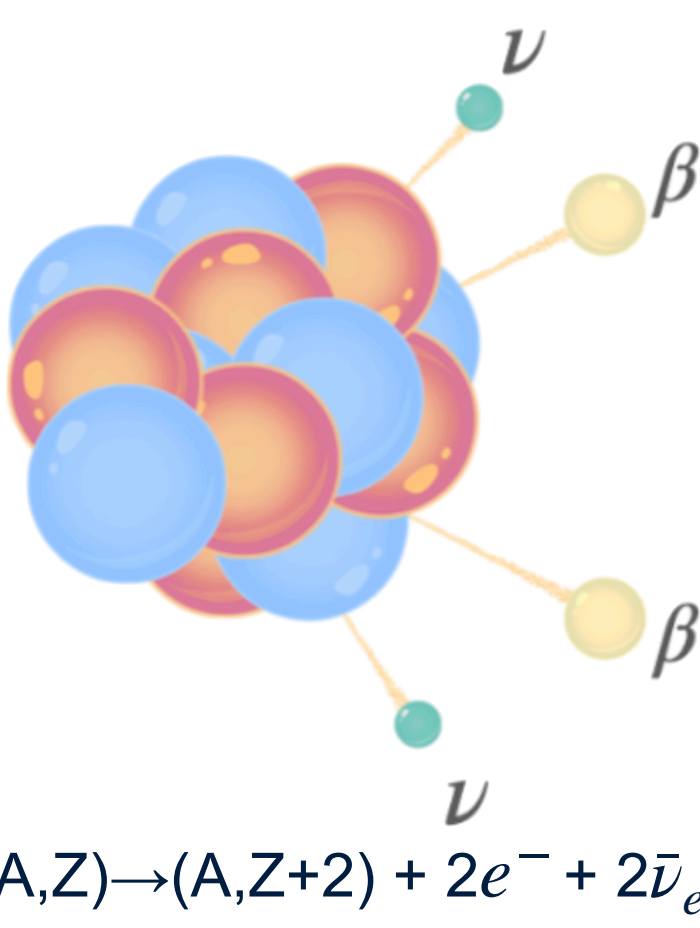


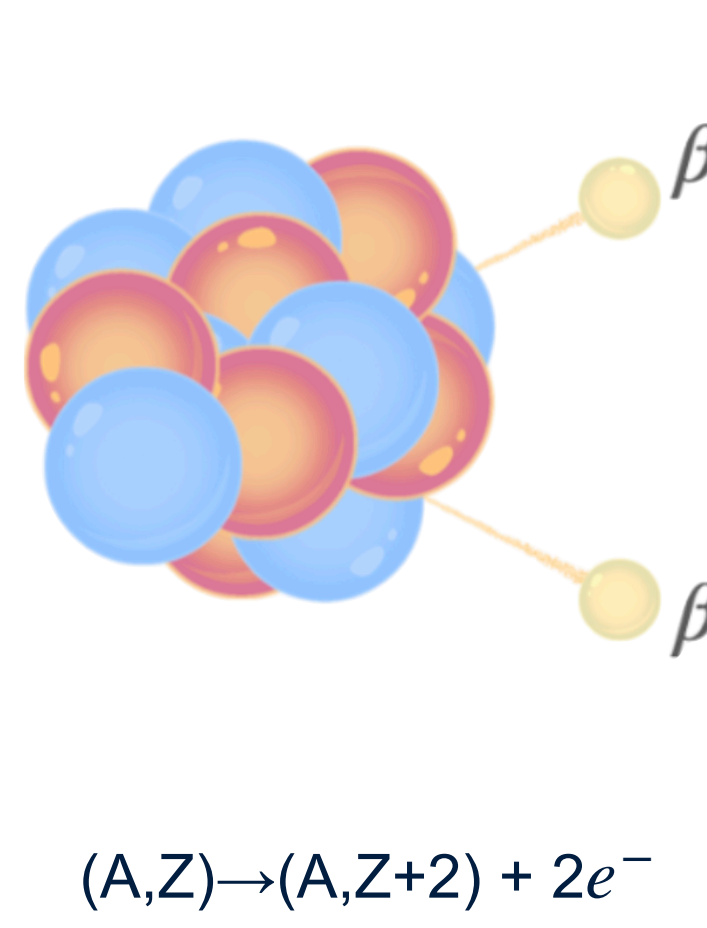


SuperNEMO Experiment

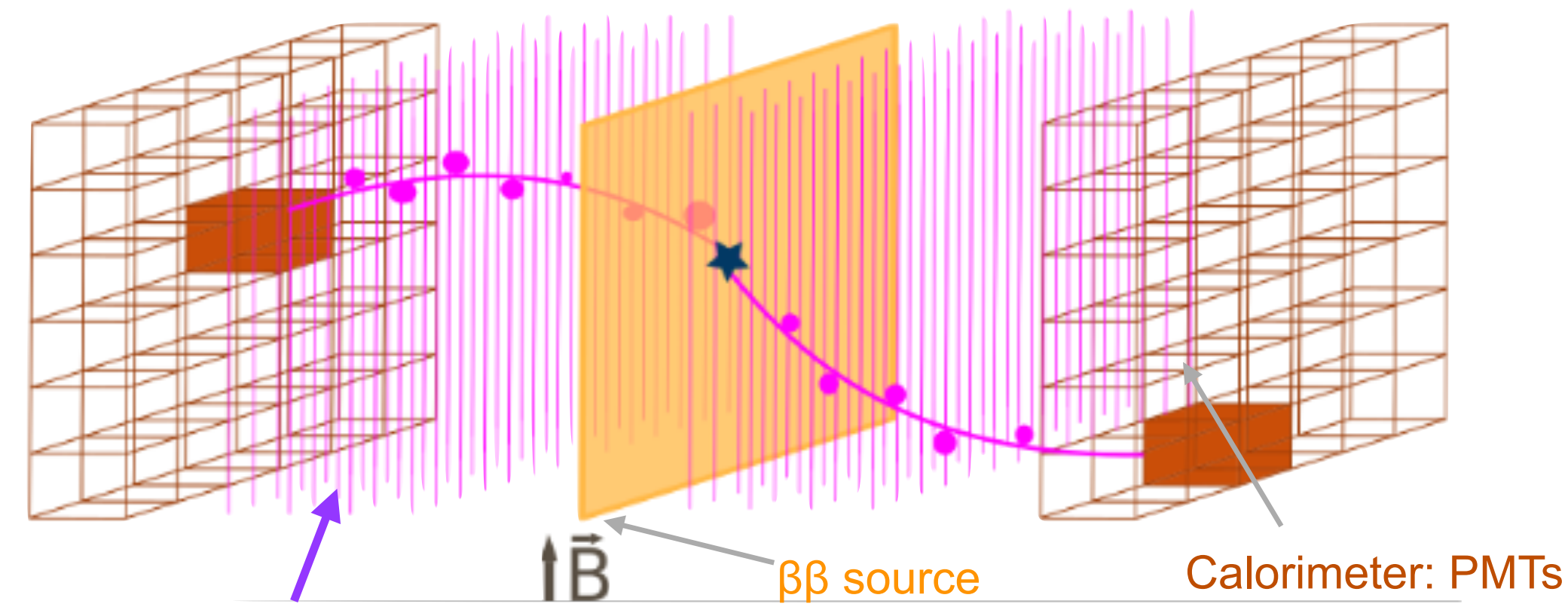
Double-beta decay



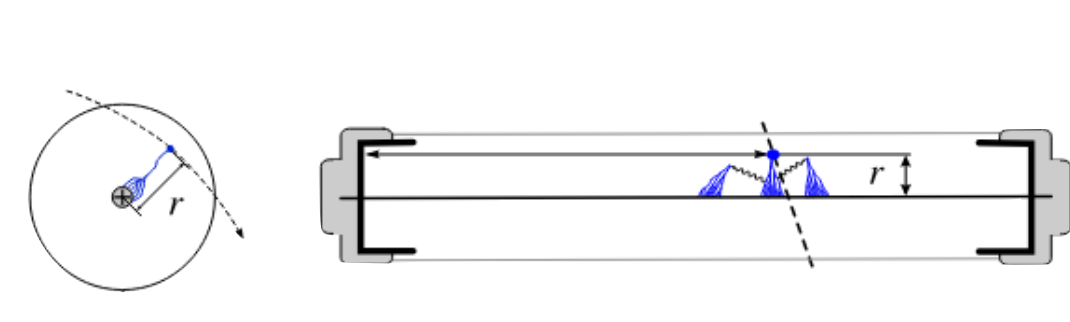
Neutrinoless double-beta decay



$\beta\beta$ event with full event topology reconstruction in SuperNEMO



Tracker : 2034 gas-filled drift cells



Helium: 95%
Inert gas \rightarrow reduce energy loss
Argon: 1%
Low ionisation energy \rightarrow avalanche propagation
Ethanol: 4% quenching \rightarrow stop avalanche

