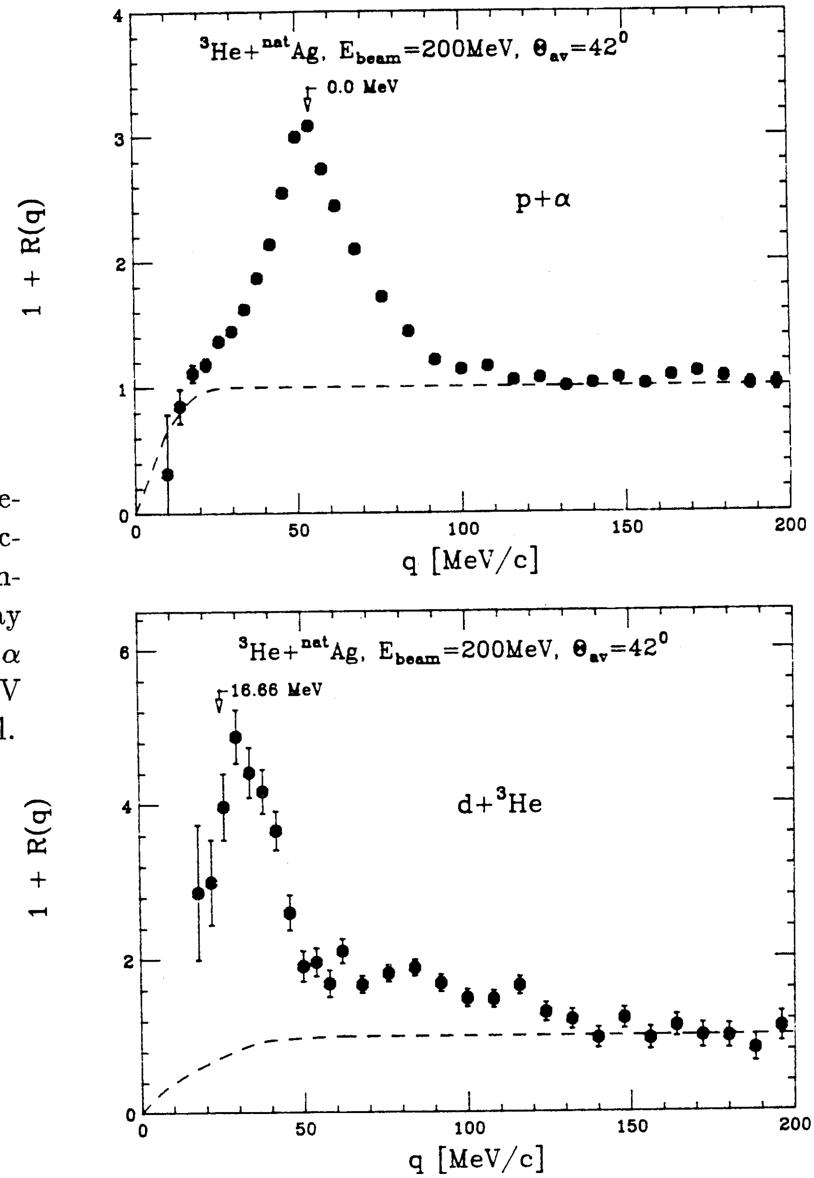

Figure 1. Particle-particle correlation function, R(q), as a function of relative laboratory momentum q of the pair for $^5Li^*$ decay from: (top) ground state to p + α channel, and (bottom) 16.6 MeV excited state to D + ^{3}He channel.

ANALYZING POWERS FOR COMPLEX FRAGMENTS FORMED IN THE 200 MeV $\vec{p}$ + Ag REACTION

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Studies of proton-induced reactions at 161 MeV[1] and 200-500 MeV[2] indicate that intermediate mass fragments (IMF: $3 \leq Z \lesssim 15$) formed in these reactions originate primarily from a fast non-equilibrium mechanism. Previous studies with polarized beams[3] have shown zero analyzing powers for IMFs emitted at angles larger than 60 degrees, indicating that direct processes cannot account for these fragments. To investigate the possibility that direct processes may become important at very forward angles where the cross sections increase rapidly and the energy spectra become quite flat, we have measured analyzing powers for IMFs emitted in the 200 MeV $\vec{p}$ + Ag reaction.

The IMF measurements were performed with a pair of particle-identification/time-of-flight telescopes consisting of a gas ion chamber operated at 20 Torr of CF_4 gas, two silicon surface-barrier detectors of thicknesses 90 μm and 1 mm, respectively, and a 5 mm lithium-drifted-silicon detector. Time-of-flight was measured with respect to the beam rf. The two telescopes were placed symmetrically at $\pm 9°$ and $\pm 15°$ with respect to the beam axis. Light charged particles were also studied separately with a telescope consisting of a 1 mm silicon detector and a 12.7 cm NaI crystal. An average beam polarization of 74% was measured for the $\vec{p}$ beam.

