

Inline Purity Monitors

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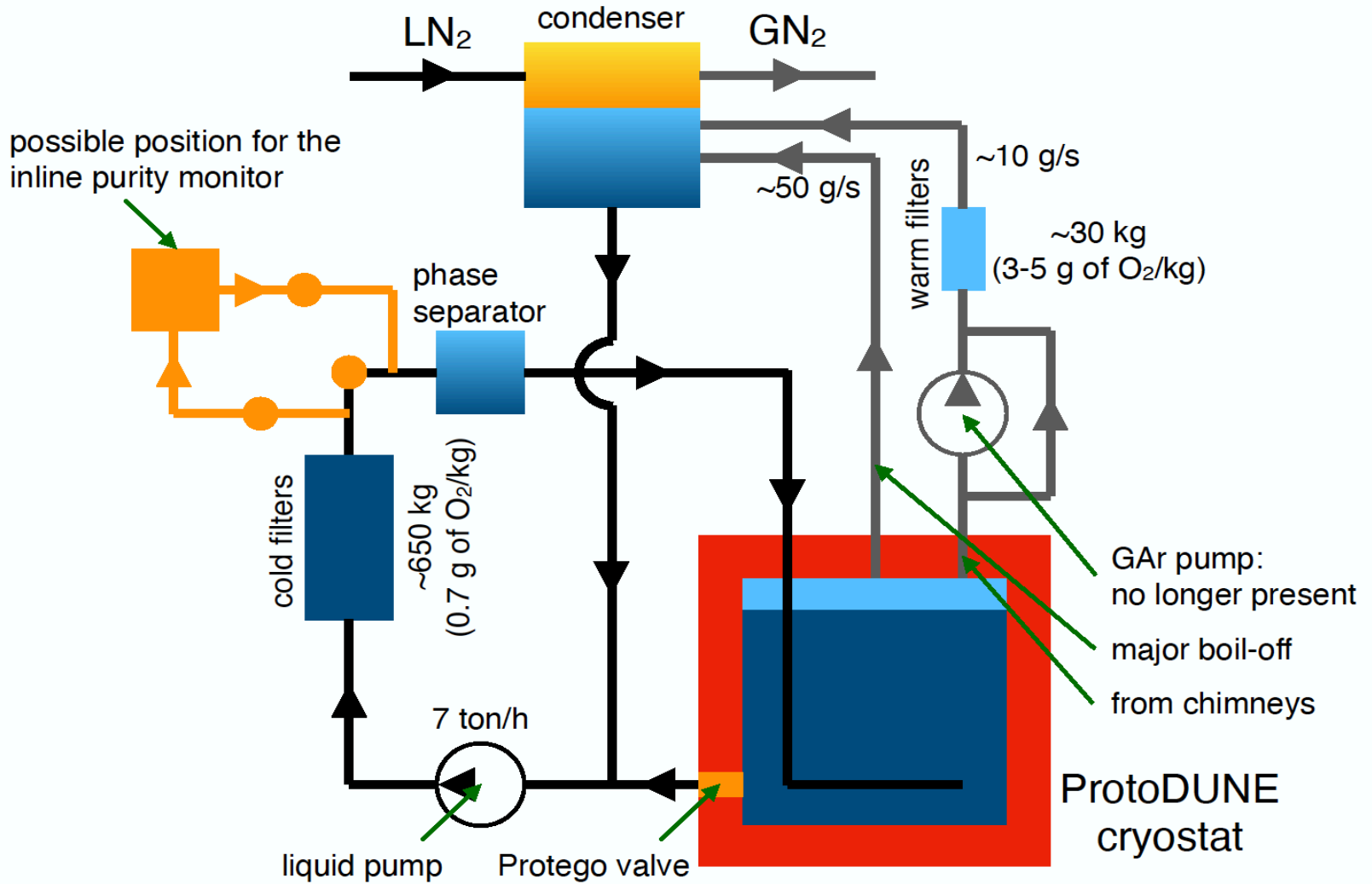
Introduction

- In ProtoDUNE-SP, cryostat purity monitors have shown critical roles in LAr filling, detector commissioning, recirculation study, and Xeon doping
- From ProtoDUNE and other experiments, it has been sufficiently demonstrated that PrM can operate for these phases for the first few years of DUNE running
- Because purity is essential to DUNE's operation and data taking, we need inline PrMs on the input and the output argon to operate over the full lifetime of DUNE
- Inline PrMs can be replaced and hence can be maintained to operate over the lifetime of the experiment
- Discuss a plan to install inline purity monitor for ProtoDUNE-SP-II

