RIBs *In-Flight* production @LNS

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Radioactive Ion Beams (RIBs) at intermediate energy by the In-Flight method (Projectile Fragmentation) were successfully produced at the LNS since a few years ago (FRIBs project) [1]. Different projectile fragmentation reactions have been studied to produce RIBs by using ^{12}C , ^{20}Ne, ^{40}Ar and ^{58}Ni projectiles at incident energies between 62 and 40 AMeV on ^{9}Be and ^{27}Al targets. Production rates, A,Z energy and positions of both neutron and proton rich RIBs up to Z= 28 have been measured (fig. 1). Transport along the LNS beam lines was measured getting up to 95% in the 20° line. Individual RIBs rates up to 10^5 ions/sec on the reaction target were extrapolated for primary beam currents on the order of 500 enA.

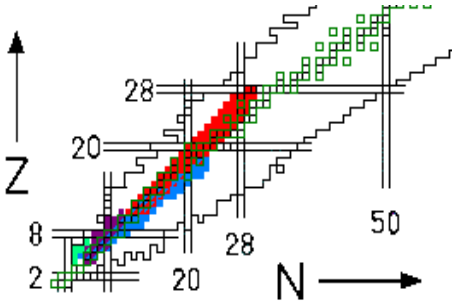

Figure 1: *Chart of nuclides for Z≤28. The colored dots represent the RIBs produced up to now at LNS by the ^{12}C (green), ^{40}Ar (red), ^{58}Ni (light blue) and ^{20}Ne (violet) projectile fragmentation.*

Moreover, since the leading idea of the FRIBs project was to tag, event-by-event, each fragment, produced by the projectile fragmentation, after the selection by the LNS Achromatic Fragment Separator and before it interacts with the secondary target, we apply the ΔE-ToF method to identify every ion(fig. 2). Such procedure was tested in a couple of very recent experiments performed at the LNS. The

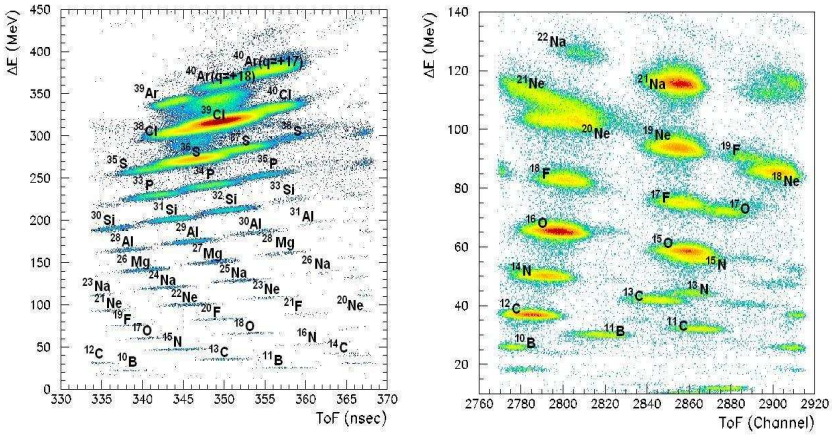

Figure 2: *Energy-loss versus time-of-flight plots. Left:^{40}Ar fragmentation products; right:^{20}Ne fragmentation products.*

status and perspective of the project and an overview of research programs will be presented.

[1] G. Raciti et al., LNS Activity Report (2001) 59; G. Raciti et al., Proceeding of the 10th International Conference on Nuclear Reaction Mechanisms, Varenna (2003) 11;E.Rapisarda PhD thesis (2005)-University of Catania