

PROJECTILE-LIKE - TARGET-LIKE FRAGMENT CORRELATIONS IN PERIPHERAL COLLISIONS OF  $^{40}\text{Ar}$  ON  $^{27}\text{Al}$  AND  $^{201}\text{Ag}$  TARGETS AT GANIL ENERGIES

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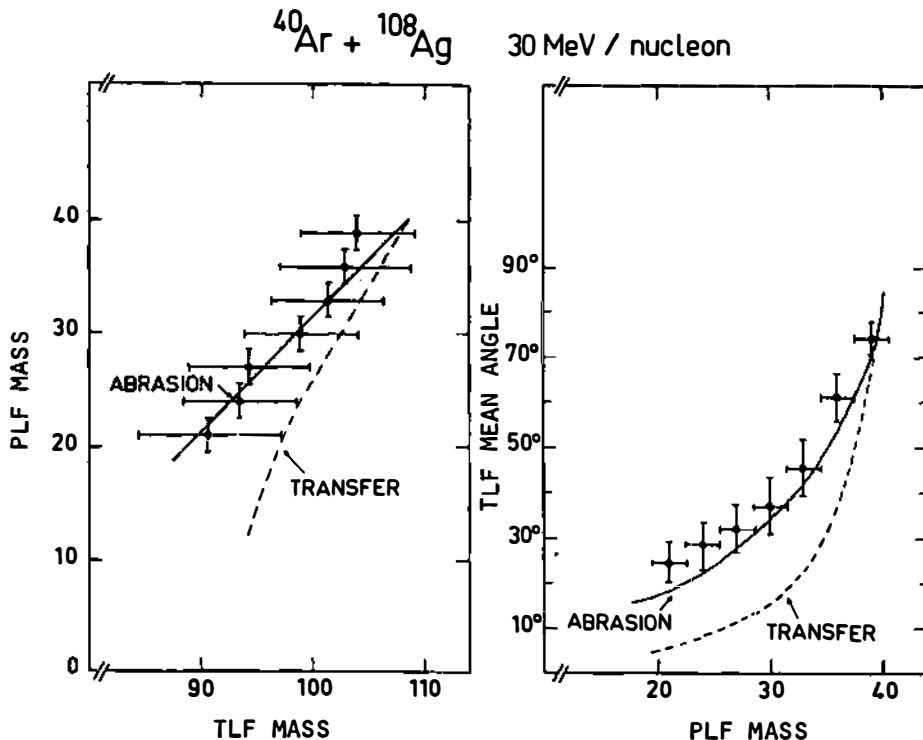
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From our first inclusive measurements done at GANIL<sup>1</sup> we could conclude that the bulk of data in peripheral interaction processes studied for  $^{40}\text{Ar}$  on  $^{27}\text{Al}$  and  $^{201}\text{Ti}$  at 44 MeV/nucleon shows up that the abrasion mode, which dominates at energies larger than 100 MeV/nucleon, can also explain all the main features which are observed. However, it is necessary, in the framework of this participant-spectator reaction process, to take into account energy dissipation. Using an extended version of such an abrasion-ablation model<sup>1</sup> we calculate and reproduce successfully the measured projectile-like fragments (PLF) mean velocities as well as the low energy tails of the energy spectra and the inclusive PLF angular distributions.

The exclusive PLF - TLF (Target-like fragments) correlation measurements, first carried on for the  $^{40}\text{Ar} + ^{27}\text{Al}$  reaction at the same incident energy of 44 MeV/nucleon<sup>2</sup> have confirmed these first conclusions. In order to study the onset of the abrasion process we choose a target-projectile nuclei combination ( $^{40}\text{Ar} + ^{201}\text{Ag}$ ) and two bombarding energies (30 and 60 MeV/nucleon) for which one expects a transition between a massive transfer regime to an abrasion one in peripheral collisions.

The experiments, done at GANIL, consist of coincidence measurements between PLF and TLF. The first ones were detected, at a fixed forward angle (3° and 6° in the case of  $^{27}\text{Al}$  or  $^{201}\text{Ag}$  targets, respectively), by means of a time of flight (1.8 m long) with Z identification set up, using Si(Li) detectors. The second ones (TLF) were detected at 10 angles between 15° and 85° using 10 Si(Li) detectors and identified in mass using for each one the time signal difference with the corresponding PLF. The main difficulty of such measurements is related to the extreme low velocities of the TLF having masses up to ~ 100 : we therefore cooled down the Si(Li) detectors and thresholds as low as 2 MeV were achieved. In order to correct the data for the large corresponding pulse height defects in those detectors, a careful mass calibration has been done using Ag recoil nuclei.

In the figure are presented the PLF - TLF correlations in mass and angle, measured at  $E = 30$  MeV/nucleon. The bars associated at each point correspond (i) for the PLF to a sum over 3 mass units and (ii) for the TLF at the FWHM of the mass, respectively angular corresponding distribution. The full lines are the predictions of the extended abrasion-ablation model presented in Ref. 1. These calculations reproduce remarkably well the observed correlations whereas a massive transfer mechanism (dotted lines), followed by statistical evaporation, cannot explain the data : for instance,



according to this latter process, one should observe much heavier TLF associated to a given PLF as one does.

The predominance of the abrasion-ablation mechanism in the  $^{40}\text{Ar} + ^{108}\text{Ag}$  peripheral reaction channels even at 30 MeV/nucleon was not expected. The interpretation of this early onset of participant-spectator processes seems to be related to the dominant influence of the separation energy of the participant zone from the target and/or the projectile nuclei and their corresponding velocities in respect to the center of mass velocity. Analysis of the same reaction at 60 MeV/nucleon is still in progress yet ; it appears however that these data, together with results obtained for other systems studied at GANIL energies, corroborate these conclusions.

- 1) R. Dayras et al., Nucl. Phys. A460 (1986) 299
- 2) R. Coniglione et al., Nucl. Phys. A447 (1987) 96c