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Nuclear physics with exotic beams

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For natural reasons, traditional experiments in nuclear physics have usually involved only stable nuclei, whose total number in nature is about 300. The past three decades, however, have seen extraordinarily rapid development of radioactive beam physics throughout the world. With the new available beams of unstable nuclei, it is possible to make and study many thousands of exotic nuclear species most of which have never existed before, or are created fleetingly only in the hot interiors of stars. These should enrich our knowledge about the structure of matter and how it evolved in the Universe. Radioactive beams also offer exciting opportunities for new medical procedures, and for applications in other areas of research and industry. Based on a recently published review, an outline of the progress made in the last decade on topics related to nuclear reactions with light (A<20) radioactive projectiles is presented. Only reactions around the Coulomb barrier are considered (E<10 MeV/nucleon) and the experiments reviewed involve elastic scattering, fusion, and breakup reactions. A respective statistics of experiments performed for each of these types of reactions is shown. An important difference in the behavior of fusion excitation functions near the Coulomb barrier between neutron-halo and proton-halo systems is pointed out and discussed.

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