First look at the charged particle beam in EHN1 for LAGUNA-LBNO prototype

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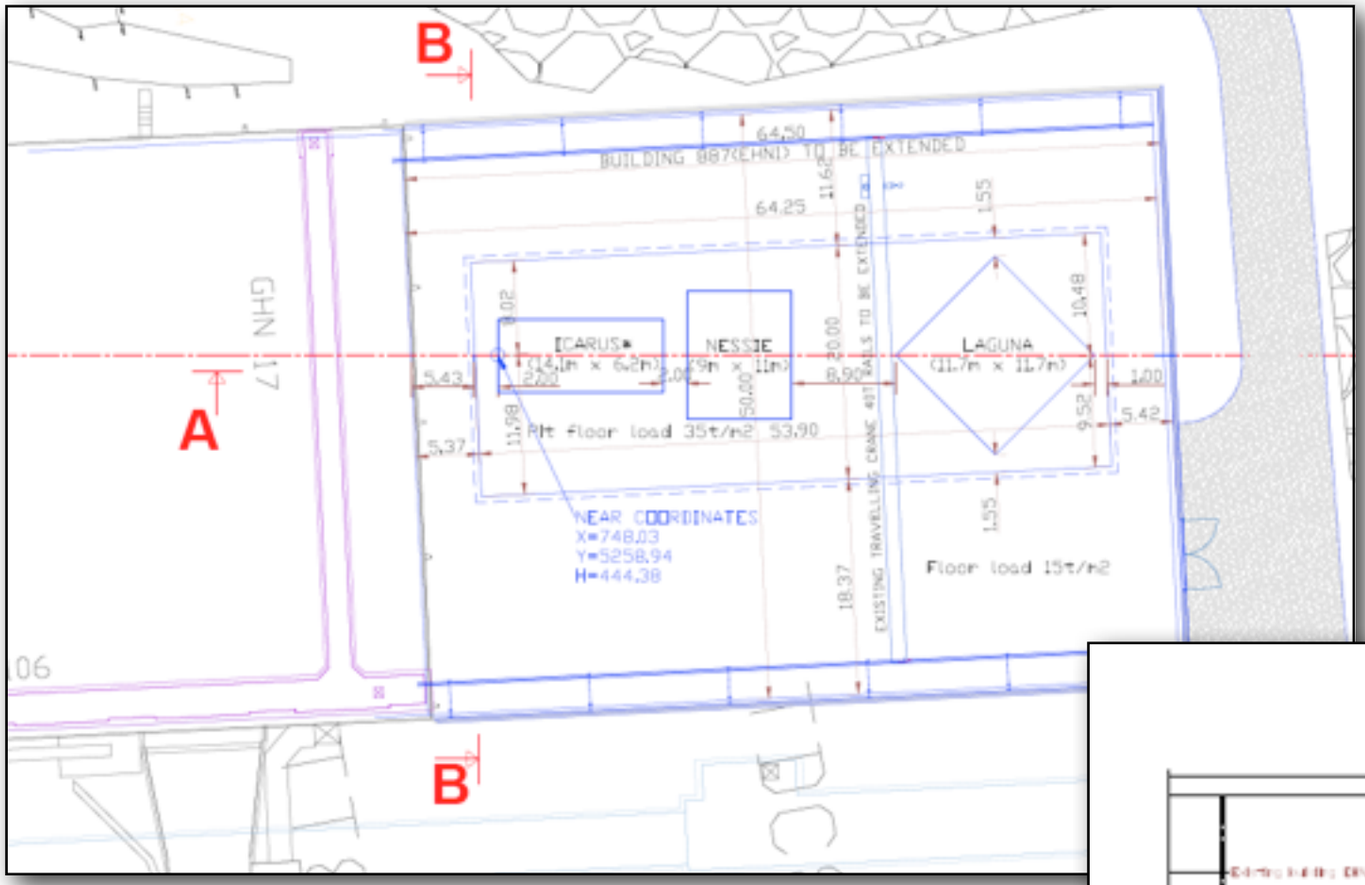
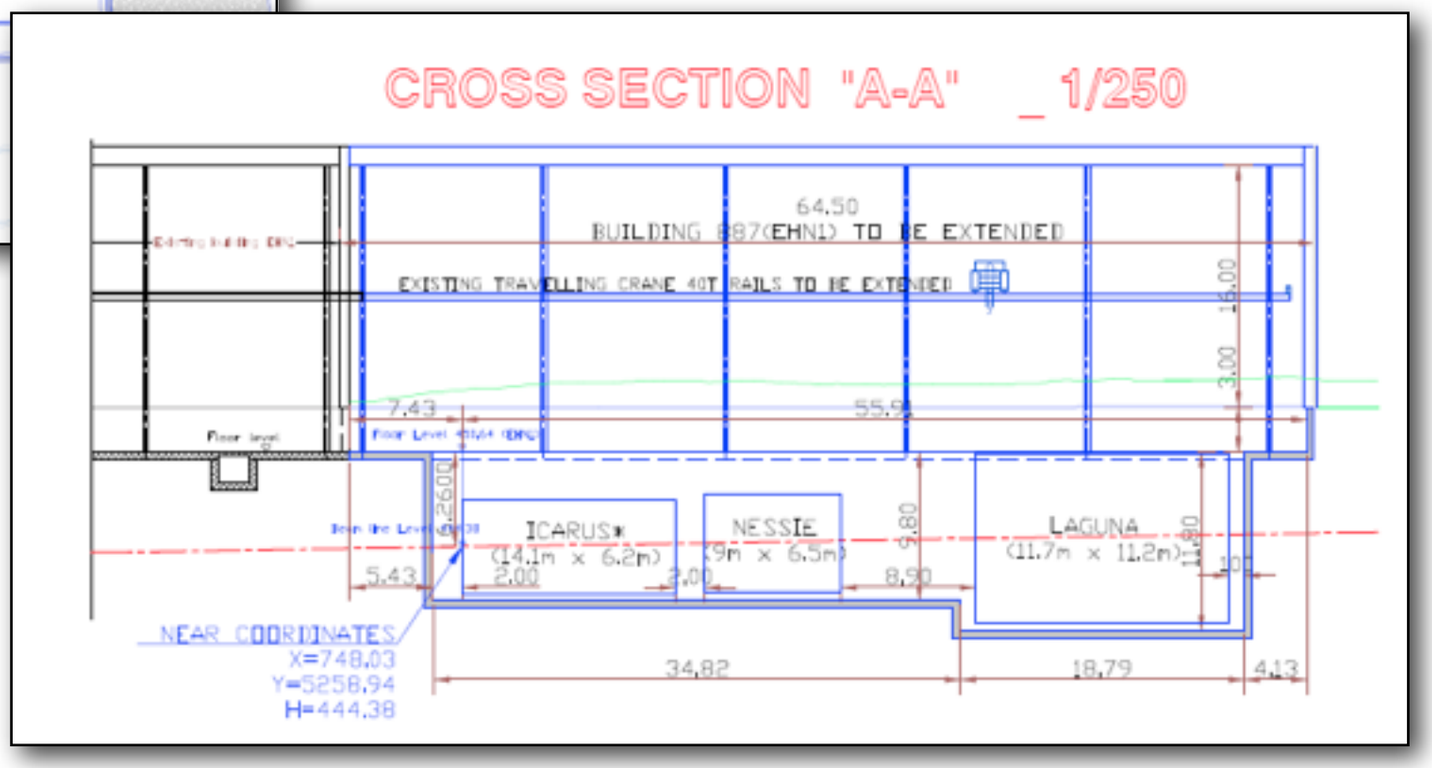
Experiment Requirements