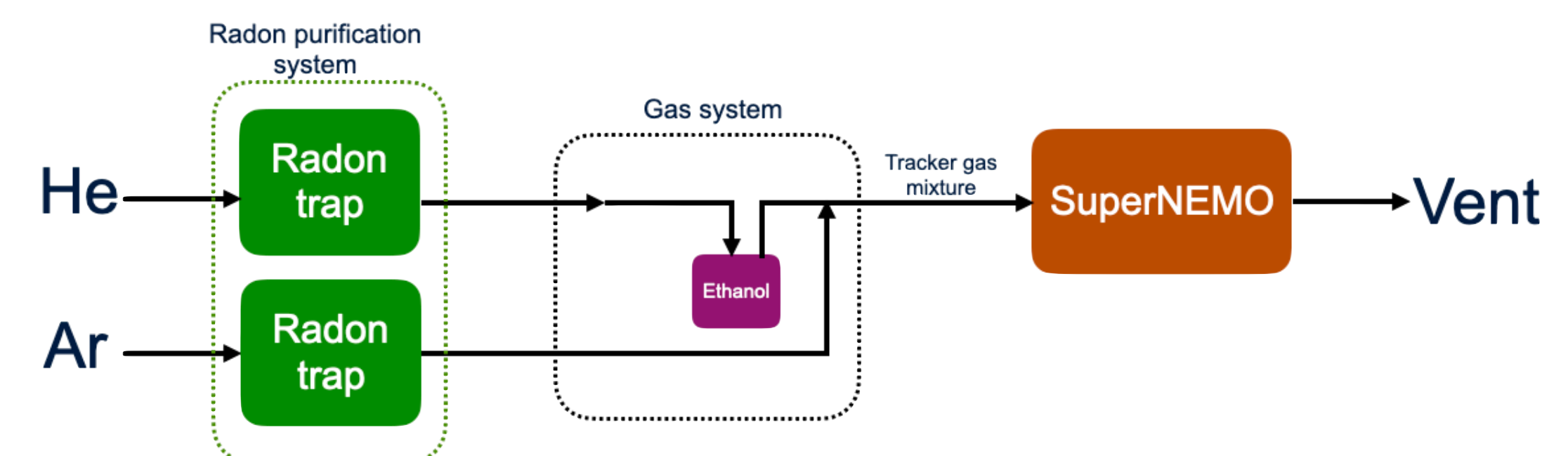
Gas circulation in SuperNEMO

Double beta decay experiment : Needs low radon activity

