1. J. Stevenson *et al.*, Phys. Rev. Lett. **57**, 555 (1986).
2. M. Kwato Njock *et al.*, Phys. Lett. **B175**, 125 (1986).
3. N. Alamanos *et al.*, Phys. Lett. **B173**, 392 (1986).
4. E. Grosse *et al.*, Europhys. Lett. **2**, 9 (1986).
5. M. Kwato Njock *et al.*, Nuc. Phys. **A489**, 368 (1986).
6. J. Clayton *et al.*, Phys. Rev. **C40**, 1207 (1989).
7. J.A. Edgington and B. Rose, Nuc. Phys. **A89**, 523 (1966).
8. M. Kwato Njock *et al.*, Phys. Lett. **B207**, 269 (1988).
9. J.A. Pinston *et al.*, Phys. Lett. **B218**, 128 (1989).

SEARCH FOR MULTIFRAGMENTATION NEAR THRESHOLD IN THE ^{3}He + Ag REACTION

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Coincidence measurements of intermediate mass fragment ($3 \leq Z \lesssim 15$) production from the ^{3}He + ^{nat}Ag system at 900 MeV and 3600 MeV have been made at the SATURNE II accelerator in Saclay, France. These measurements are a followup on previous inclusive measurements[1] of this system that extended the existing data[2] from threshold through the proposed onset of multifragmentation.

Inclusive measurements indicate that the IMF formation mechanism undergoes a change between 900 MeV and 1.8 GeV.[1] This is evidenced by (1) a large increase in the overall cross section; (2) a flattening and then saturation of the high-energy tails of the energy spectra, accompanied by a broadening and a shift to lower energies of the Coulomb peak, and (3) a saturation of the fragment charge distribution.

The experimental setup included 36 detector telescopes covering about 20% of 4π. Thirty-two detectors were gas ion chamber (GIC)/500 μm silicon μstrip ΔE/E telescopes capable of detecting fragments from Z=3-15 with good energy resolution. The remaining four detectors were GIC/220 μm silicon μstrip/(300 μm or 500 μm) silicon μstrip/scintillator logrithmic telescopes capable of detecting light charged particles as well as IMFs. Several different scintillators were used in an attempt to determine which would be most suitable for future work: these included CsI, BGO, and orange plastic, with the resulting light detected by photodiodes in all cases.

Shown in Fig. 1a is the raw multiplicity (M) distribution for Z $\geq$ 3 fragments at 3600 MeV. Although few in number, there are events of charge 3 or more up to M_{imf}=5, accounting for at least 30% of the total charge of the target and projectile. This has been corrected for accidentals, but not for solid angle or angular distribution. Fig. 1b compares the multiplicity distribution relative to singles at 900 MeV and 3600 MeV. Although singles dominate at both energies, the ratio of triples to singles shows an 8-fold increase for the higher energy.

