Preparation of the demonstrator facility

PTOLEMY general meeting, 21-22/11/2024 Genova,

LNGS, group

In preparation of the Demonstrator

Facility preparation:

Hardware OK budget wise.

Last effort towards full design of the Injection+RF+electrodes.

Fellow for Mech Ing. In preparation

First phase standard e-calorimeter

Power line OK

Permission to run magnetic field in preparation

People on site?

Budget in preparation of the Demonstrator

- PRIN 2022 (190 k): assigned to LNGS+ROMA1+Roma3.

Not big budget but important to see that the PTOLEMY project is supported by the Italian system.

Part of the budget is dynamically assigned in proportion to the contract you give out of it.

At LNGS the first contract will be for a young Mech. Ing. that will be part of the Mech Ing. Service of the LNGS but dedicated to PTOLEMY drawings and design

Also ROMA3 can give a contract.

Total consumable and instrumentation <= 80 k.

MISTER grant

Better late than never. Cash flow available

- 300 k hardware
- 100 k contracts (will be converted in budget for PhD)

Missing components of the magnet

- Horns
- Power supply
- B field mapping system
- Ciller?

Issuing order in January. This will allow to have magnet completed before the trip to CERN.

Missing components of vacuum and Cryogeny

- Cold head + He compressor for copper shield
- Ciller
- Gate Valve
- Pumping system
- 2 pressure gauges
- 4-6 Temperature sensors (at 5 K)
- Temperature sensors readout

Purchasing in January
by means of the opened
order of INFN.

Missing components of vacuum chamber

- Radiation shield
- Super insulation
- Supports of vacuum chamber

Missing facility on the LNGS site

- Busway for power line (almost completed)
- Support platform for magnet foot

Missing components of magnet

- Horns
- Power supply
- B field mapping system
- Ciller?

Offer necessary SOON. IN January the order
Can be issued.
50 kE?

Issuing order in January. This will allow to have magnet completed before the trip to CERN.

Missing components of vacuum and Cryogeny

1. Cold head + He compressor for copper shield
2. Ciller
3. Gate Valve
4. Pumping system
5. 2 pressure gauges
6. 4-6 Temperature sensors (at 5 K)
7. Temperature sensors readout

1. Preliminary offer 70 k. Useless too big
2. We need to check if we can have a common (magnet and chamber) chilling system.
3. 5 k
4. 25 k
5. 3 k
6. 2 k
7. 5 k

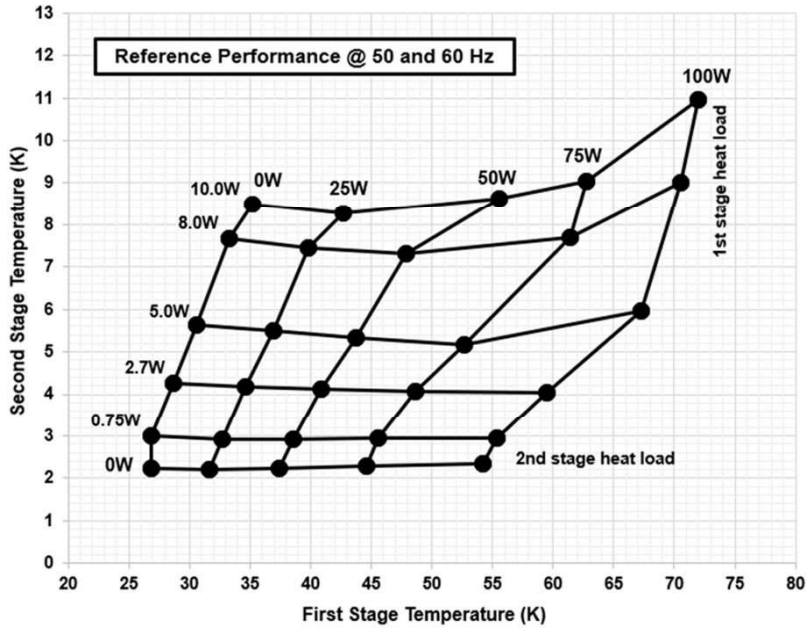
Purchasing in January by means of the opened order of INFN.