Simplified cryogenic circuit

For ProtoDUNE-SP-II inline purity monitor

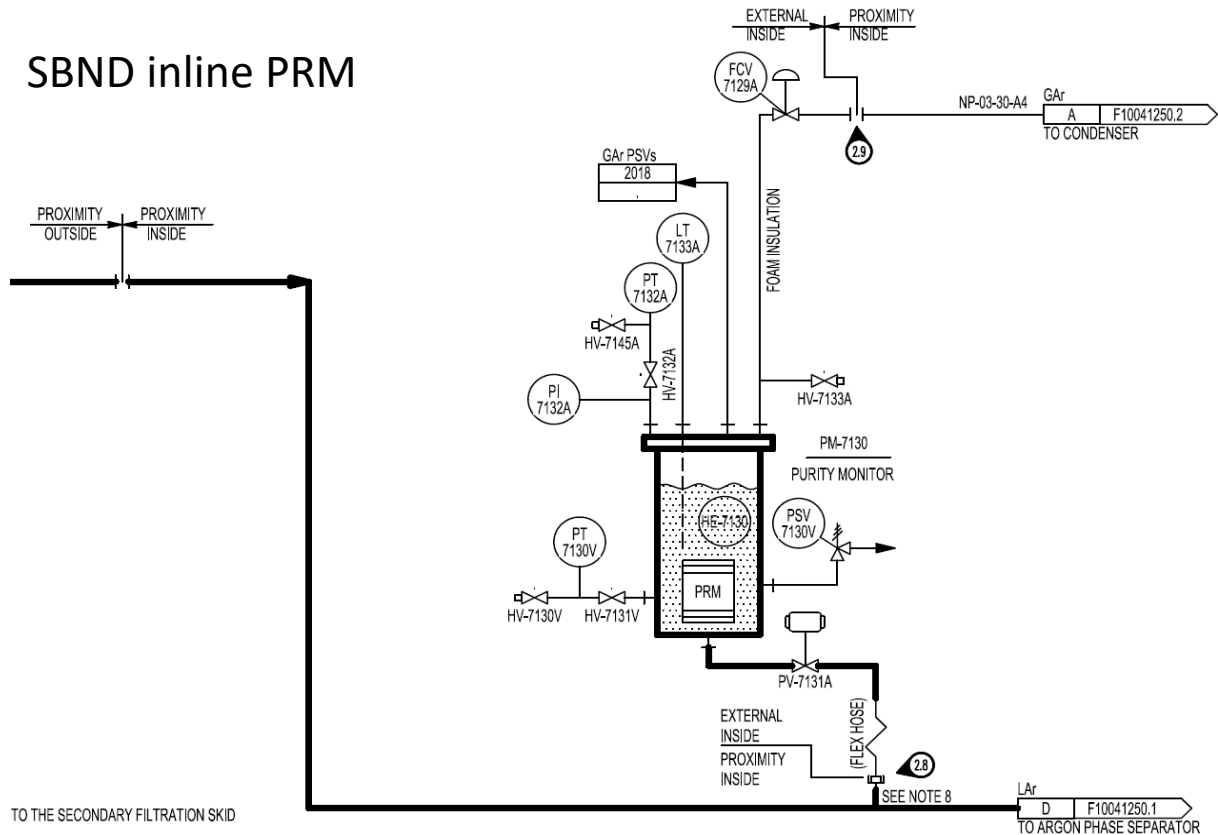
Filippo Resnati



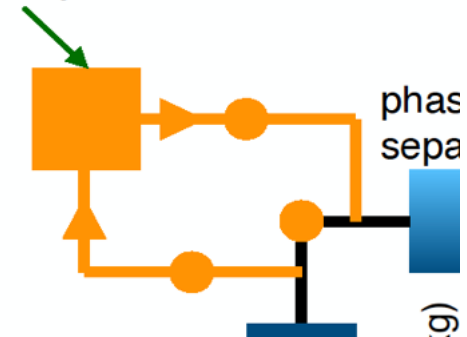
Message from Filippo Resnati (CERN cryogenic)

- The installation must be at least supervised by CERN cryogenic team.
- There will be pipe welding and vacuum insulation pipes to be modified and added.
- The best is to coordinate the design and the production, so that everybody agrees on what will be installed well in advance.
- I don't have a price estimation, but 25 kCHF may be the cost of the valves only.
- The system must then be integrated with the cryogenic control.
- At the earliest, the installation can be done after the summer 2020, when the cryostat is warm.
- The latest, I would say around the TCO closure (Late 2021).

