Abstract Submitted
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(Multi-)nucleon transfer and its role in understanding the transition from quasi-elastic scattering to deep inelastic collisions in nuclear reactions MAURITS EVERS, DAVID HINDE, MAHANANDA DASGUPTA, Department of Nuclear Physics, The Australian National University, Canberra, ACT 0200, Australia — Measurements of (multi-)nucleon transfer excitation functions in backward-angle quasi-elastic scattering at near- barrier energies have been carried out, using beams of ^{16}O and ^{32}S [1]. A detailed comparison of the measured transfer probabilities within the coupled-channels framework indicates a major problem with the standard coupled-channels approach. The experimental results show events with large kinetic energy losses, which are not treated in the coherent coupled channels model. The presence of these deep inelastic collision processes already seen at sub-barrier energies, leads to questions of what the physical processes are behind the transition from quasi- elastic scattering to deep inelastic collisions, and how processes leading to large total kinetic energy losses may be included in nuclear reaction models. Our observations point to the need to include effects of quantum decoherence in a new nuclear reaction model [2], and promises a new understanding of nucleus-nucleus collisions, with implications for areas such as nuclear astrophysics and nucleosynthesis.

References

[1] M. Evers et al., Phys. Rev. **C78**, 034618 (2007)
[2] D. Hinde et al., Nuc. Phys. **A834**, 117c-122c (2010)

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