- Energy range : 1 - 20 GeV/c
  - momentum definition to ±1%
- Particle types : pions, muons, electrons, protons
  - particle fractions and purity not critical can be optimized later
    - particle ID is required
  - both charge signs
- Particle rate : < 200 Hz
- Beam orientation: 45±15 deg wrt the readout views, ±15 deg vertically towards the active volume center

Detector location layout in EHN1

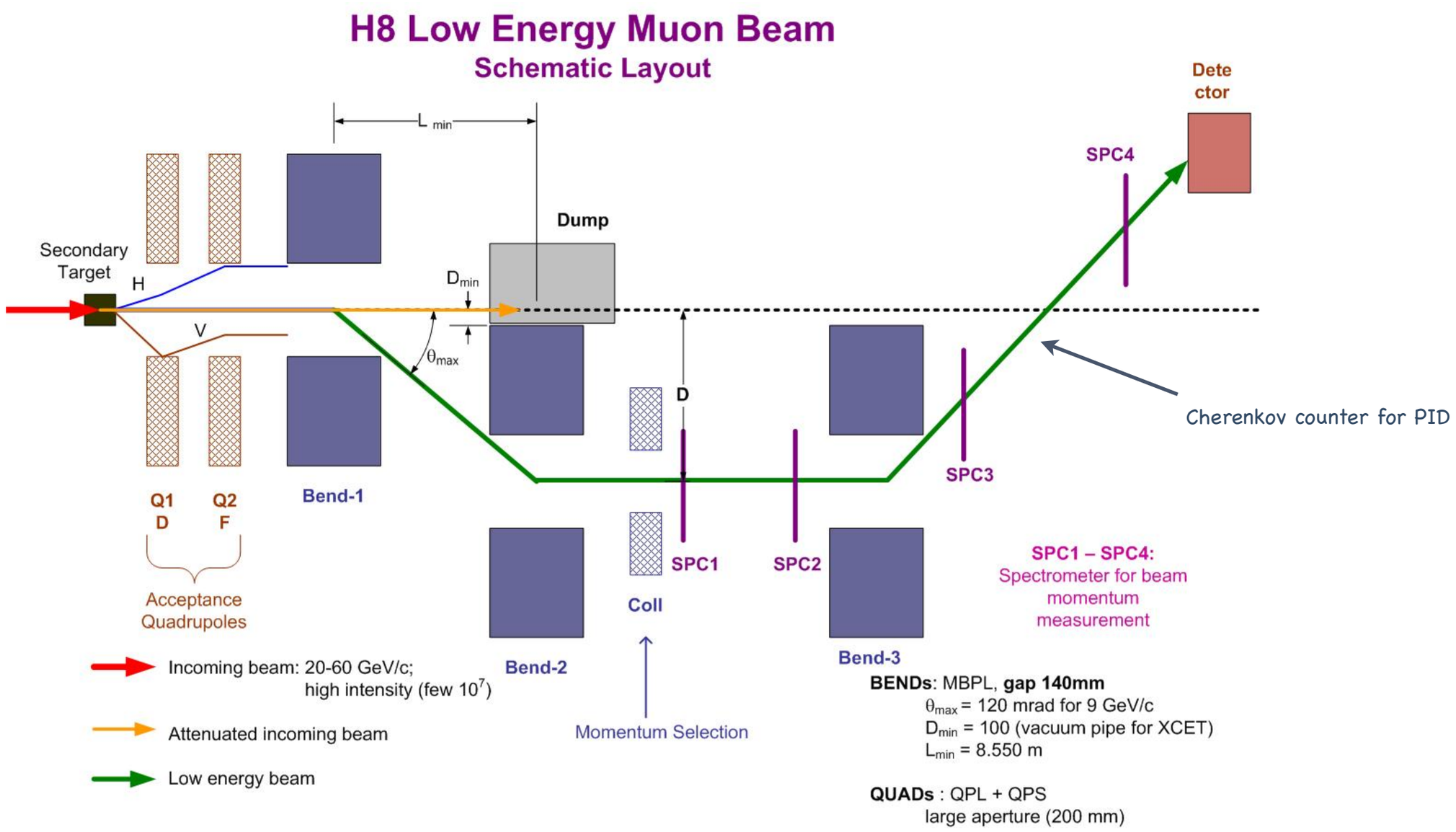
- Latest (?) drawings - downloaded this morning form EDMS





