

Exploring the limits of observable nuclei

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Summary

A long-standing question in nuclear physics is where are the limits of nuclear existence? On earth there are around 300 nuclear species that occur naturally, many of which are stable, but a few undergo alpha decay, beta decay or spontaneous fission.

Much of our knowledge of the strong force that binds atomic nuclei is based on measurements of these nuclides and their neighbours. Over many years, this understanding has been tested and refined by extending experimental studies to nuclides away from the valley of beta stability, where other decay modes including beta-delayed particle emission and the spontaneous emission of nucleons become important. Around 3300 nuclides have been studied to date, with many more being discovered every year. Their properties can be of interest beyond pure nuclear physics because of applications in medicine and nuclear-related sectors, as well as the ramifications for the synthesis of heavy elements in various astrophysical scenarios that involve nuclear reactions of unstable species. In this talk I will review recent progress in extending the boundaries of our knowledge of nuclear properties and exploring the limits of observable nuclei.