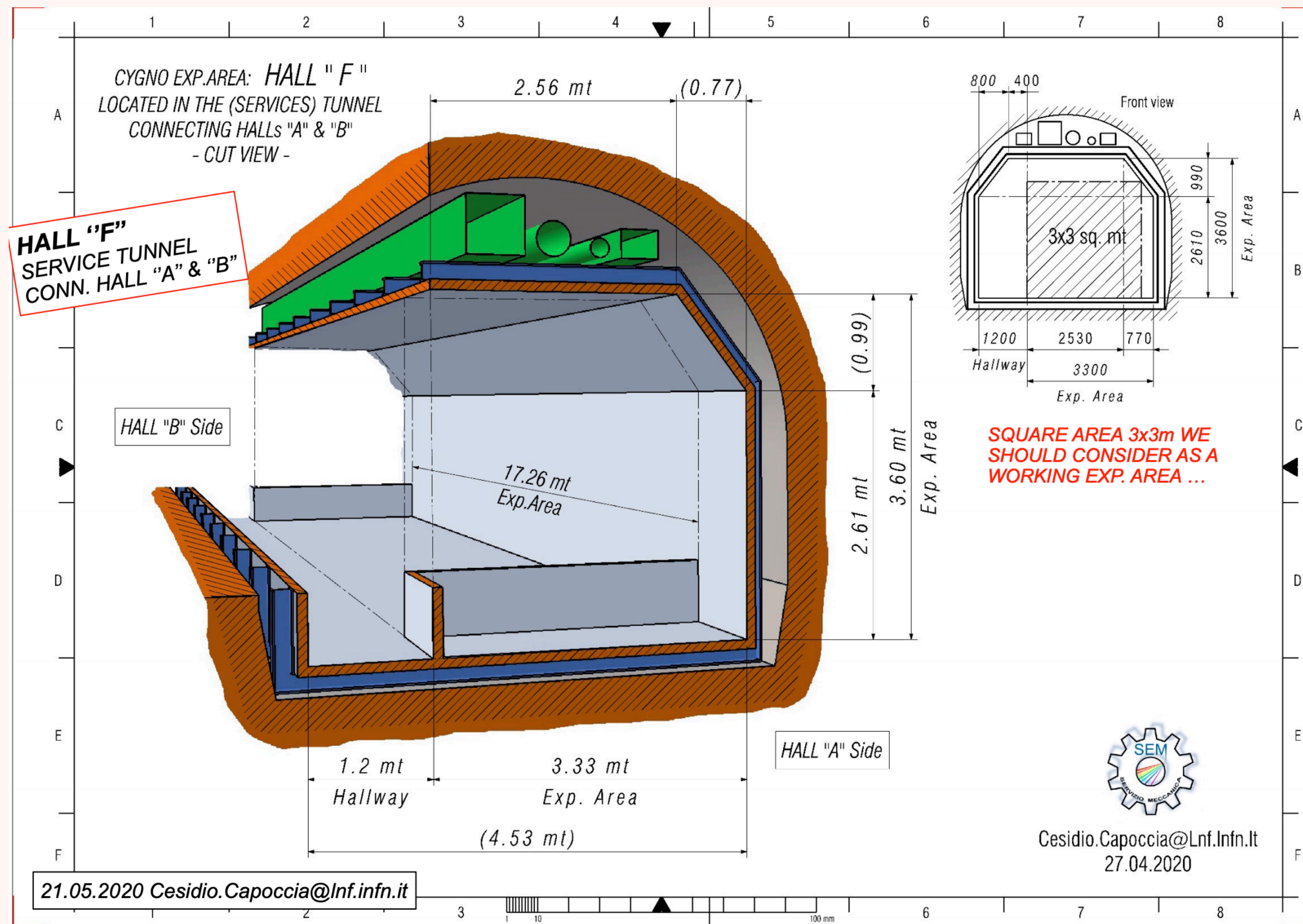

NEWS



HALL-F: CYGNO IN THE BOTTLE

