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NUCLEUS outer veto prototype for the CEυNS detection at nuclear reactors

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The detection of Coherent Elastic Neutrino-Nucleus Scattering (CEυNS) represents an experimental challenge because of its unique signature: a nuclear recoil with low energy in range of 10 to 100 eV on average.
This process, largely unexplored until today, could probe physics beyond the Standard Model such as non-standard neutrino interactions and electromagnetic form factors.

NUCLEUS is a nuclear reactor neutrino experiment conceived for CEυNS detection using a new type of ultra-low energy threshold (below 20 eV) cryogenic calorimeters based on the CRESST technology.

Thanks to the greatly enhanced CEυNS cross-section (10 to 1000 times greater than the standard neutrino detection channels), NUCLEUS is aiming for its first phase to develop a miniaturized detector of only 10 g target mass.

The detector will be installed at the Very Near Site (VNS), a shallow depth experimental hall located in between of the 2 nuclear reactors of the Chooz B power plant in France, with reactor baselines of 72 m and 102 m.
At this location with shallow-overburden, a highly efficient background suppression system will be fundamental.

It will include an active cryogenic outer veto designed to work in anti-coincidence with the target detector in order to identify and reject gammas due to the environmental radioactivity and neutron interactions, events that can mimic the CEυNS signal.
In this "talk+poster" I will present the preliminary promising results obtained with our cryogenic outer veto prototype.

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