Analyzing powers measured at 15 degrees are presented in Fig. 1 for hydrogen isotopes (Figs. 1a-c) and for Z≤8 fragments (Figs. 1d-l). With the exception of the protons, all

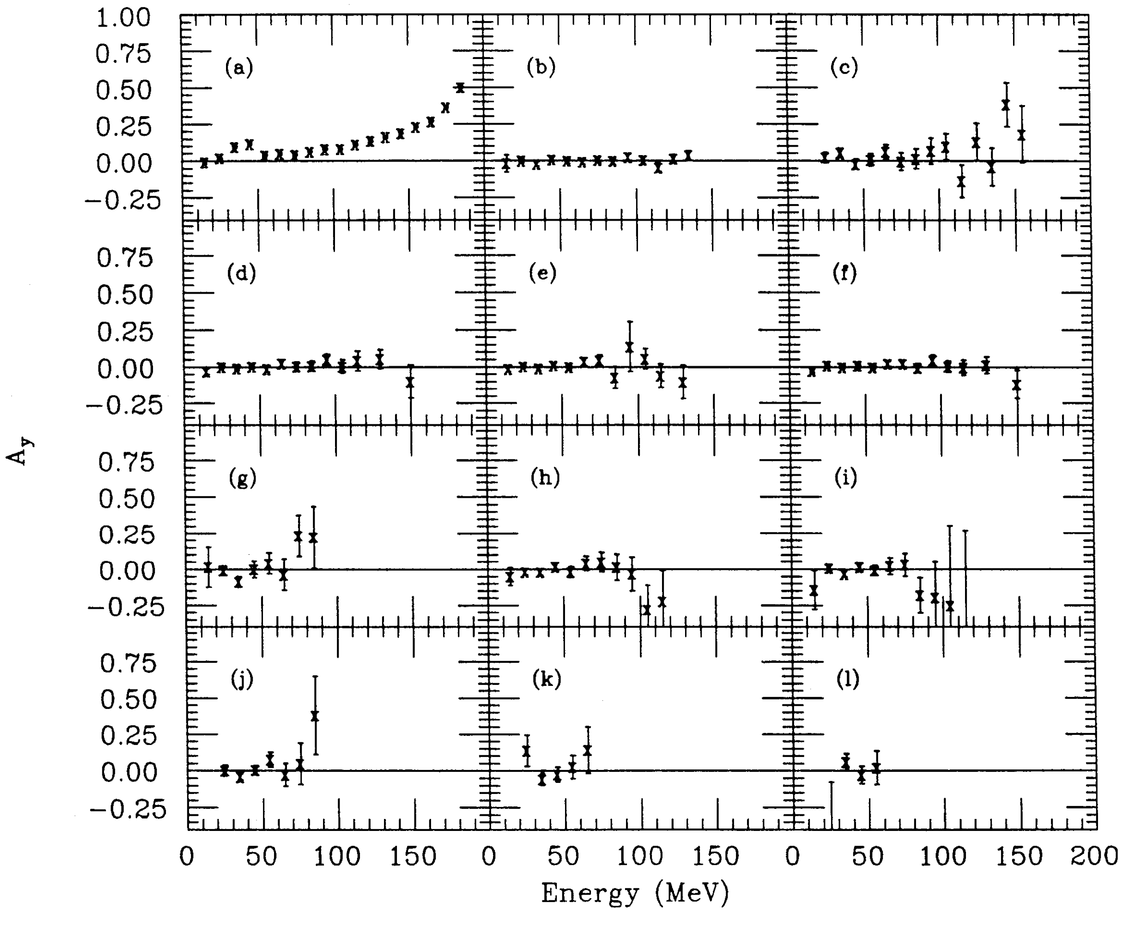

Figure 1. Analyzing powers as a function of fragment energy at 15° for (a) protons, (b) deuterons, (c) tritons, (d) ^{6}Li, (e) ^{7}Li, (f) Li, (g) ^{7}Be, (h) Be, (i) B, (j) C, (k) N, and (l) O.

ejectiles show a value of the analyzing power consistent with zero. Assuming that beam polarization information is destroyed when the projectile undergoes more than one collision with target nucleons, the null value of the analyzing power indicates that formation of complex fragments does not proceed via a simple direct reaction mechanism.

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IMF EMISSION IN THE ^{14}N + ^{nat}Ag, Au REACTIONS AT E/A = 60-100 MeV

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In a recent study[1,2] of IMF emission in the ^{14}N + ^{nat}Ag, Au systems at bombarding energies of 20 to 50 MeV per nucleon, three sources of intermediate mass fragment (IMF) production were reported. The most important emission source at low bombarding energies produced IMFs with kinetic energies near the Coulomb repulsion energy and angular distributions that were relatively isotropic. The energy and angular distributions of these IMFs were well described by the model of Moretto;[3] thus, this source was identified with emission from a fully equilibrated compound nucleus. In addition to this "equilibrium" source, two other sources were observed. The first of these was associated with projectile fragmentation-like events and was analyzed using the empirical model of Kiss, *et al.*[4] The remaining source of IMF production grew in importance as the bombarding energy was increased. The IMFs produced by this "non-equilibrium" source are highly energetic and strongly forward-focused, and they constitute a significant part of the total cross section well-beyond the grazing angle. These characteristics tend to indicate that the emission takes place on a relatively short time scale. However, polarization studies[5] imply that these IMFs retain no memory of the initial beam polarization, therefore, the projectile must undergo several collisions with target nucleons before the IMF emission takes place.

In order to shed more light on the underlying mechanisms of IMF emission, as well as to investigate the possible emergence of multifragmentation as a source for IMF production, the systematics of the previous ^{14}N + ^{nat}Ag, Au studies were extended to 100 MeV per nucleon. The experiment took place at the MSUNSCL K1200 cyclotron, which delivered ^{14}N beams of 60, 80, and 100 MeV per nucleon. High-purity, self-supporting targets of ^{nat}Ag and ^{nat}Au were surrounded by seven IMF detector telescopes at 20, 50, 70, 90, 120, 140, and 160 degrees in the laboratory. The detector telescopes consisted of a CF_4