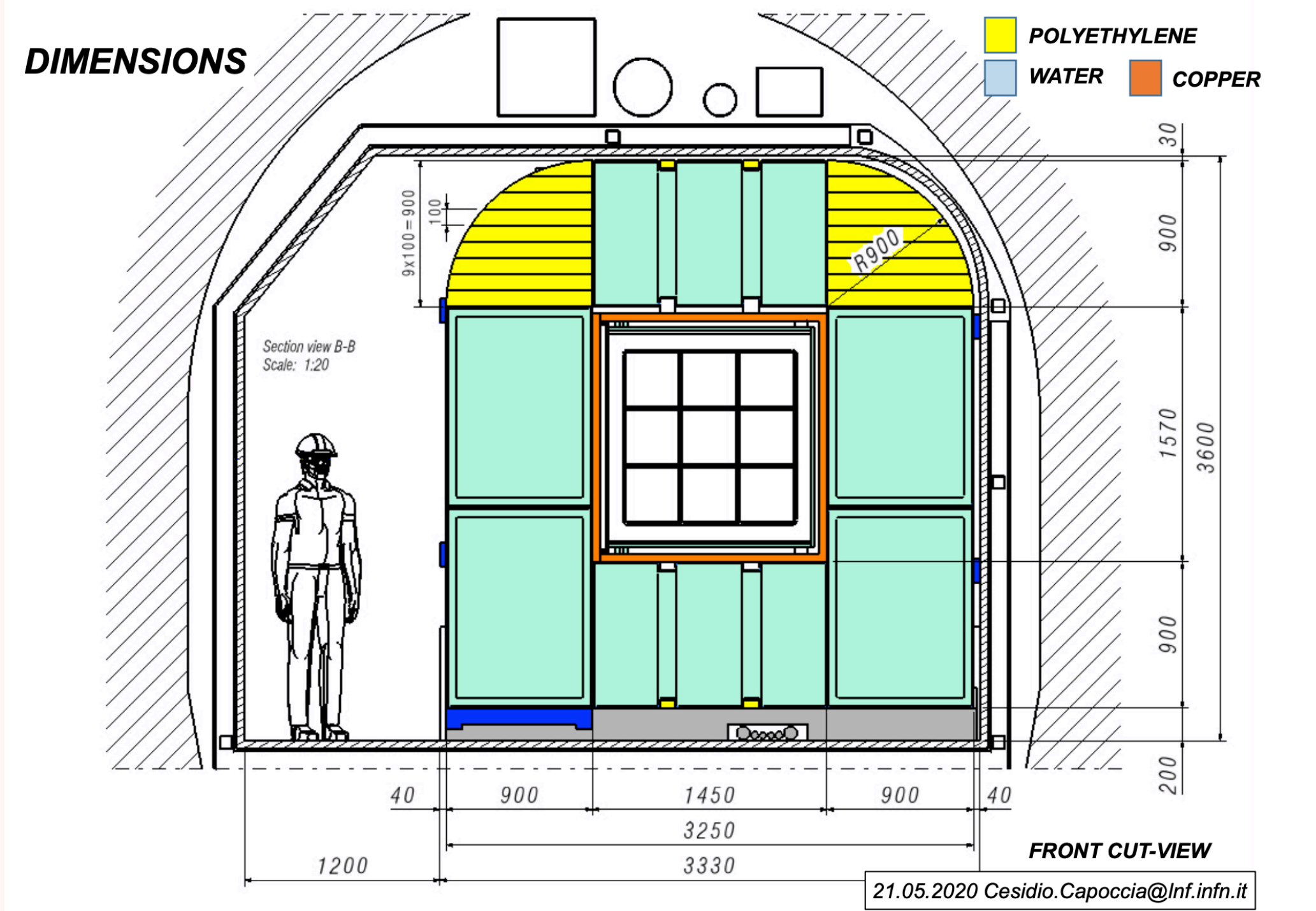


A possible room for CYGNO is in Hall-F (tunnel connecting A and B halls);