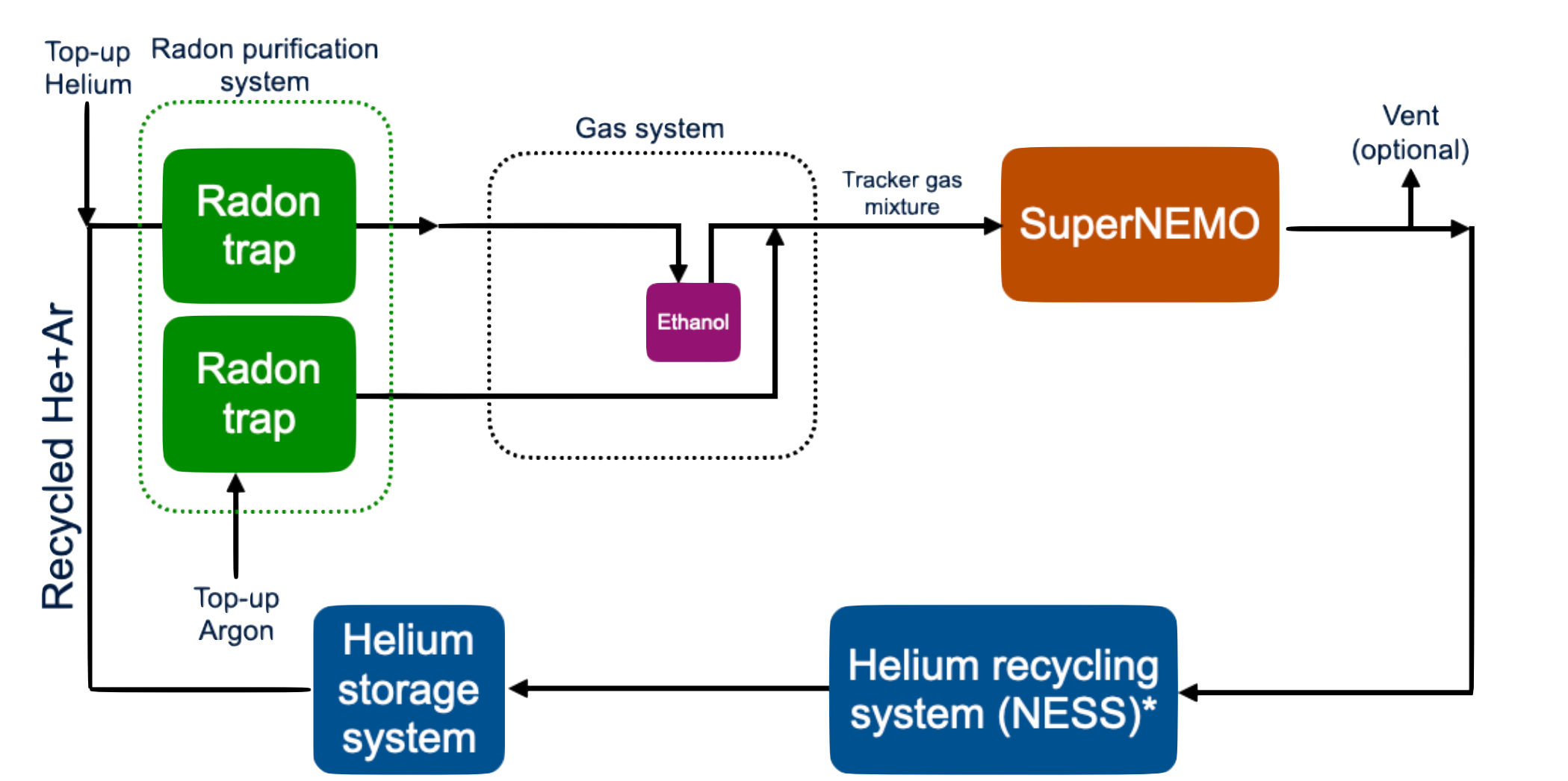
SuperNEMO radon trap : Cannot tolerate ethanol

SuperNEMO gas recycling : Needs to remove ethanol

Old SuperNEMO gas flow:



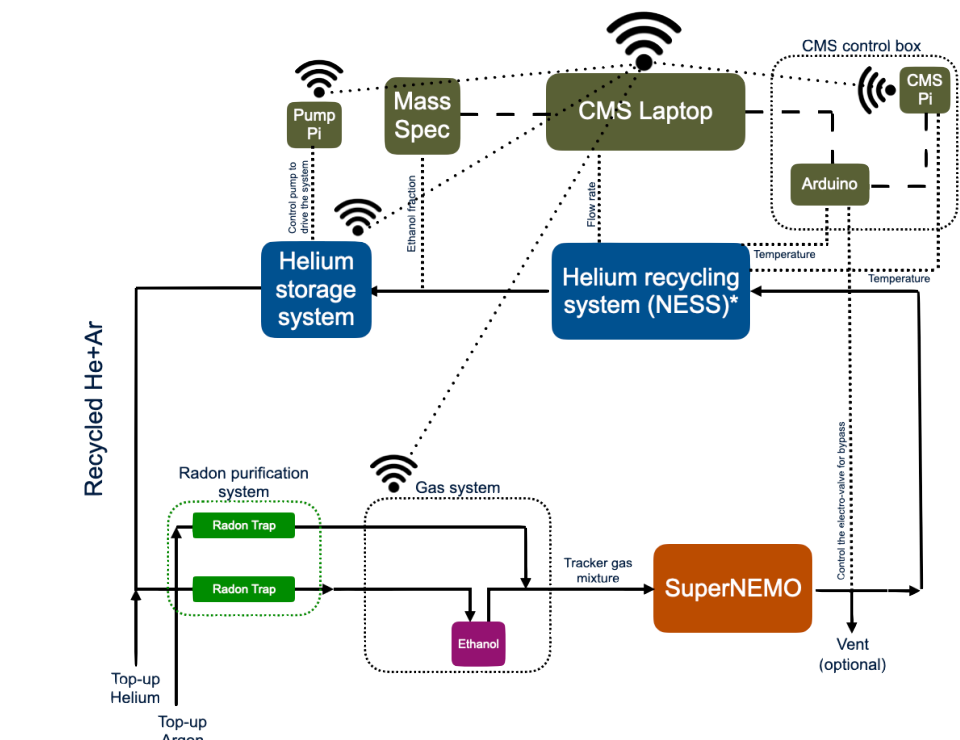
New SuperNEMO gas flow:



* No-Ethanol System for SuperNEMO

My work on the SuperNEMO helium recycling system

Control and monitoring system



The Control and Monitoring System (CMS)