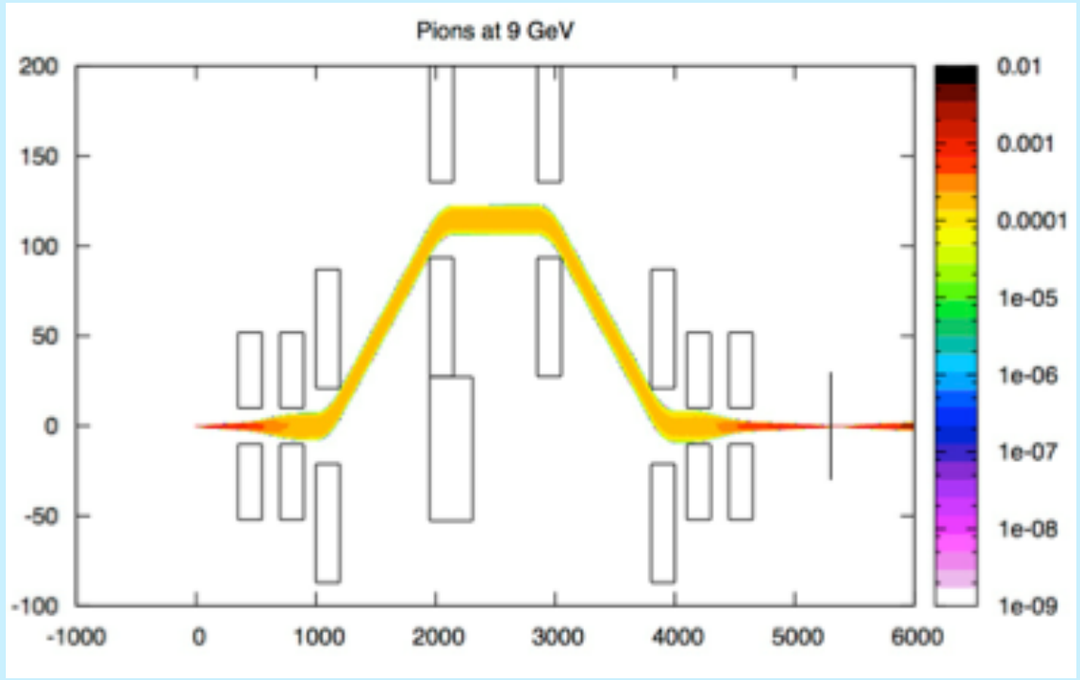
How to get the low-energy beams

- Low energy hadron beams (<10 GeV/c) are produced using a secondary target and a tertiary branch
  - setup validated in H2(H8) for CMS(ATLAS) experiments
  - Note: instrumentation and PID are the tricky things to make it working correctly!



Recent studies for AIDA (ν - detectors)

