Making gold and other heavy elements in the Universe

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If there is one thing we learned about the synthesis of heavy elements in the Universe during the last 10 years, it's that it is complicated business. Three astrophysical processes were proposed initially, since the birth of nuclear astrophysics in the 1950s, to describe the production of all heavy elements. These three processes (p, s, and r) are still strong contributors and still exhibit significant open questions. However, today we understand that other processes may have significant contributions to the production of heavy elements as well. This talk will present the new complex picture of heavy elements nucleosynthesis, with an emphasis on the important nuclear physics input. I will discuss recent experiments performed at the National Superconducting Cyclotron Laboratory at MSU, as well as new initiatives, and plans for the future at the Facility for Rare Isotope Beams.