Contribution ID: **197** Type: **Poster**

Helium Recycling System For SuperNEMO

Wednesday 27 August 2025 18:00 (2 hours)

The SuperNEMO Demonstrator is a double-beta-decay detector, currently taking physics data at LSM, France. It has a unique ability to measure the full topology of decay events, thanks to a tracking detector filled with a carefully-controlled gas mixture consisting of 95% ultra-pure helium, 4% ethanol, and 1% argon. To achieve SuperNEMO's ambitious radiopurity target of 0.15 mBq/m^3, fresh gas is constantly flowed through a bespoke radon trap, and subsequently through the SuperNEMO detector.

In response to the recent helium shortage, the decision was made to recycle helium from SuperNEMO's exhaust. This is particularly challenging as due to the design of the radon trap, all traces of ethanol must be removed from the SuperNEMO exhaust before it can be recirculated. This poster presents our innovative helium-recycling system, which uses a novel combination of cryogenic and adsorption techniques to reduce ethanol levels to below 1ppm. It explains how, through a bespoke control and monitoring system, it runs semi-automatically, maintaining our controlled gas composition, and dramatically reducing SuperNEMO's helium consumption.

Collaboration you are representing

SuperNEMO

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Session Classification: Poster session

Track Classification: Neutrino Physics and Astrophysics