NONEQUILIBRIUM SLOPE TEMPERATURES FOR IMF EMISSION IN THE E/A = 20–100 MeV ^{14}N + ^{197}Au REACTION

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Nonequilibrium slope parameters, T_{NEQ}, have been measured for intermediate mass fragments formed in the ^{14}N+ ^{197}Au reaction at energies between E/A = 20 and 100 MeV. The values of T_{NEQ} are found to be essentially independent of IMF atomic number and bombarding energy above E/A = 30 MeV [Fig 1 (top)]. For ^{nat}Ag targets, all values are consistent with $T_{NEQ} \approx 20$ MeV (except at E/A = 20 MeV, where nonequilibrium yields are poorly defined). Similar results have been observed by Trockel *et al.*,[1] for ^{16}O-induced reactions. Similarly, a bombarding-energy independence has been reported for the slope parameters associated with pion spectra from heavy-ion-induced reactions in the energy range E/A $\cong$ 30–100 MeV, where values of $T_\pi \cong 20 - 22$ MeV are found.[2] In contrast, a distinct dependence of T_{NEQ} on bombarding energy over this same energy range has been reported in Ref. 3 for light charged particles (LCP) and intermediate mass fragments (IMF) emitted in E/A = 42–151 MeV Ne- and Ar-induced reactions on ^{197}Au. The fitting procedure in Ref. 3 employed a single isotropic emission source and the detector configuration emphasized forward-angle IMF emission with detector thresholds of E/A $\approx$ 3.5 MeV. To illustrate the sensitivity of T_{NEQ} for the IMF component to the completeness of the data set, Fig. 1 (bottom) shows values of T_{NEQ} for fits to our data performed over the angular range $30° \leq \theta \leq 130°$ with detector thresholds for IMF's of E/A = 4 MeV, identical to those in the measurements of Ref. 3. Here one observes a systematic increase in T_{NEQ} with bombarding energy, in contrast to the energy-independent values of T_{NEQ} derived from the full data set. These results emphasize that extracted nonequilibrium temperature parameters are dependent upon the experimental conditions under which the data were obtained. Data taken over a limited anglar range or with thresholds well above Coulomb energy do not adequately account for equilibrium emission and thereby produce anomalous values of T_{NEQ}.

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2. T. Suzuki, *Proc. of Fourth Int. Conf. on Nucleus-Nucleus Collisions*, ed. H. Toki and I. Tanihata, to be published in Nucl. Phys.
3. B.V. Jacak, G.D. Westfall, G.M. Crawley, D. Fox, C.K. Gelbke, *et al.*, Phys. Rev. C **35**, 1751 (1987).

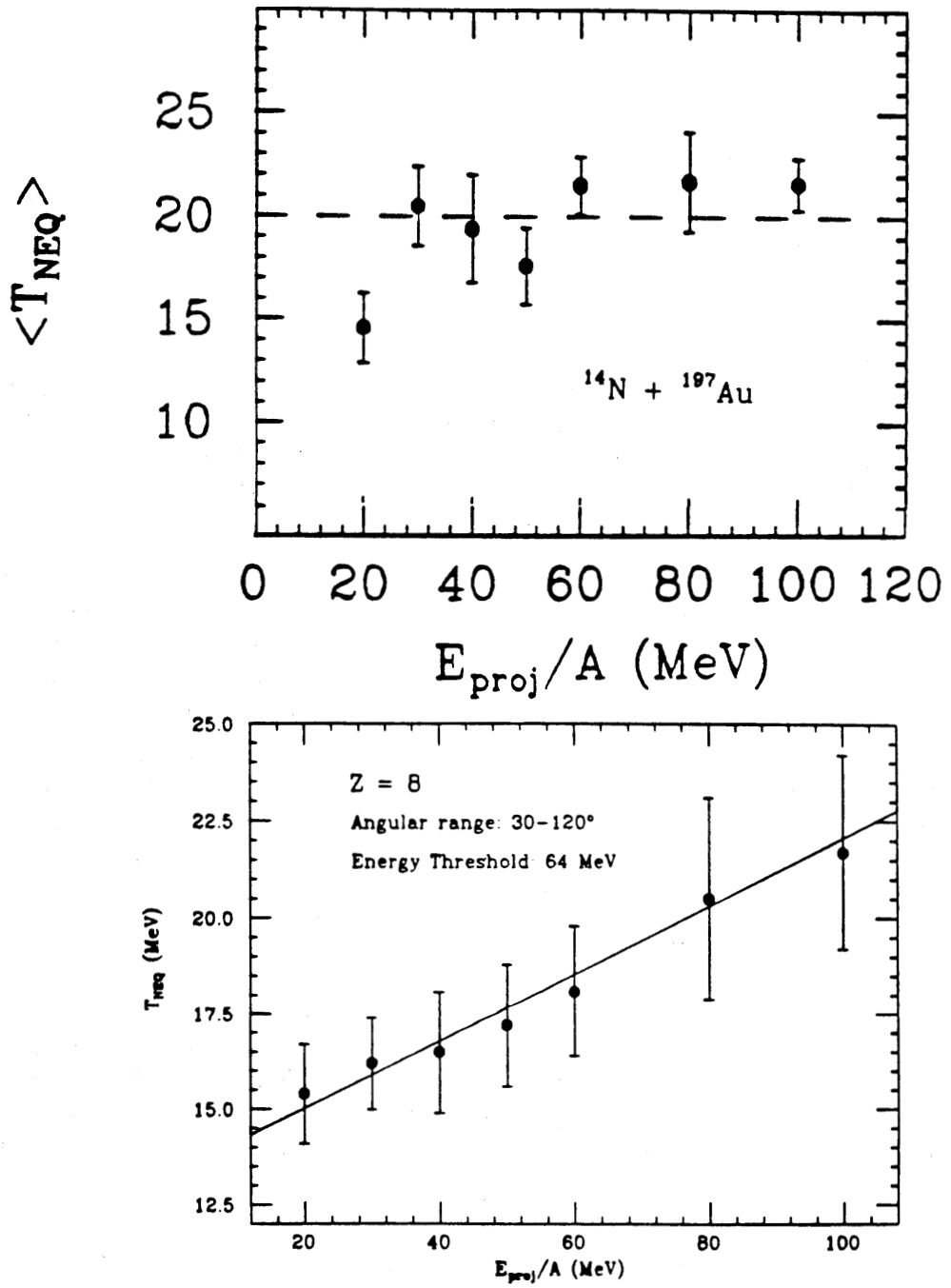

Figure 1. Values of T_{NEQ} for Z = 8 fragments from the $^{14}N + ^{197}Au$ reaction as a function of bombarding energy. Top: fit results for angle $20° \leq \Theta \leq 160°$ and detector threshold of 8 MeV; bottom: fit results for same parameterization, but $30° \leq \Theta \leq 130°$ and detector threshold of 64 MeV.