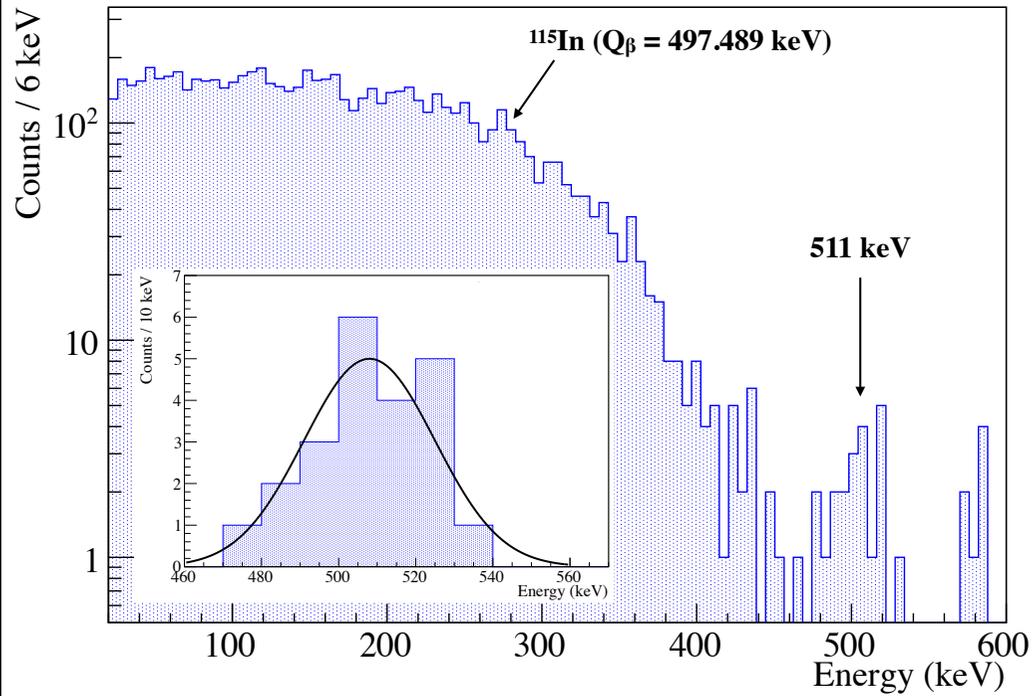


Figure 1: Decay scheme of the ^{115}In to the ground state ($1/2^+$) and excited state ($3/2^+$) of ^{115}Sn . Figure reprinted from Ref. [11].



In_2O_3
 4th forbidden non-unique β decay

Thank you for your attention !