# Reaction Dynamics for the Systems $^{11}$Be+$^{209}$Bi and $^{17}$F+$^{208}$Pb at Near-Barrier Energies

M. Mazzocco[1], T. Glodariu[2], B . Martin[3], D. Pierroutsakou[3], C. Signorini[1], R. Bonetti[4], F. Farinon[1], A. Guglielmetti[4], G. Inglima[3], M. La Commara[3], M. Romoli[3], M.Sandoli[3], F. Soramel[5], L. Stroe[2], E.Vardaci[3]

[1]Dipartimento di Fisica and INFN Sezione di Padova, I-35131 Padova, Italy
[2]National Institute for Physics and Nuclear Engineering, 077125 Magurele, Romania
[3]Dipartimento di Scienze Fisiche and INFN Sezione di Napoli, I-80126, Napoli, Italy
[4]Istituto di Fisica Generale ed Applicata and INFN Sezione di Milano, Milano, Italy
[5]Dipartimento di Fisica and INFN Sezione di Udine, I-33100 Udine, Italy

The elastic scattering process for the systems $^{11}$Be + $^{209}$Bi and $^{17}$F + $^{208}$Pb has been studied at energies around the Coulomb barrier in several experiments performed at ANL (USA) [1], RIKEN (Japan) [2] and, more recently, at LNL (Italy) [3]. Our measurements contributed to the investigation of breakup related effects on the reaction dynamics for light weakly bound radioactive ion beams interacting with high-Z targets. In this contribution, we will briefly present an overview of our recent experiments and we will discuss the results at the light of those obtained for similar systems by our and other groups.

Fig. 1 shows the reduced reaction cross sections for eleven light projectiles impinging on $^{208}$Pb or $^{209}$Bi targets. One can clearly see that different elements are characterized by different behaviours. For helium isotopes, the reaction cross section for the halo and loosely bound $^{6}$He nucleus turns out to be several orders of magnitude larger than for the $^{4}$He "core". For beryllium isotopes, although the different binding energies and the $^{11}$Be halo structure, no differences can be observed within the experimental uncertainties between the systems $^{9,11}$Be + $^{209}$Bi and $^{10}$B e+ $^{208}$Pb, whereas for lithium isotopes, the $^{8}$Li "reactivity" is enhanced over that measured for more weakly bound $^{6}$Li. Finally, our recent data at sub-barrier energies confirmed that the breakup channel seems to inhibit the reaction probability for the weakly bound $^{17}$F with respect to $^{16}$O and $^{19}$F.

All these outcomes indicate that breakup related effects on the reaction cross section cannot be predicted or deduced considering only the projectile halo structure and/or its small binding energy. Couplings to direct reaction channels (as observed for $^{6}$He and $^{8}$Li), collective structure (as for $^{9}$Be and $^{19}$F) as well as single-particle properties (as for $^{17}$F) of the colliding nuclei could strongly influence the reaction dynamics at near-barrier energies.

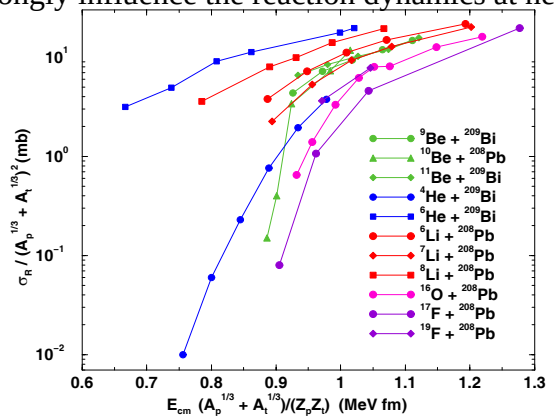


Figure 1: Reduced reaction cross sections for systems of light projectiles impinging on high-Z targets.

[1] M. Romoli *et al.*, Phys. Rev. C **69**,064614(2004)
[2] M. Mazzocco *et al.*, Eur. Phys. J. **28**,295(2006) and M. Mazzocco *et al.*, Eur. Phys. J. ST(in press)
[3] D. Pierroutsakou et al., Eur. Phys. J. ST(in press)