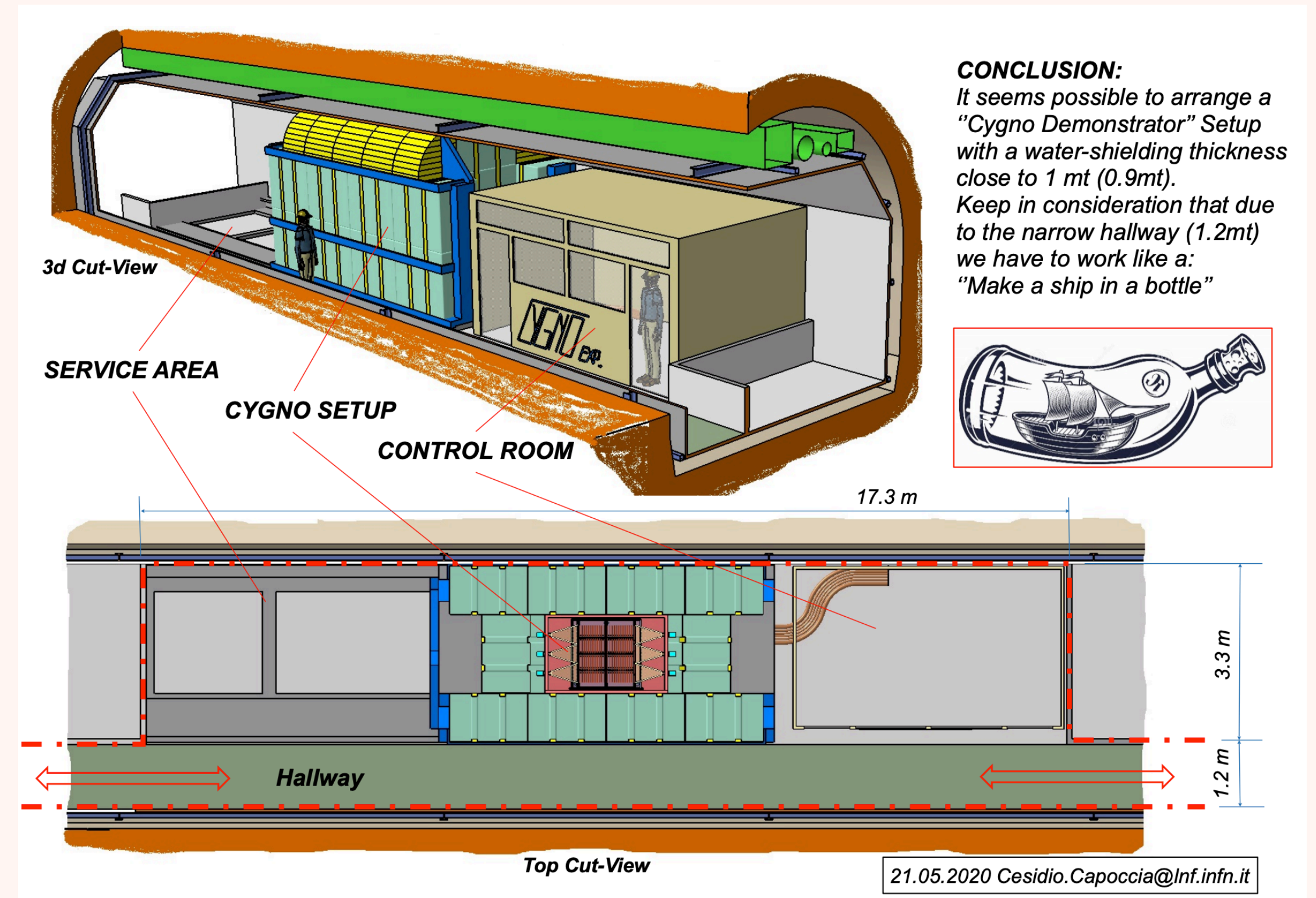
Available cross section is 3x3 m²

Length is 17 m

HALL-F: CYGNO IN THE BOTTLE



It will be possible to house 1 m³ - CYGNO with a total shield thickness of 90 cm.