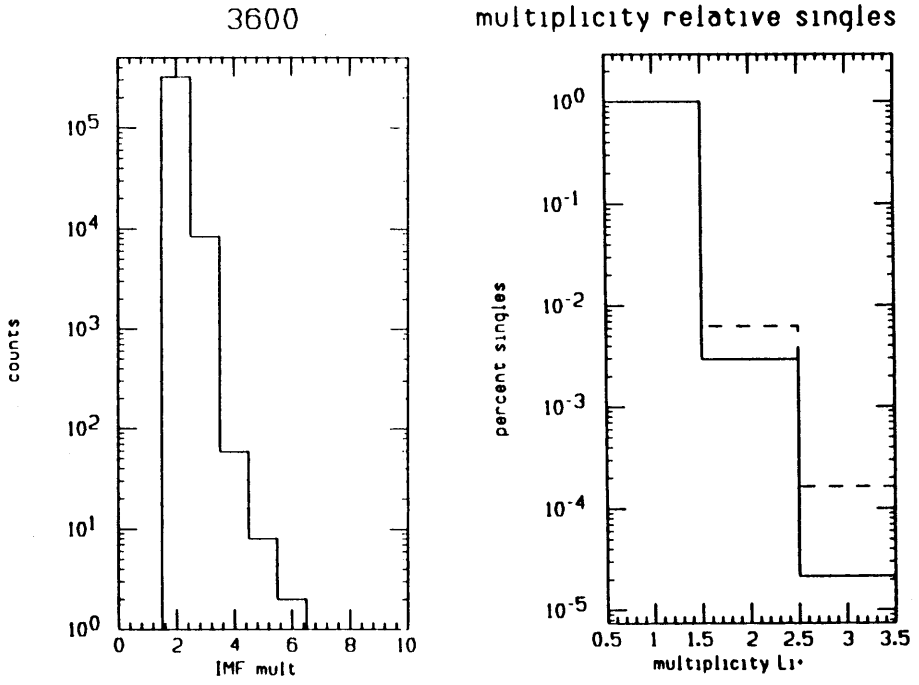

Figure 1. (left): Relative raw multiplicity of Z $\geq$ 3 fragments formed in 3600 MeV ^{3}He + Ag reaction; (right): Fraction of events relative to singles for Z $\geq$ 3 fragments observed in ^{3}He + Ag reaction at 3600 MeV (dashed line) and 900 MeV (solid line).

The charge distribution can best be quantified by fitting the yields to a power law,

$$\sigma(Z) = aZ^{-\tau}.$$

A τ value of approximately 2.1 has been suggested as an indication of multifragmentation.[3] In Fig. 2 we show how the tau parameter is affected by requiring a coincidence with a particular trigger detector. The solid and dashed lines are the values of the tau parameter from the inclusive data. For both energies, requiring a coincidence with a backward detector produces relatively more heavy fragments than requiring a coincidence with a forward detector. These are more likely to be associated with central collisions[4] which deposit more energy and thus are more likely to produce multifragmentation events.

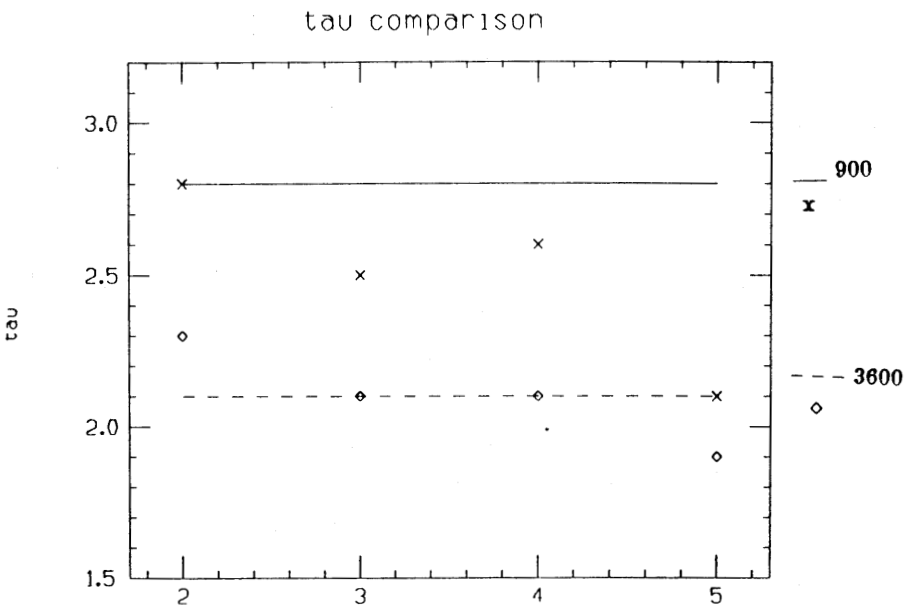

Figure 2. Value of charge distribution parameter τ for fragments coincident with trigger detectors at various angles. Trigger detectors are defined as follows: 2(25°), 3(63°), 4(117°) and 5(149°). Data at 900 (3600) MeV are indicated by crosses (diamonds) and the average τ value is given by solid (dashed) line.

1. S.J. Yennello, *et al.* to be published in Phys Lett. B.
2. L.G. Sobotka, *et al.*, Phys. Rev. Lett. **51** (1983) 287; K. Kwiatkowski *et al.*, Phys. Lett. **B171** (1986) 41.
3. N.T. Porile, *et al.*, Phys. Rev. C **39** (1989) 1914.
4. M. Fatyga, *et al.*, Phys. Lett. **B222** (1989) 356.