Probing the decay mechanism of hot nuclei by Coulomb chronometry

Diego Gruyer

Grand Accélérateur National d'Ions Lourds, and
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Collisions between Coulomb and Fermi energies

Coulomb barrier

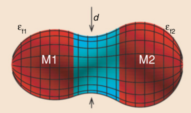
Fermi energies

Available energy

Collisions between Coulomb and Fermi energies

Coulomb barrier — Fermi energies → Available energy

Fission/Evaporation



adapted from P. Möller et al.
Phys. Rev. C **79**, 064304 (2008)

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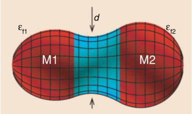

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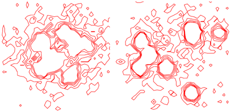
Multifragmentation



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Collisions between Coulomb and Fermi energies

This work →

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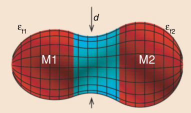

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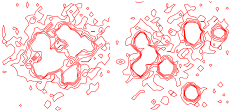

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Multifragment production in Xe+Sn central collisions

Studied reactions

- Xe+Sn at 8, 12, 15, 18, 20, 25 MeV/A
- Measured with INDRA at GANIL
- Fusion-like events

A.Chbihi et al. J.Phys. : Conf.Ser. **420**, 012099 (2012)

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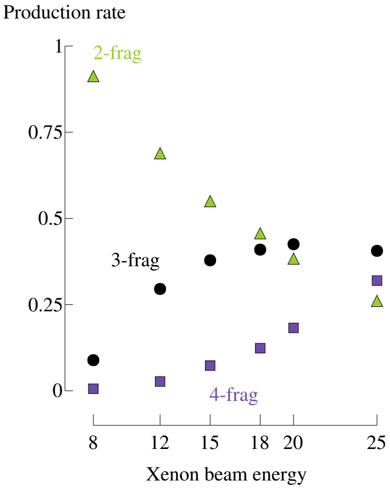

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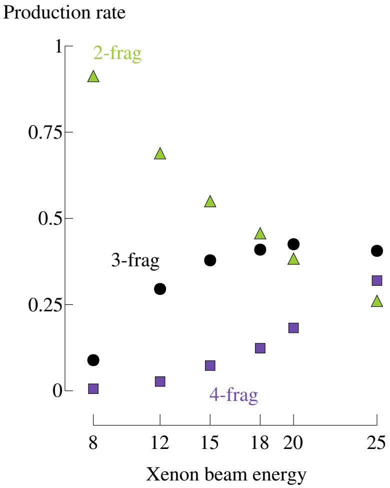

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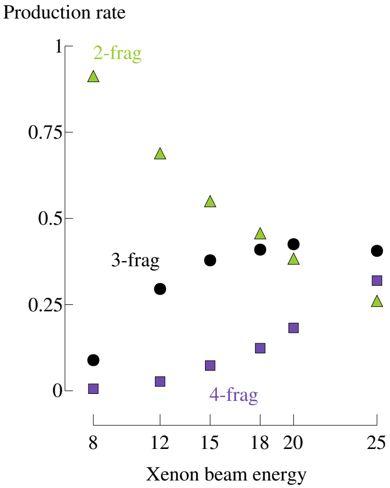
- Continuation of fission ?
- Precursor of multifragmentation ?



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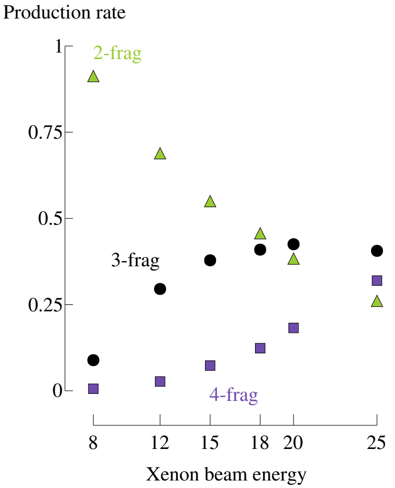
- Precursor of multifragmentation ?
- Estimation of the involved timescales



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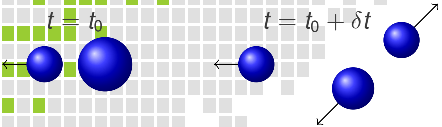
From hot sequential fission to multifragmentation



Experimental results

- Two succesive binary splittings

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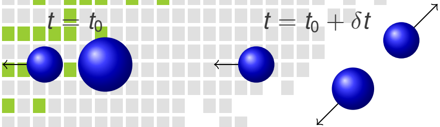