Baseline solution is 200 cm water and 5 cm copper giving a bkg cpy [1-20] keV of 10³;

With 85/5 we expect a bkg cpy [1-20] keV of 10⁶;

HALL-F: CYGNO IN THE BOTTLE

Table 1: Background rates. Copper costs (25 €/kg) assuming for LIME: 50 × 50 × 100 cm³ internal shielding size; 0.162 m³ for 5 cm, 0.406 m³ for 10 cm, 1.188 m³ for 20 cm; for 4×LIME: 90 × 90 × 200 cm³ internal shielding size 1.040 m³ for 10 cm

Detector Volume (m ³)	Water/Copper Thickness (cm)	Water Cost (k€)	Copper Cost (k€)	[1-20] keV cpy
1	250/5			1 × 10 ²
1	200/5			1 × 10 ³
1	100/5			2 × 10 ⁵
1	85/5			1 × 10 ⁶
1	50/5			8 × 10 ⁶
0.05	-	-	-	3 × 10 ⁸
0.05	50/5	20	40	5 × 10 ⁵
0.05	50/10	20	95	5 × 10 ⁴
0.05	100/5	25	40	3 × 10 ⁴
0.05	110/10	25	95	2 × 10 ³
0.05	50/20	20	270	1 × 10 ³
0.40	90/10	50	250	2 × 10 ⁴

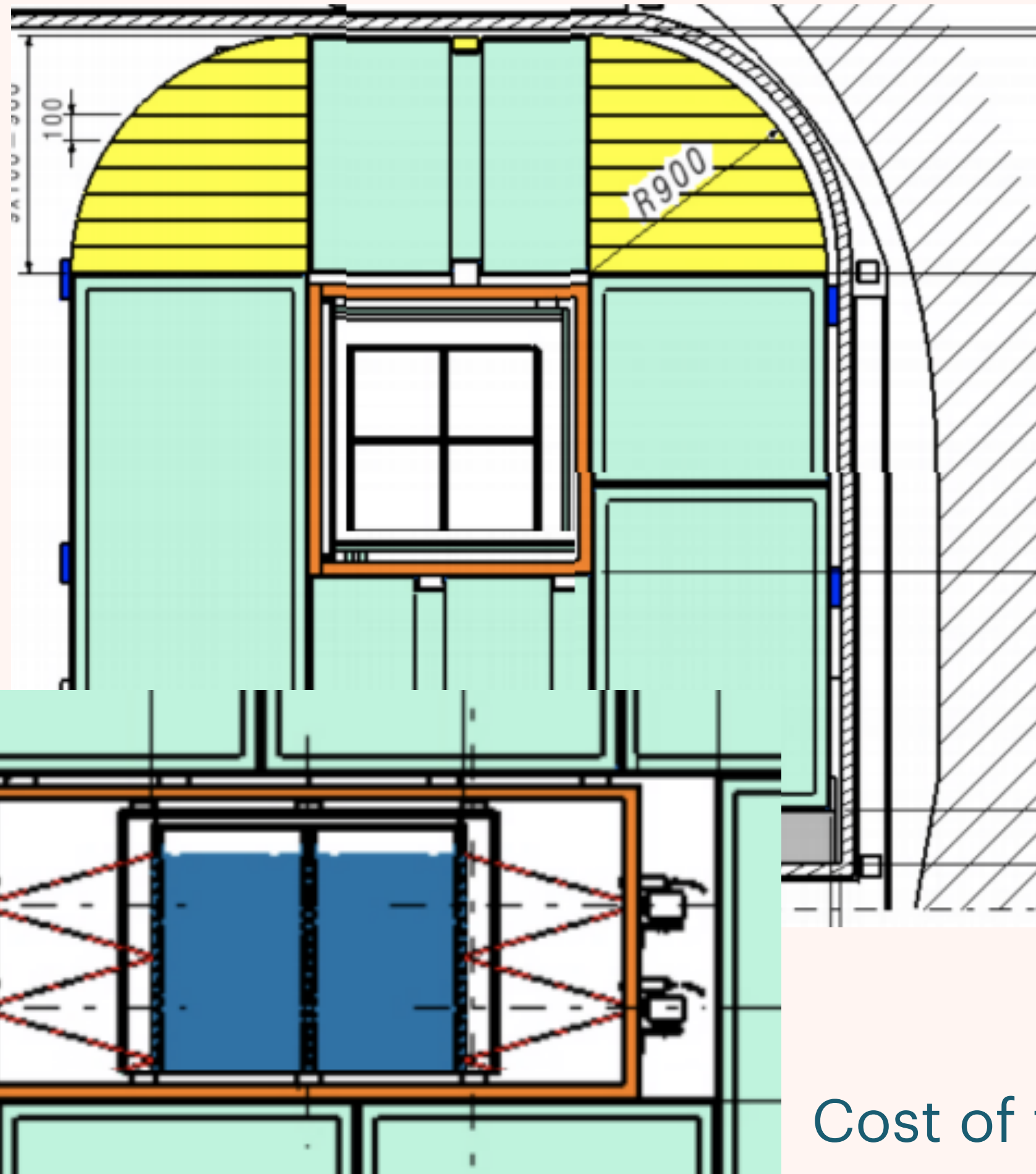
Our rejection capability in [1-20] keV is something between **10²-10³**

