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Development of a Rn removal system for future Xe-based neutrino detectors using resonant ionization

Radon is one of the major background sources in low energy neutrinoexperiments. Accordingly it is essential to suppress radon events in future large-scale xenon detectors aiming for neutrino-less double beta decay and pp solar neutrino measurements. Although the removal of radon from air using adsorption on activated charcoal is well established, because its chemical properties are similar to those of radon this technique cannot be used with xenon; Xenon itself adsorbs to charcoal and thereby deteriorates its radon absorption efficacy.

We propose a new radon removal method for xenon using a resonance-enhanced multiphoton ionization process.A tunable laser is used to promote radon atoms to an electronically excited state via resonant single- or multiple-photon absorption and these excited radon atoms are then ionized by the introduction of another photon (from the same laser or another laser). With this method radon impurities can be selectively ionized and removed with an applied electric field.

In this Poster we report details of the removal method and present the status of ongoing research and development.

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