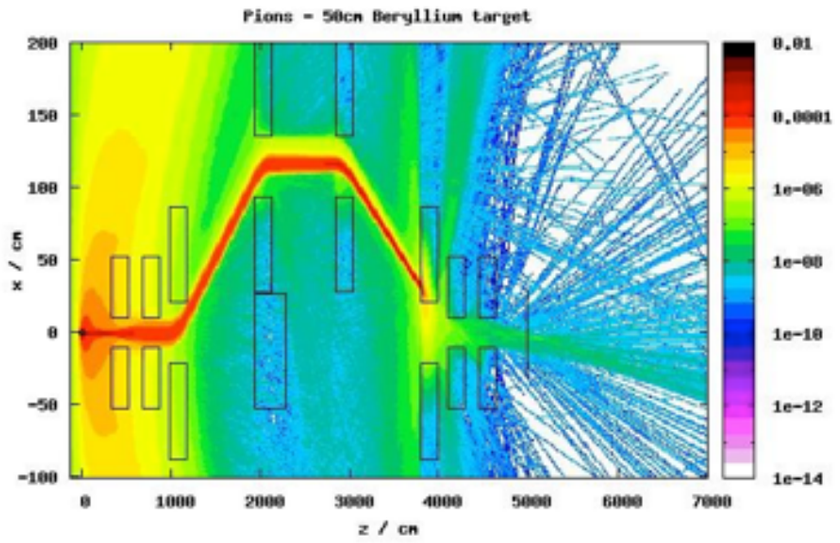
Pion configuration



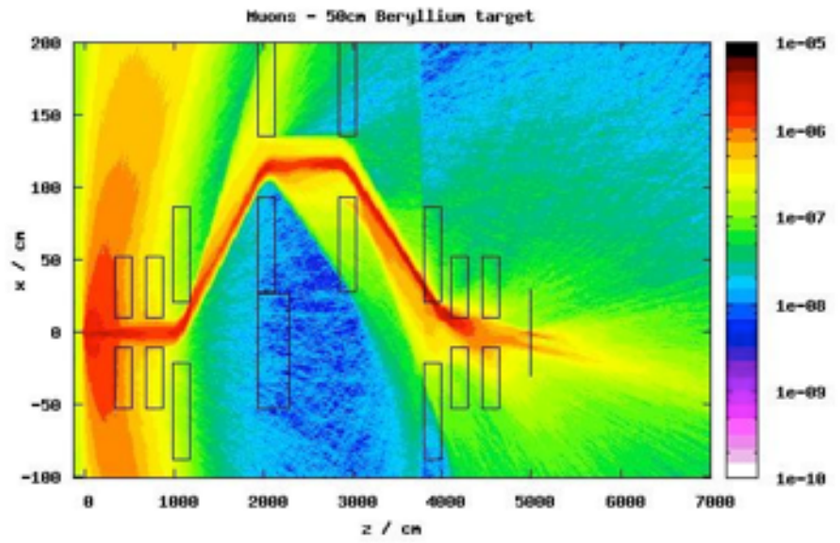
- low-energy electron beams can be produced using a secondary electron beam
- In all cases the wanted rates would be easily achieved, purity would depend on trigger & PID configuration