Full time remote monitoring and control of NESS

Can bypass the system in emergency

2-step ethanol removal system

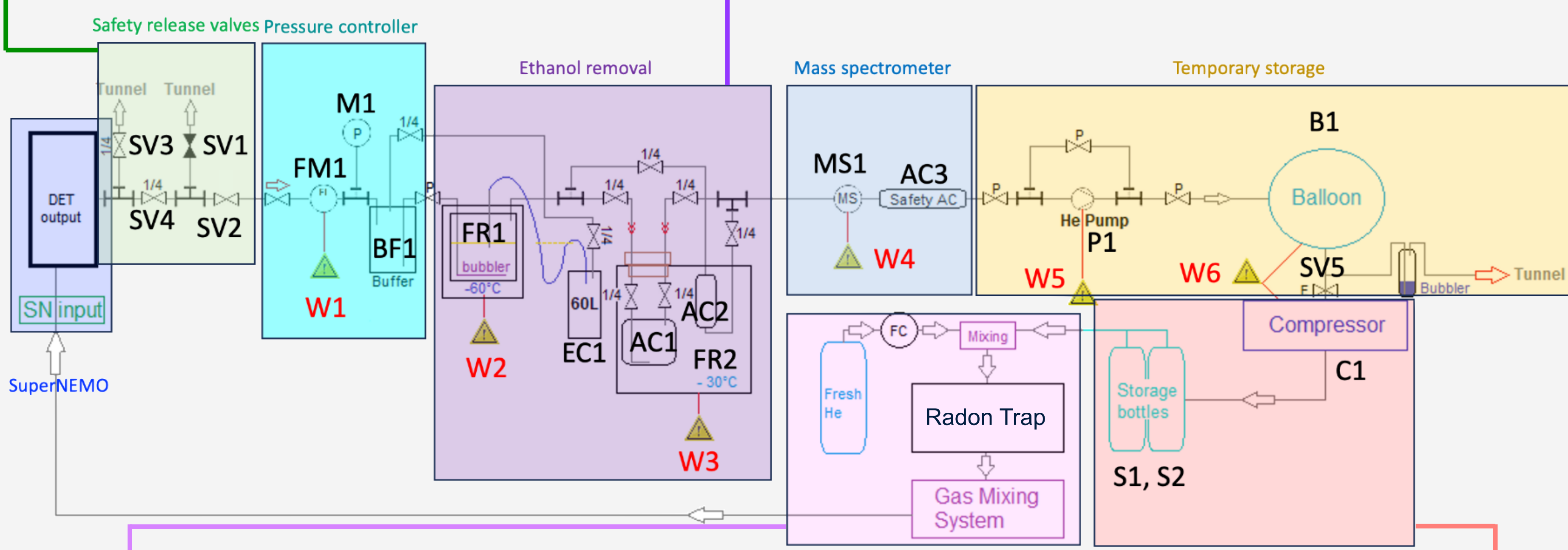
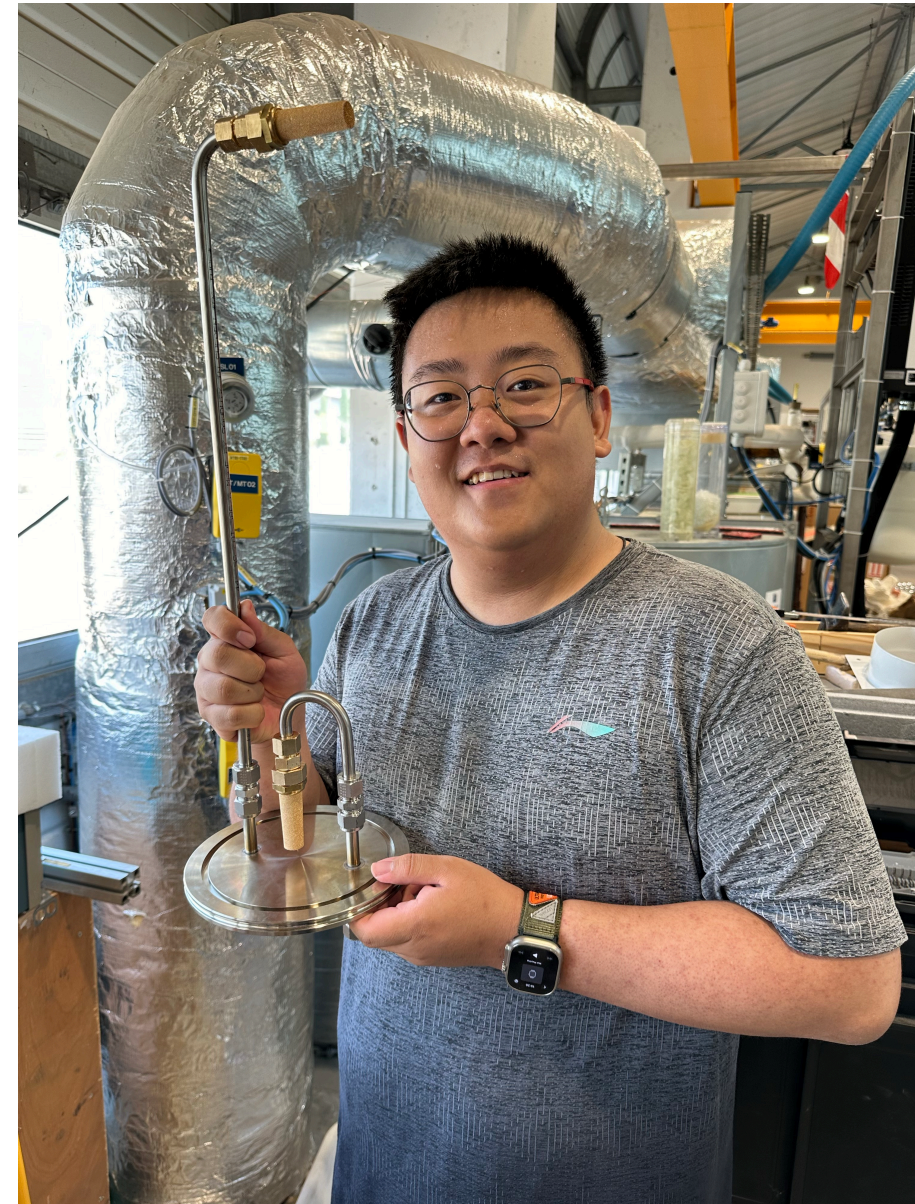


