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nuCARIBU: An Upgrade for the CARIBU Facility at the Argonne Tandem Linac Accelerator System

The Californium Rare Isotope Breeder Upgrade (CARIBU) facility is changing the mechanism for creating neutron-rich fission products. Spontaneous fission from a ^{252}Cf source has provided beams to support the low energy and accelerated-beams ATLAS programs. ^{252}Cf has a 2.65-year half-life, requiring the source to be replaced every three years to maintain high beam intensities. Fabricating an appropriately thin ^{252}Cf source to efficiently release the fission products has been challenging. The solution to these problems is nuCARIBU, a new system that provides neutron-induced fission on actinide foils. The Best Cyclotron B6P System (6-MeV proton beam at 0.5 mA) is chosen, utilizing a multi-cusp negative ion source extracting into a cyclotron, which uses carbon foils to strip the H^- ions to protons. These protons are delivered to a ^7Li target to produce neutrons. The fast neutrons are moderated to thermal energies to induce fission in an actinide foil, providing neutron-rich fission products.

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