Muon configuration

pions



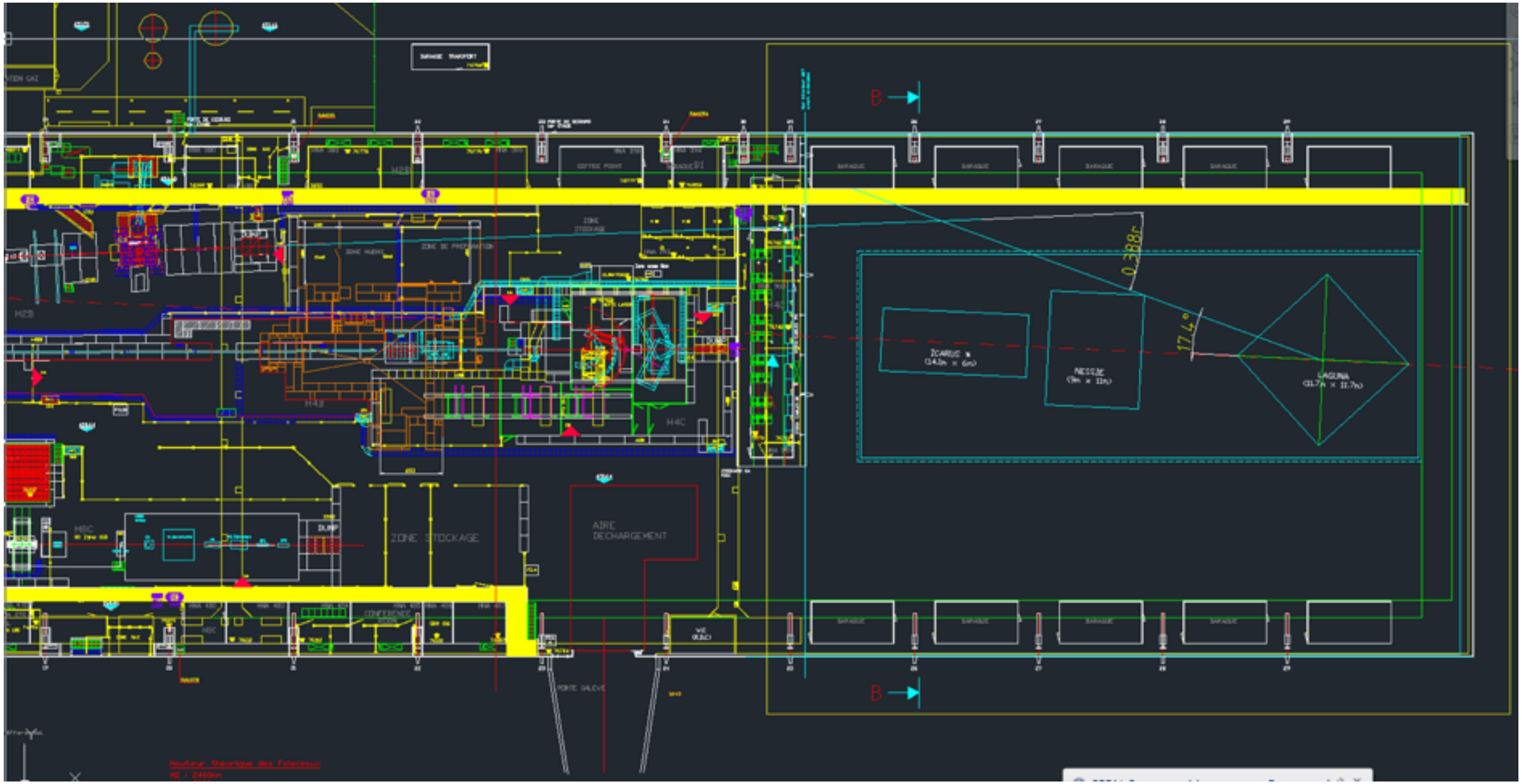
muons



Charged beam to LAGUNA-LBNO prototype

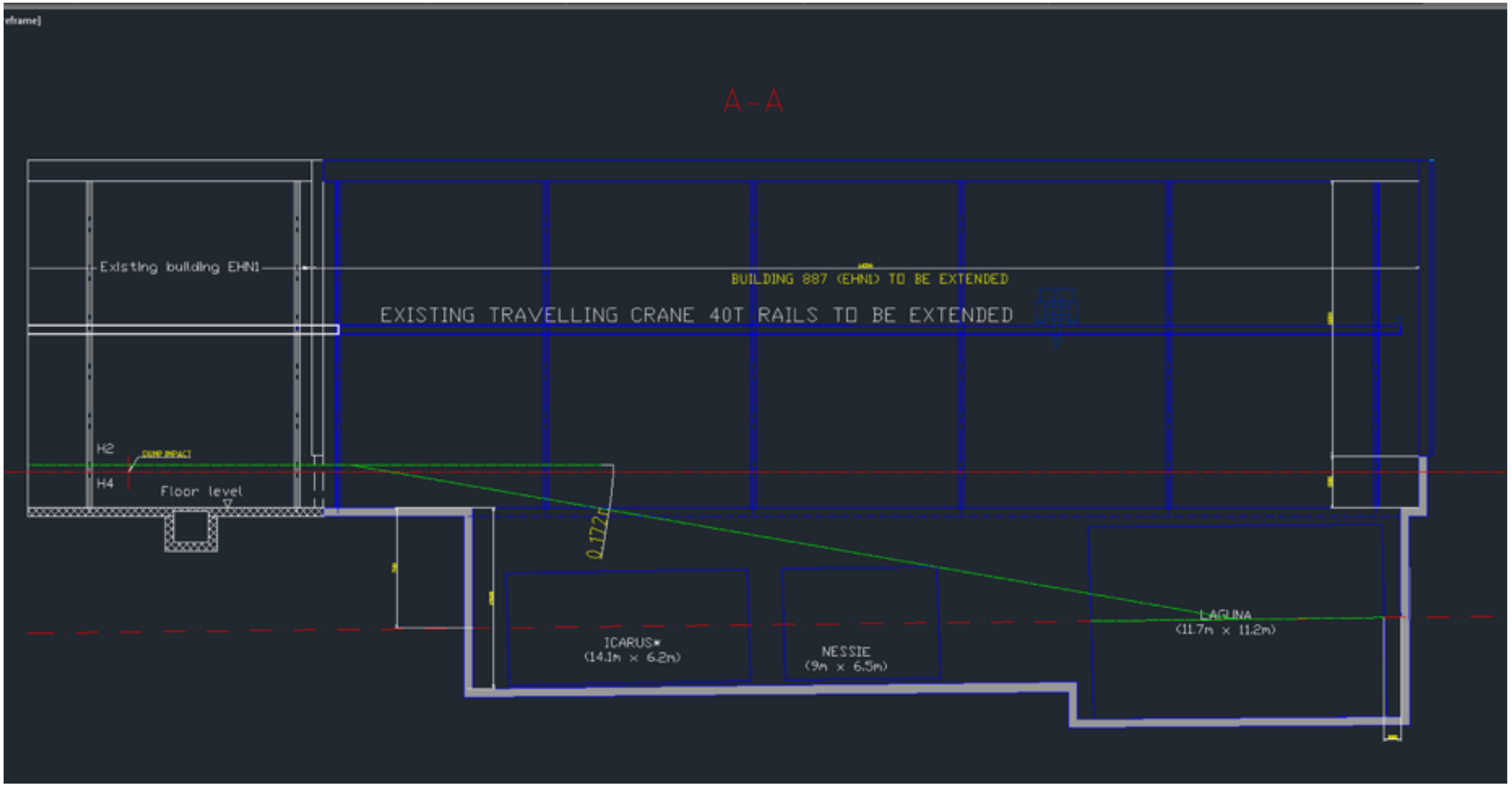
- Only possibility (on Jura side) : beam from H2 line

- H-plane angle (smallest): **388mrad** / available magnets: 120mrad@9GeV



Charged beam to LAGUNA-LBNO prototype

- V-plane (smallest) : **172 mrad**
  - use the combined H/V magnets for the beam spectrometer (Δp definition)



Comments

- A solution using a tertiary beam from H2 seems feasible
  - low-energy beams < 10 GeV can be delivered to LAGUNA-LBNO prototype at its current location
  - it affects the present layout of the GIF++ area but a solution has been found for this
- We need the exact drawings for the layout and NESSIE volume to advance, or define max volume?
- The beam requires a lateral space of ± 2.5 meters around the beam pipe
  - so the exact energy range will be defined once the drawings are finalized
  - the space on the Jura side will be mostly taken by the beam
  - I must find a location for the beam dump of the secondary beam
- The beam interlock and access conditions for the new tertiary branch must be defined
  - do we need a beam dump at the end, i.e. downstream LAGUNA, or we consider the LArgon as the dump?
  - if the beam goes through the trench we must defien the controlled access area

More as the studies progress....