

Structure of exotic and halo nuclei

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„skin” structure of ^8He

proposal of an experiment at GANIL (PAC on Monday)

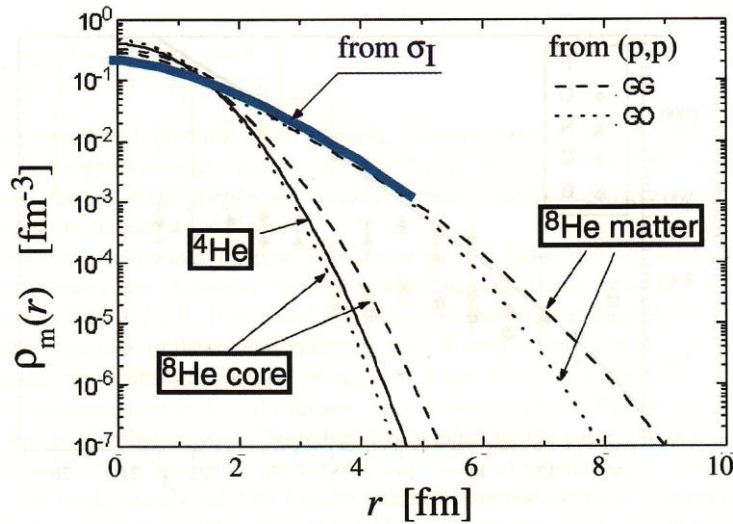
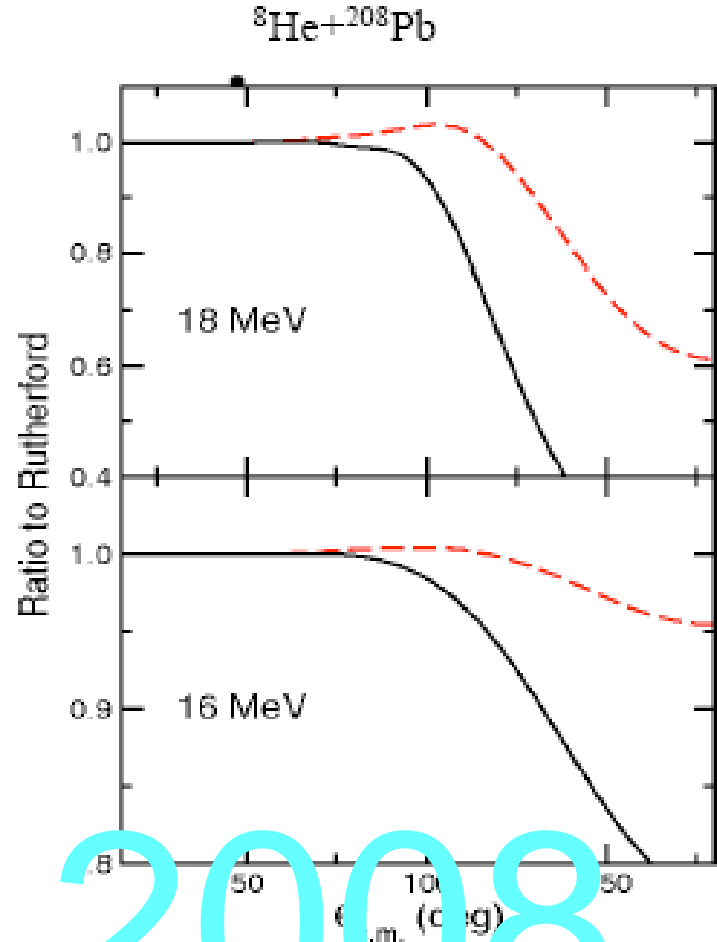


Fig. 2. Density distributions of ^8He from two methods.

