

# Isospin Dynamics in Fusion Processes: Collective Dipole Bremsstrahlung

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We evaluate the pre-equilibrium Dipole photon radiation accompanying the fusion of charge asymmetric ions. Following a semiclassical approach we estimate the collective bremsstrahlung emission in a fusion dynamics described via a microscopic quantum transport model.

We study energy, charge and mass dependence of this contribution to the Giant Dipole Resonance (*GDR*) photon emission in hot nuclei.

The dynamical origin of the extra *GDR* strength will show up in a characteristic anisotropy of the dipole  $\gamma$ -emission, being this dipole oscillation constrained on the reaction plane.

We stress the interest in experiments with the new available radioactive beams. Apart the importance of a better analysis of this new pre-equilibrium phenomenon, we suggest the possibility of using such characteristic signal to select fusion paths in dissipative collisions with exotic nuclei.

- [1] V. Baran *et al.*, Nucl. Phys. **A599**, 29c (1996); Nucl. Phys. **A600**, 111 (1996).
- [2] M. DiToro *et al.*, Acta Phys. Polonica **B30**, 1331-1352 (1999).
- [3] M. DiToro *et al.*, "The Dynamical Dipole Mode", Int. Conf. on Giant Resonances, Osaka 2000, Nucl. Phys. **A** (2000) in press.
- [4] V. Baran *et al.*, "The Dynamical Dipole Mode in Dissipative Heavy-Ion Collisions", arXiv:nucl-th/0005023, Nucl. Phys. **A** (2000) in press.
- [5] V. Baran, Ph. Chomaz, M. Colonna and M. DiToro, "Pre-Equilibrium Hot Giant Dipole Resonance Excitation in N/Z Asymmetric Nuclear Reactions", in "Isospin Physics with Heavy-Ion Collisions", Ed.s Bao-An Li and U.Schroeder, Nova Publ. (2000) in press.