New isotope production around the third r-process peak

J. Kurcewicz[1], S. Pietri[1], F. Farinon[1,2], H. Geissel[1,2], C. Nociforo[1], A. Prochazka[1,2], H. Weick[1], P. Allegro[3], J. Benlliure[4], G. Benzoni[5], M. Bunce[6], M. Bowry[6], P. Boutachkov[1], J.Gerl[1], M.Górska[1], A. Gottardo[7], N. Gregor[1], R. Janik[8], R. Knöbel[1], I. Kojouharov[1], T. Kubo[9], Yu. A. Litvinov[1,10], E. Merchan[1], I. Mukha[1], F. Naqvi[1,11], B. Pfeiffer[1], M. Pfützner[12], W. Plaß[2], M. Pomorski[12], Zs. Podolyak[6], P. Regan[6], B. Riese[1], M.V. Ricciardi[1], H. Schaffner[1], C. Scheidenberger[1,2], B. Sitar[8], P. Spiller[1], J. Stadlmann[1], P. Strmen[8], B. Sun[2,13], I. Szarka[8], H. Takeda[9], I. Tanihata[14], S. Terashima[9], J.J. Valiente-Dobón[7], J.S. Winfield[1], M. Winkler[1], H.-J. Wollersheim[1], Ph. Woods[15]

[1]GSI, Darmstadt, Germany; [2]JLU Giessen, Germany, [3]USP, Sao Paulo, Brazil; [4]USC, Santiago de Compostela, Spain; [5]INFN-Universita di Milano, Italy; [6]University of Surrey, Guildford, UK; [7]LNL-INFN Legnaro, Italy; [8]Comenius University, Bratislava, Slovakia; [9]RIKEN Nishina Center, Wako, Japan; [10]MPI-K, Heidelberg, Germany; [11]IKP, Köln, Germany; [12]IEP, Warsaw, Poland; [13]Beijing University, China; [14]Osaka University, Japan; [15]University of Edinburgh, UK.

The development of the numerous Radioactive Ion Beams facilities in the last 20 years, has contributed to a better understanding of the synthesis of the elements in the stars with new measurements of crucial nuclear data including half-lives, masses and neutron-pairing energies of the most exotic nuclei.

In particular relativistic projectile fragmentation reactions represent a unique and powerful method for the production of heavy neutron-rich nuclei near and at the shell closures of N=82 and N=126. In this contribution we discuss the results of an experiment performed at the SIS synchrotron of GSI Darmstadt, which delivered a 1 A GeV 238U beam impinging on a 1.6 g/cm2 thick beryllium target placed at the entrance to the projectile Fragment Separator (FRS) [1]. The primary beam intensity was about $2*10^9$ ions/spill. The reaction products were separated by the FRS operated in the standard achromatic mode. The implantation point located at the final focal plane was surrounded by the RISING germanium detector setup [2]. The isomer tagging technique was applied in order to facilitate the identification of the reaction products. Several $B\rho$ settings of the FRS were used yielding optimum beam intensities for neutron rich Dy, Os, Hf, Pt and At isotopes. We report on the discovery of heaviest neutron-rich isotopes with $Z<92$. The measured production yields of the studied neutron-rich isotopes will be discussed. Lifetime and mass measurements at N=126 will be the next steps in this experimental campaign.

[1] H. Geissel et al. NIM B 70, (1992) 286
[2] S. Pietri et al. NIM B 261, (2007) 1079