Condense ethanol from 4% to 70ppm with cryogenic bubbler

Remaining 70ppm cleaned by adsorption to < 1ppm

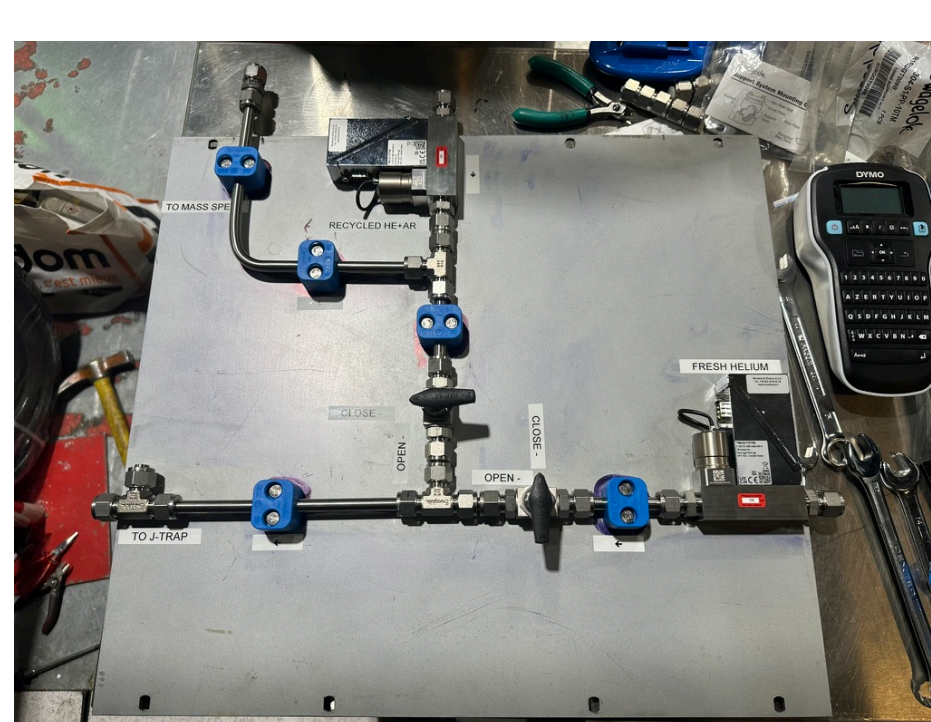
Gas quality checked by mass spec

Me building the system in Marseille



Schematic of the Helium Recycling

Remixing system



Expected recycling efficiency $\geq 80\%$
Mix recycled helium and argon with fresh helium
Mixing flow rate based on mass spec reading

Time Line

Installation
Dec 2024

System approved
Apr 2025

Now
First test run

Compressor system



Commercial system from BAUER
Recycled gas compressed to 150 bars
Integrated into CMS for emergency START/STOP