

LOW ANGULAR-MOMENTUM-CUTOFF IN STATISTICAL  
HEAVY-ION PROCESSES<sup>†</sup>

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The existence of a lower- $\ell$  cutoff ( $\ell_{\min}$ ) in angular momentum that limits the complete fusion cross-section of heavy-ions, has been extensively discussed in the last few years and has been predicted both by Time-Dependent-Hartree-Fock calculations and semiclassical coupled channel model calculations.

The existence of  $\ell_{\min}$  must sensitively affect the

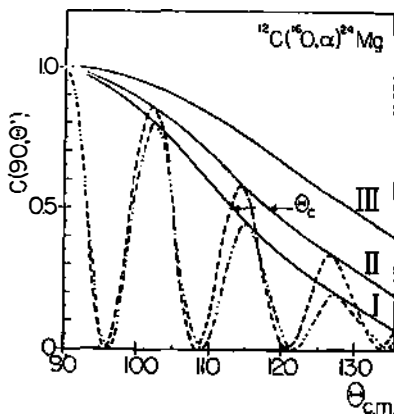


Fig. 1 - Calculations for the ground state transition  $\ell_{\min} = 0, 12$  (curves I and II). Curve III is for  $E^* = 15$  MeV and  $\ell_{\min} = 0$ .

main characteristics of statistical quantities such as cross-correlation functions and fluctuation cross-sections.<sup>1)</sup>

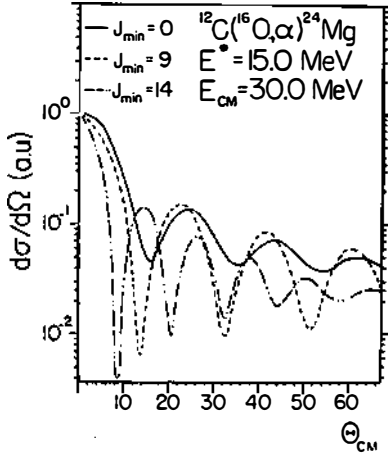
The presence of  $\ell_{\min}$  increases the value of the coherence angle  $\theta_c$  and qualitatively changes the diffraction pattern of the angular cross-correlation function (fig. 1).

The truncation at low J-values of the partial cross sections  $\sigma_J(E^*, I)$  that contribute to the yield of a given final state  $(E^*, I)$ , will shift the center of gravity  $\langle J \rangle$  of the  $\sigma_J$  distribution to higher J-values and reduce of the effective number of

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independent channels that contribute to a given transition.

Angular distributions of transitions to zero spin



final states will be sensitively affected, oscillating more rapidly, with a period  $\Delta\theta_{\text{CM}} \sim \pi/\langle J \rangle$  and displaying larger "peak-to-valley" ratio (fig. 2).

### References

1. A. Szanto de Toledo and M.S. Hussein, Phys. Rev. Lett. (in press).

Fig. 2 - Relative differential cross sections calculated for  $l_{\min} = 0, 9$  and  $14 \hbar$  ( $J_{\max} = 30 \hbar$ )