Study of projectile multifragmentation in the reactions $^{24}Mg + ^{112,124}Sn$ and the effect of system N/Z at 32 MeV/u

S. Galanopoulos, G. A. Souliotis, A. L. Keksis, M. Veselsky, M. Jandel, D. V. Shetty, S. Soisson, B. Stein, S. Wuenschel, and S. J. Yennello

The relationship between the entrance channel isospin (N/Z) and the isotopic distribution of the reaction products has been found to be a sensitive observable in the study of the charge asymmetry term in the nuclear equation of state, (nEOS) [1]. A number of recent studies have revealed that the yield ratio of a given fragment coming from a neutron-rich vs a neutron deficient fragmenting system follows an exponential dependence with respect to the neutron and proton number of the fragments, an effect termed isoscaling (e.g. [2-4]).

In the present study, we are investigating projectile multifragmentation reactions in the collisions of $^{24}Mg + ^{112,124}Sn$. The measurements were performed at the K500 Cyclotron accelerator of Texas A&M University using a ^{24}Mg beam at 32 MeV/u. The produced reaction fragments were detected by the Forward Array Using Silicon Technology (FAUST) [5]. The data are presently under analysis. Preliminary results of the isotopic yield ratio of projectile fragments from the two reactions are depicted in Fig. 1. In this plot, the isotopic yields have resulted from the integration of all the individual yields detected within the angular acceptance of FAUST detector. The rapid growth of the neutron-rich vs the neutron-deficient isotopic yield ratio is evident for each element.

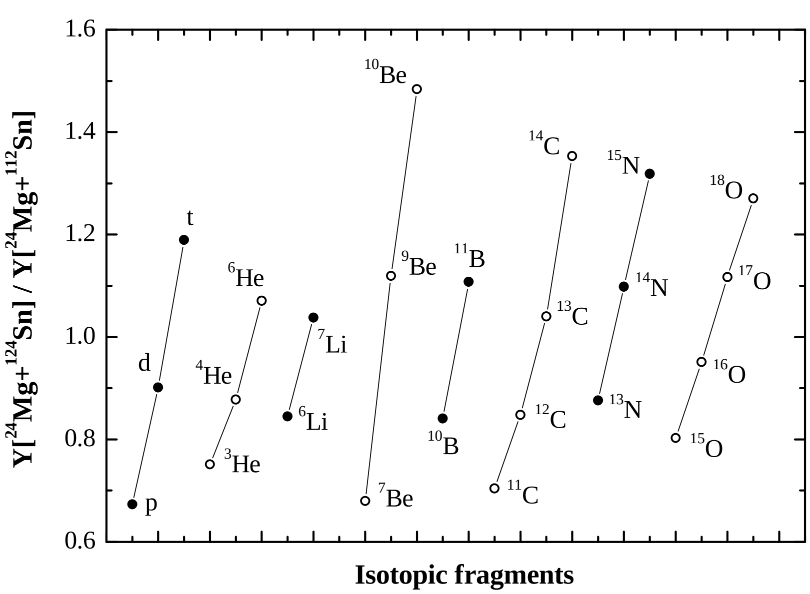

Figure 1. Isotopic neutron rich to neutron deficient yield ratios of the fragments (solid and open dots) emitted in the $^{24}Mg + ^{112,124}Sn$ collisions.

From the present data, we plan to obtain reconstructed quasiprojectiles and to study systematically their angular distributions, excitation energy and N/Z. We also plan to compare the experimental results to detailed calculations using a) phenomenological models like DIT [6] and HIPSE [7] and b) microscopic models, e.g. the quantum molecular dynamics code CoMD [8]. It's our hope that via such systematic comparisons, information on the underlying dynamics and the nEOS, especially the asymmetry term, may be obtained.

[1] M. Colonna and M. B. Tsang, Eur. Phys. J. A **30**, 165, (2006).

[2] M. B. Tsang *et al*., Phys. Rev. Let. **86,** 5023 (2001).

[3] D. V. Shetty *et al*., Phys. Rev. C **68**, 021602 (2003).

[4] G. A. Souliotis *et al*., Phys. Rev. C **73,** 024606 (2006).

[5] F. Gimeno-Nogues, D. J. Rowland, E. Ramakrishnan, S. Ferro, S. Vasal, R. A. Gutierrez, R. Olsen, Y. -W. Lui, and S. Y. Yennello, Nucl. Instrum. Methods Phys. Res. **A399**, 94 (1997).

[6] L. Tassan-Got and C. Stephan, Nucl. Phys. **A524**, 121 (1991).

[7] D. Lacroix *et al*., Phys. Rev. C **69**, 054604 (2004).

[8] M. Papa *et al*., Phys. Rev. C **64**, 024612 (2001); J. Comp. Phys. **208**, 403 (2005).