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Status of SuperNEMO and Analysis of First Data

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SuperNEMO is searching for the hypothesised lepton-number-violating process, neutrinoless double-beta decay ($0\nu\beta\beta$). Extending NEMO-3's world-leading design, our isotope-agnostic tracker-calorimeter architecture has the unique ability to track trajectories and energies of individual particles. This is a vital background-rejection tool, and enables detailed studies of the Standard Model double-beta decay process ($2\nu\beta\beta$) that produces two electrons, invisible neutrinos and, for some nuclear transitions, photons. By studying the electrons' and photons' energies and the angles between their trajectories at the emission point, SuperNEMO will be able to investigate nuclear processes indistinguishable to other technologies. For example, we can study decays to excited nuclear states, and provide constraints on the axial coupling constant, g_A . Precise measurement of the observables of $2\nu\beta\beta$ decays allows searches for beyond-the-Standard-Model effects like exotic $0\nu\beta\beta$ modes, Lorentz-violating decays and bosonic neutrino processes.

The SuperNEMO Demonstrator at LSM, France is now taking data with the full tracker and calorimeter from a 6.3kg Se-82 double-beta source. We are currently calibrating the detector with an automatic Bi-207 source deployment system, as well as taking the vital background data required to isolate our future signal samples. A multi-layer shielding system, now under construction, will allow us to start collecting double-beta-decay data later this year.

Submitted on behalf of a Collaboration?

Yes

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