Pulse Tube Refrigerator

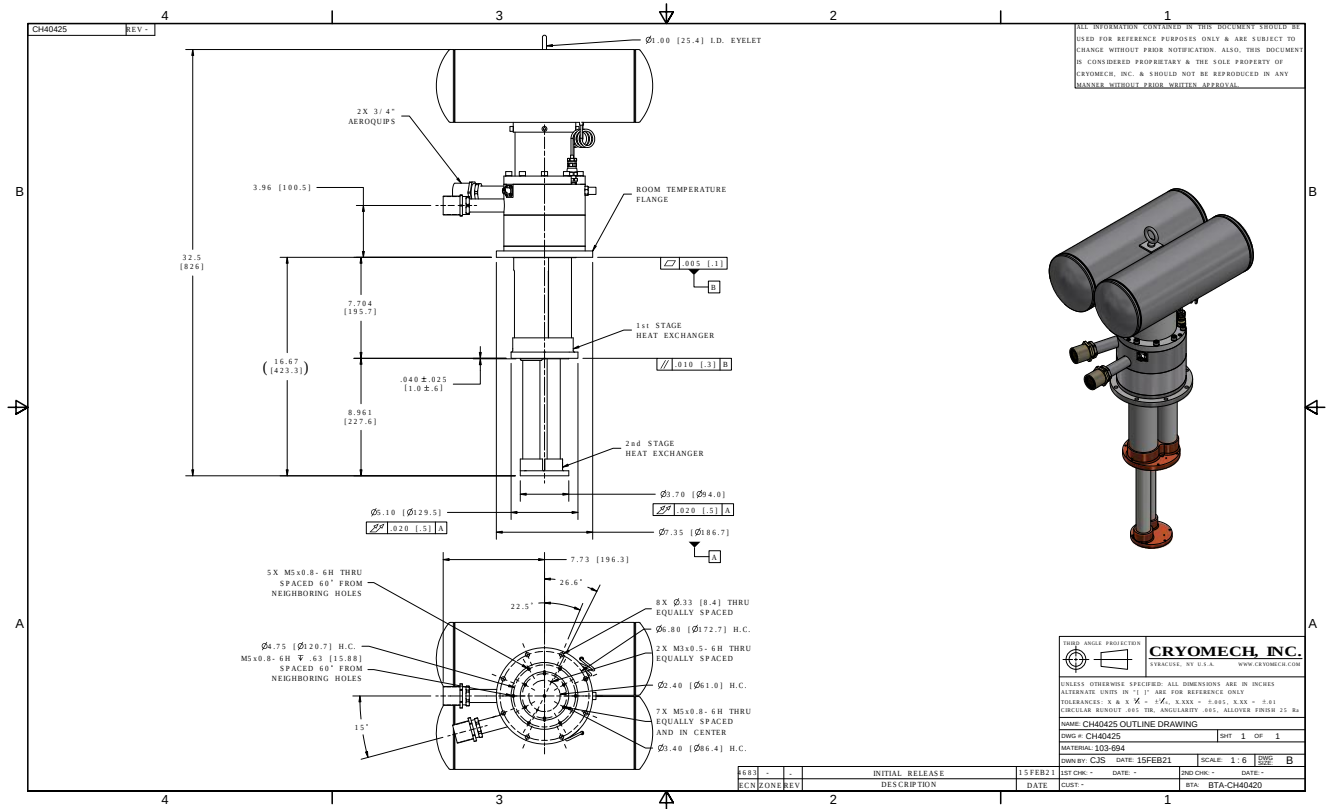
Capable to deliver more than 10 W at 10 K. Probably too much for us.

CRYOMECH

PT425 Cryorefrigerator Capacity Curve



Certified Performance: 0 W ≤ 2.8K
2.7 W @ 4.2 K with 55 W @ 45K



Missing components of vacuum chamber

1. Radiation shield
2. Super insulation
3. Supports of vacuum chamber

1. 10 k
2. 3 k
3. 2 k

Missing facility on the LNGS site

- Busway for power line
- Support platform for magnet foot

1. Paid
2. Figuring out what to do

A look to the future

Run Demonstrator Phase0
unless of unexpected issue the budget should be there.

Run Demonstrator Phase1

Preparation of Tritiated graphene sample.
Facility in UK? Very probable
Budget? We need inputs from UK, then we
go to the funding agencies.
100 k we can be saved from presents Italian budgets

How do we prepare ourself for CSN II of INFN?

Shell, we go to the February meeting with a Letter of Intent and then we decide what to propose CSN II in July?

Future papers to support INFN proposal

Filter papers plus

1. Low energy electron measurement
2. Stability of H/D on graphene (hints on T stability)
3. First RF measurement of single e- in a PTOLEMY setup
4. HV reference voltage
5. Demonstrator setup
6. Theory papers
7. LoI where Phase0 and Phase1 contents are defined