SBND Inline PrM and cost (Alan Hahn)



possible position for the inline purity monitor



SBND cost estimate:

Purchase Purity Monitors Instrumentation \$5k

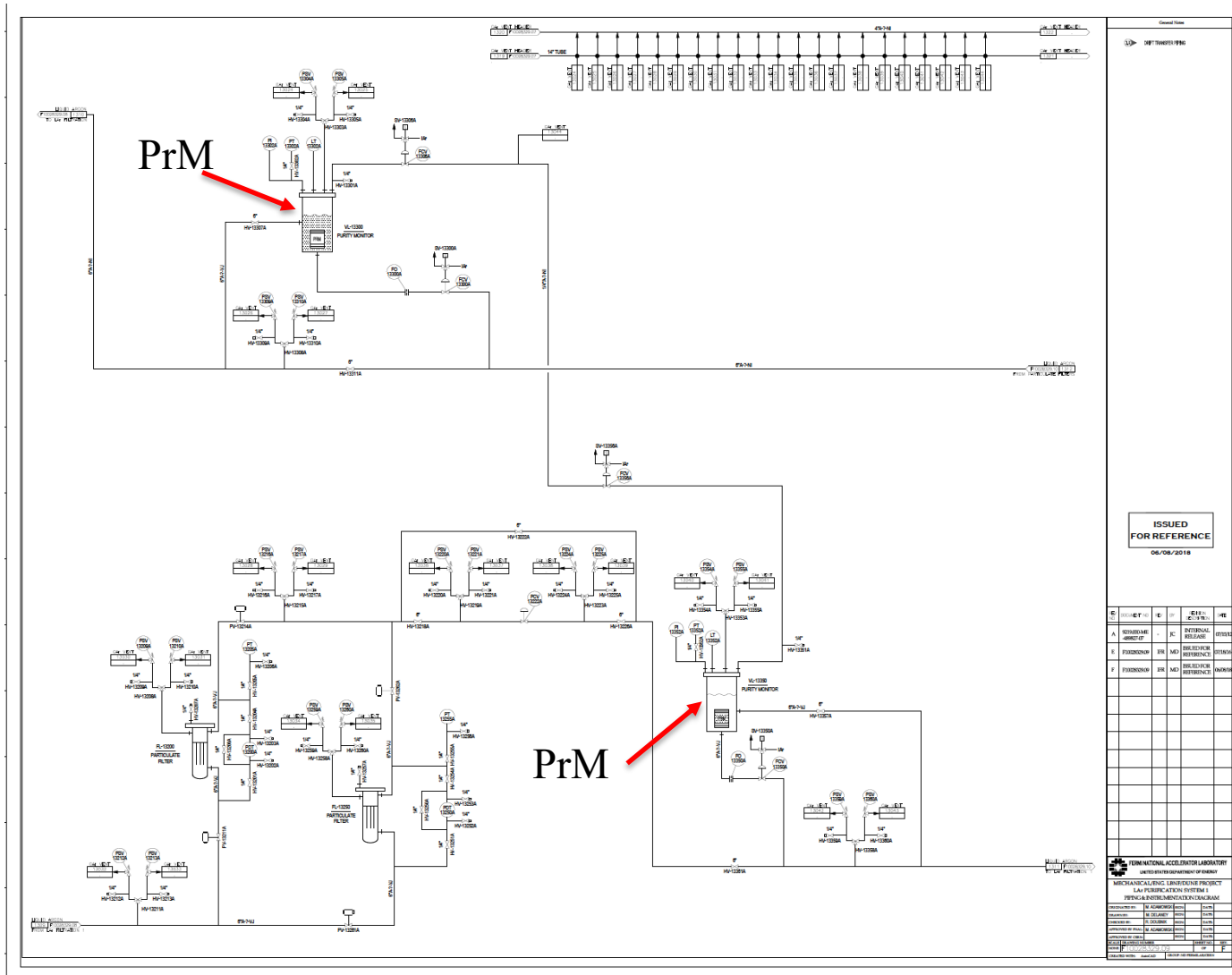
Valves: \$20k

Hoses, Piping and Fittings: \$9k

CERN estimate was 100k for ProtoDUNE-I

Inline Purity monitors for DUNE

2 PrMs outside of cryostat inline with cryogenics system, before and after filtration system



Plan for ProtoDUNE-II

- Need to closely work with CERN cryogenic crew
- People power: CERN staff, UCI students/postdoc, UH student, Andrew and me
- Vessel and valves: CERN
- Detector: build/refurbish a short purity monitor
- Electronics: fabricate an electronic box
- High Voltage: use current HV for cryostat PrM, long cables needed?
- DAQ: use current PC for cryostat, buy a new digitizer, long cables needed?
- Fabricate feedthroughs and mounting structure: UCI and UH