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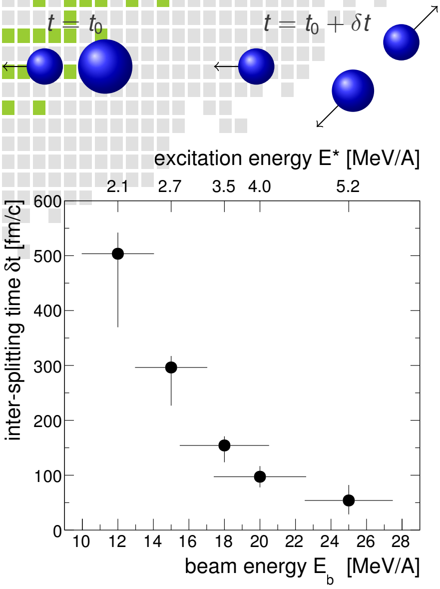

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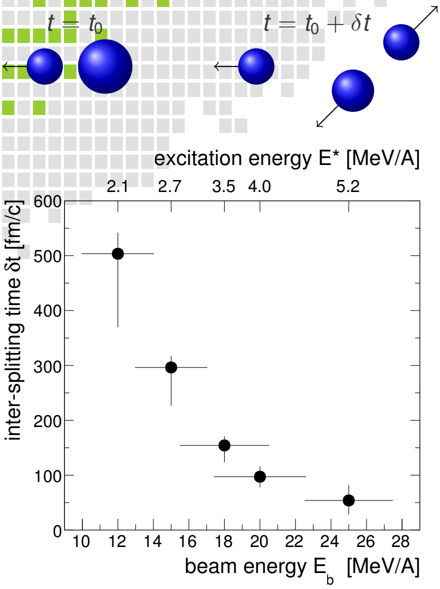

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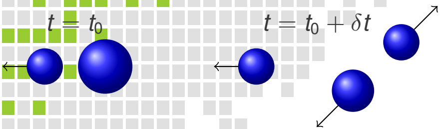

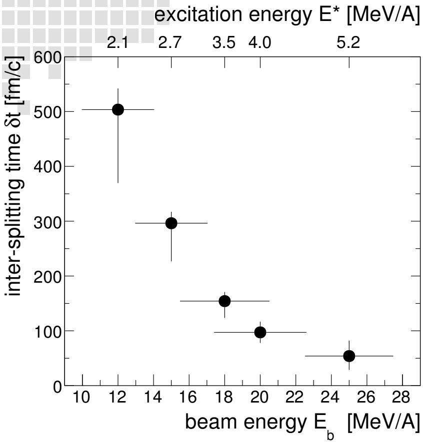

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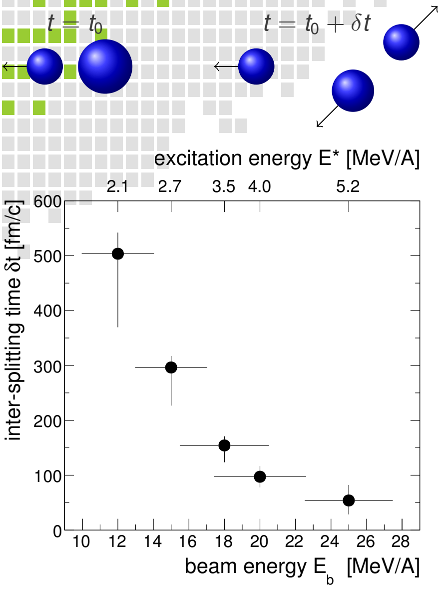

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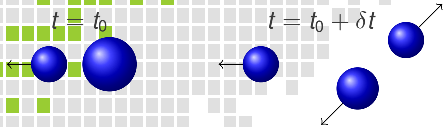

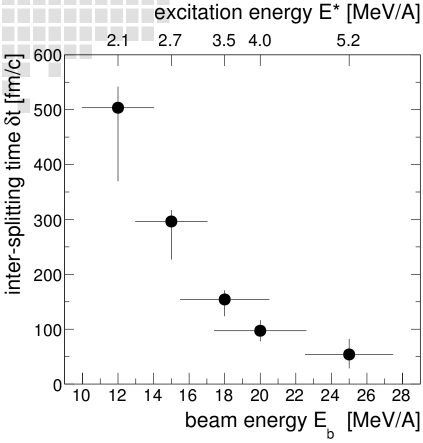

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Decay mechanism

- Successive splittings occuring on shorter and shorter time scale
- Compatible with simultaneous break-up above E_b=20 MeV/A
- Onset of multifragmentation above $E^* = 4.0 \pm 0.5$ MeV/A

D.Gruyer[1], **J.D.Frankland**[1], **E.Bonnet**[1], **A.Chbihi**[1], G.Ademard[3], M.Boisjoli[1,4], B.Borderie[3], R.Bougault[5], E.Galichet[3,10], E.Gauthier[4], D.Guinet[6], P.Lautesse[6], L.Manduci[7], N.Le Neindre[5], E.Legouée[5], O.Lopez[5], P.Marini[1], K.Mazurek[8], P.N.Nadtochy[11], M.Pârlog[5], P.Pawłowski[8], M.F.Rivet[3], R.Roy[4], E.Rosato[9] G.Spadaccini[9], G.Verde[12], E.Vient[5], M.Vigilante[9], and J.P.Wieleczko[1]
(INDRA Collaboration)