Background rates were evaluated with simulation

There are 3 solutions that fit in the Hall-F;

- CYGNO (1m³) with a too high bkg rate;
- LIME (50 l) with 110/10 shielding scheme (2×10³);
- A matrix of 2x2 double-LIMEs (0.4 m³) with 90/10 shielding scheme (2×10⁴);

HALL-F: CYGNO IN THE BOTTLE



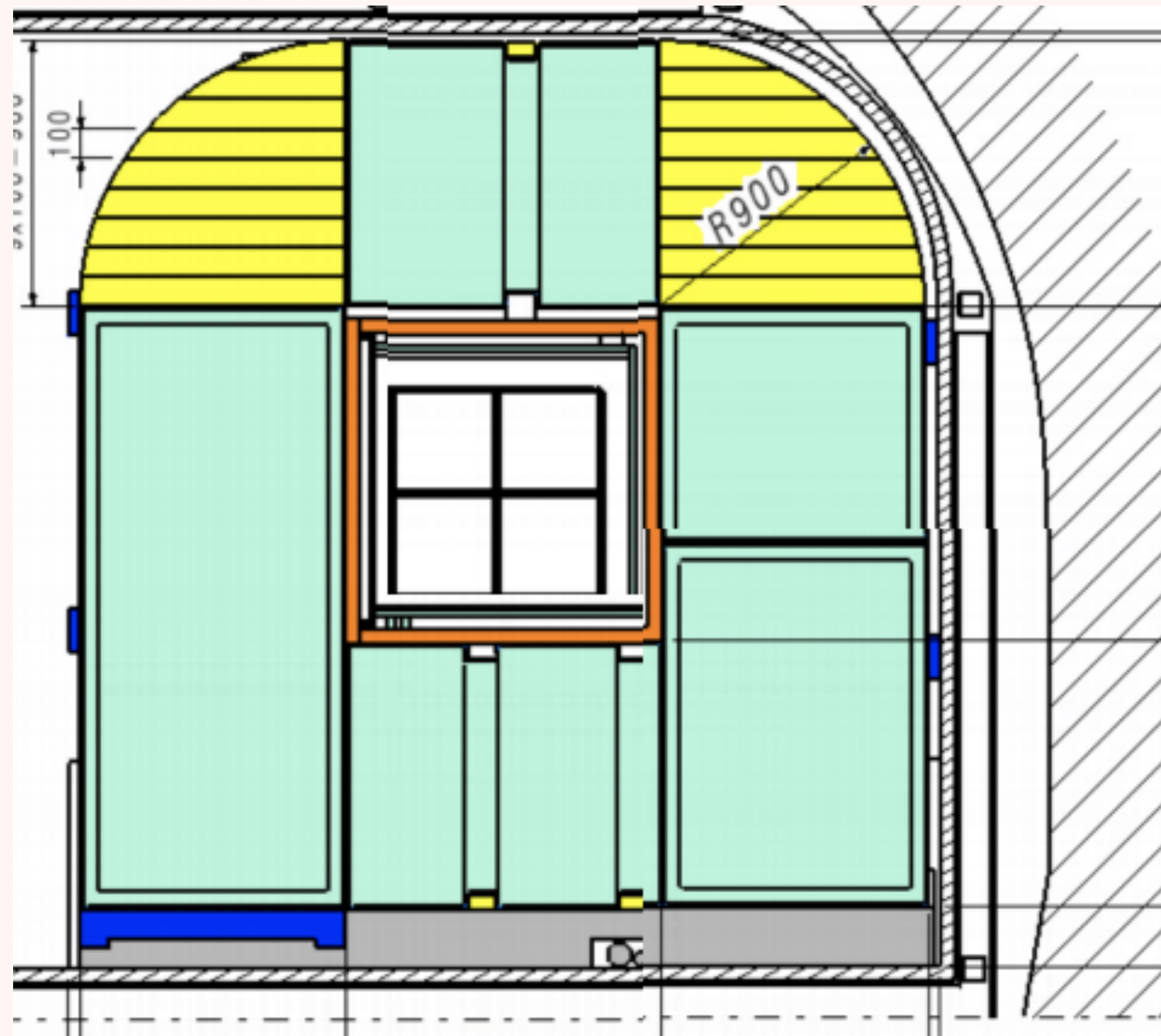
Background rate of **2×10^4** cpy, will be lower than internal bkg (currently **5×10^5** cpy) and will allow to study it;

With a rejection of **10^2 - 10^3** these numbers will result in an avoidable bkg of:

- few **tens** of events/year **external**;
- few **hundreds** of events/year **internal**;

Cost of this shielding scheme was evaluated to be **300 keuro**;

HALL-F: CYGNO IN THE BOTTLE



Proposal:

- **LNF** team should make an evaluation about **space left** for the shielding with a matrix of 2x2 double-length LIME;
- Once we have it, we investigate with **simulation** what the best compromise water/Cu in terms of **bkg** and **costs**;
- GSSI people study the performance achievable in different bkg conditions;

CYGNO PRESSURE

Operating detector gas at a pressure different from atmospheric (lower or higher) can give some help (best tracking or larger mass and possibly NID);

In order to take some final and serious decision on this I think we have to study in details pros and cons from different points of view:

- **experimental:** what are the performances at different pressure (light yield, detection efficiency, tracking, long term stability)? Vacuum vessel moved to LNGS should fit MANGO. Detailed tests should start and results will be crucial to have an answer;
 - **Physics:** what are the above performance?
 - **mechanics**
-

LIME

Yesterday we switched ON LIME;

Everything was fine from the HV point of view (GEM up to 460 V, transfer field up to 2 kV/cm and drift field up to 400 V/cm);

No electronic neither light signals;

An issue in the GEM cabling was (probably) found and fixed;

Gas flux restarted in the late afternoon.

Tomorrow there will be a new test.

