COMMENTS

Comments are short papers which criticize or correct papers of other authors previously published in the **Physical Review**. *Each Comment should state clearly to which paper it refers and must be accompanied by a brief abstract. The same publication schedule as for regular articles is followed, and page proofs are sent to authors.*

Comment on "Energy partition in near-barrier strongly damped collisions ^{58}Ni + ^{208}Pb"

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(Received 20 April 1992)

Chatterjee *et al.* [Phys. Rev. C **44**, R2249 (1991)] report that the sharing of dissipated energy in the ^{58}Ni + ^{208}Pb reaction at $E/A = 6.5$ MeV is not influenced appreciably by the direction and magnitude of net charge (and mass) transfer. We point out that neither this conclusion nor one arguing for a correlation between mass flow and excitation energy division is supported by the data and analysis presented in their communication.

PACS number(s): 25.70.Lm, 25.70.Pq

In a recent Rapid Communication, Chatterjee *et al.* [1] have examined the partition of excitation energy in near-barrier damped collisions for the $E/A = 6.65$ MeV ^{208}Pb + ^{58}Ni reaction. They derive the ratio of projectile-like (Pb-like)-to-total available excitation energy ($E^*_{\rm PLF}/E^*_{\rm Total}$) from comparison of measured neutron multiplicity distributions with evaporation calculations. Here we point out that the uncertainties of this analysis are such, that it is not possible to draw conclusions concerning the presence or absence of correlations between net mass transfer and excitation energy division [2–5].

In the study by Chatterjee *et al.* [1] the comparisons between the data and simulations suggest a mechanism in which the heavy fragment acquires most of the available excitation energy. The authors of Ref. [1] state that their data can best be described by a value of $E^*_{\rm PLF}/E^*_{\rm Total} = 0.80$. Taking their various prescriptions for estimating the masses of the targetlike and projectile-like fragments (TLF and PLF), one calculates an expected value of $E^*_{\rm PLF}/E^*_{\rm Total} \approx 0.65–0.69$. Thus, the results imply that the Pb-like fragment receives an enhanced share of the available excitation energy. Further examination suggests that a value of $E^*_{\rm PLP}/E^*_{\rm Total} = 0.90–1.0$ in the simulations may provide an even better fit to the data for fragments that result from significant charge transfer from the heavy to the light fragment. This is most evident in their Fig. 3, but is consistent with the other figures as well. Furthermore, comparison between the data and calculations as a function of the different fragment charge bins in Fig. 4 of their paper implies a negative correlation between charge (mass) and excitation energy transfer. While the magnitude of such a correlation is impossible to determine from this analysis, these data cannot be used to exclude such an effect.

One of the difficulties with the analysis presented by Chatterjee *et al.* [1] is that only the charge of the Ni-like fragment was measured experimentally and not its mass. As a consequence, the authors must assume in their simulations some value for the average mass-to-charge ratio of the initial fragments, prior to evaporation. For this value they have chosen the mass-to-charge ratio of the combined system. However, previous measurements of Ni-induced reactions on ^{238}U in which both Z and A were identified have indicated that the composite N/Z ratio is never achieved, even for very highly damped events [6,7]. For example, in the ^{58}Ni + ^{238}U reaction the composite N/Z ratio is 1.47. However, a value of about 1.40 is deduced for fully damped light fragments from secondary experimental data. Based on the paper under discussion, a ratio of 1.35 or less would follow. Thus, the N/Z assumption in Ref. [1] results in a neutron number that is two to five neutrons smaller for the heavy fragment than expected from the experimental data of Refs. [6] and [7]. Since neutron binding energies decrease strongly as a function of neutron excess, the simulations require an anomalously high excitation energy in order to reproduce the experimentally observed neutron multiplicities. Simultaneously, since the light fragment has an excess of neutrons, very little excitation energy is needed to account for its neutron multiplicity.

If the above situation applies to the $^{208}Pb + ^{58}Ni$ reaction as well, then the calculated ratio E^*_{PLF}/E^*_{Total} will decrease significantly. Thus, without an accurate knowledge of the A and Z of the primary fragments, the analysis in Ref. [1] must be considered inconclusive with respect to the question of mass transfer and excitation energy division. Such information requires, in addition to the neutron multiplicities and charge of the TLF, measurements that define the mass of the TLF, or equivalent quantities for the PLF.

Correlations between excitation energy and net mass transfer have been reported in kinematical coincidence studies [2–4]. These have been shown to be primarily important for partially damped events. With increasing energy dissipation, the magnitude of the correlation decreases, becoming statistically insignificant for fully damped events. Thus, an absence of such correlations in the data of Chatterjee *et al.* [1]—which were reported for nearly fully damped events—would still be consistent with Refs. [2–4] and [8].

This work was supported by U.S. Department of Energy Grant No. DE-FG02.88ER.40404.A000 and by the National Science Foundation.

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