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Science Opportunities with Stable and Long-lived Beams[1]

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As new techniques and instrumentation have been developed for reaction studies with radioactive ions beams, it has become apparent that these new approaches can also be highly desirable for studies with stable and long-lived beams. This is particularly the case at linear-accelerator facilities such as ATLAS at Argonne National Laboratory and the reaccelerated (ReA) beam facility at the National Superconducting Cyclotron Laboratory (NSCL), which will operate in a standalone mode as NSCL transitions to the Facility for Rare Isotope Beams (FRIB). Access to a broad range of stable and long-lived beams at energies and intensities ideal for direct-reaction studies is available at these facilities. This presents researchers with a myriad of opportunities for studies related to nuclear structure, nuclear astrophysics, and fundamental symmetries. These include, among many others, the use of long-lived actinides for (d,p)-induced fission studies, reactions on long-lived s-process branching-point nuclei, and reactions on gaseous species involved in neutrinoless double-beta decay. A broad overview of near-future science programs at these facilities will be given, with a focus on opportunities using solenoidal-spectrometer based techniques.

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