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Signatures of the r- and rp-processes

HENDRIK SCHATZ, Michigan State University

The astrophysical r- and rp-processes leave important signatures in the cosmic pattern of elemental abundances and in the observed features of astrophysical events such as X-ray bursts and cooling transient X-ray binaries. A wealth of new observational data has been collected on these signatures over the last years, providing new clues and also puzzles related to some key questions in nuclear astrophysics. This has greatly increased the need for reliable nuclear physics to enable interpretation of the observational data. I will review the progress in observations, the important open questions related to the r- and rp-processes, and the prospects of addressing the nuclear physics problems with radioactive beam experiments.