Multi-particle excitations in very proton rich Sn isotopes identified with GASP + Si-ball + Recoil Mass Spectrometer

G.de Angelis[a], A. Gadea[a], M. Sferrazza[b], D. Ackermann[a], D. Bazzacco[b], P. Bednarczyk[a], P. G. Bizzeti[c], A. M. Bizzeti Sona[c], F. Brandolini[b], R. Burch[b], A. Buscemi[b], D. De Acuna[b], M. De Poli[a], C. Fahlander[d], E. Farnea[a], Y. Li[a], M. Lipoglavsek[d], S. Lunardi[b], A. Makishima[e], R. Menegazzo[b], L. Müller[b], D. Napoli[a], M. Ogawa[f], P. Pavan[b], C. Rossi-Alvarez[b], F. Scarlassara[b], G. F. Segato[b], D. Seweryniak[d], F. Soramel[g], P. Spolaore[a], R. Zanon[b] and Nordball Collaboration

[a] *INFN, Laboratori Nazionali di Legnaro, Legnaro (Padova), Italy*
[b] *Sezione INFN and Dipartimento di Fisica dell'Università, Padova, Italy*
[c] *Sezione INFN and Dipartimento di Fisica dell'Universitá, Firenze, Italy*
[d] *The Svedberg Laboratory, University of Uppsala, Uppsala, Sweden*
[e] *Center for Radioisotope Science, National Defense Medical College, Tokorozawa, Japan*
[f] *Department of Energy Sciences, Tokyo Institute of Technology, Yokohama, Japan*
[g] *Sezione INFN and Dipartimento di Fisica dell'Università, Udine, Italy*

The new large γ-ray detector arrays have been especially designed to improve the study of nuclei at high spin produced in fusion-evaporation reactions. Their sensitivity and selectivity can also be of great help, when coupled with various kinds of particle detectors, for studying exotic nuclei far from stability [1]. We have started at the GASP spectrometer a program to investigate proton rich nuclei in the vicinity of ^{100}Sn. For this goal we have built a Si-ball composed of 40 E-ΔE telescope detectors of 130 and 1000 μm thickness, covering $\approx$90% of the total solid angle, which fits into the BGO inner ball of GASP. Nuclei close to ^{100}Sn have been produced using the ^{50}Cr+^{58}Ni reaction at 190 MeV. The beam was provided by the Tandem XTU accelerator of the Legnaro National Laboratory (LNL) and γ-rays have been detected using all the 40 high efficiency Ge detectors of the GASP array. Together with the Si-ball, in order to get mass and charge identification, we made use also of the recoil mass spectrometer (RMS). About 0.5×10^9 triples and higher fold events were collected that, after unfolding, gave a total of 1×10^9 triple and 0.1×10^9 quadruple coincidence data. For the RMS we obtained an efficiency of 9%. After mass selection by using the high fold Ge data we could identify many evaporation residues. Several level schemes (e.g. ^{105}Sn and ^{105}In) have been greatly improved. They show both the single particle level sequences typical of this region and well developed collective structures. Obviously the goal of the experiment is to extend our knowledge to new more exotic nuclei. We have established some level sequences which are candidates for such nuclei. The analysis is in progress in order to complete the identification of those γ-rays and their attribution to a definite nucleus.

[1] M. De Poli et al. Physica Scripta in press.