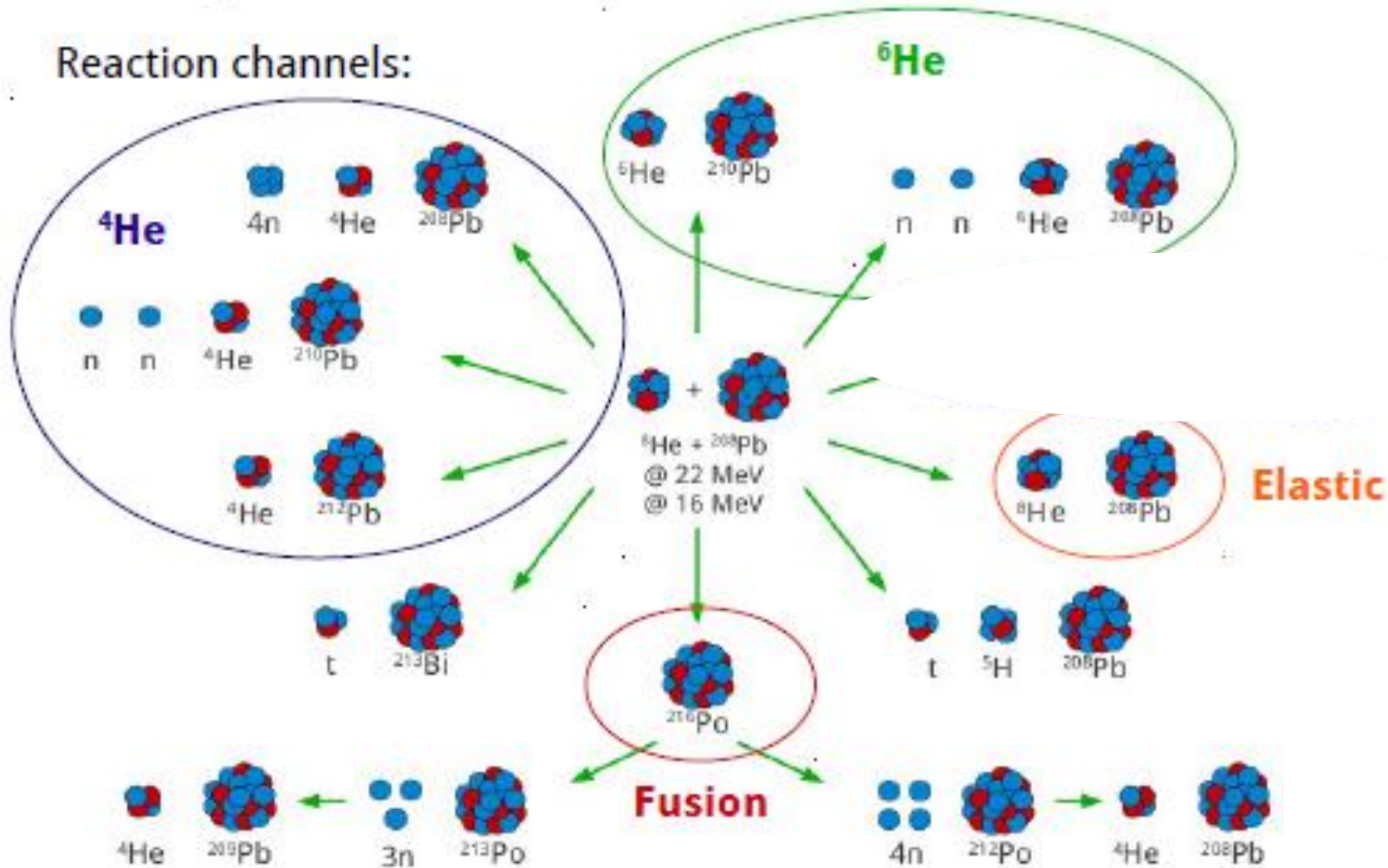


Effect of n-transfer on elastic scattering

Paris 2008

Collaboration with I. Martel et al.

Reaction channels:



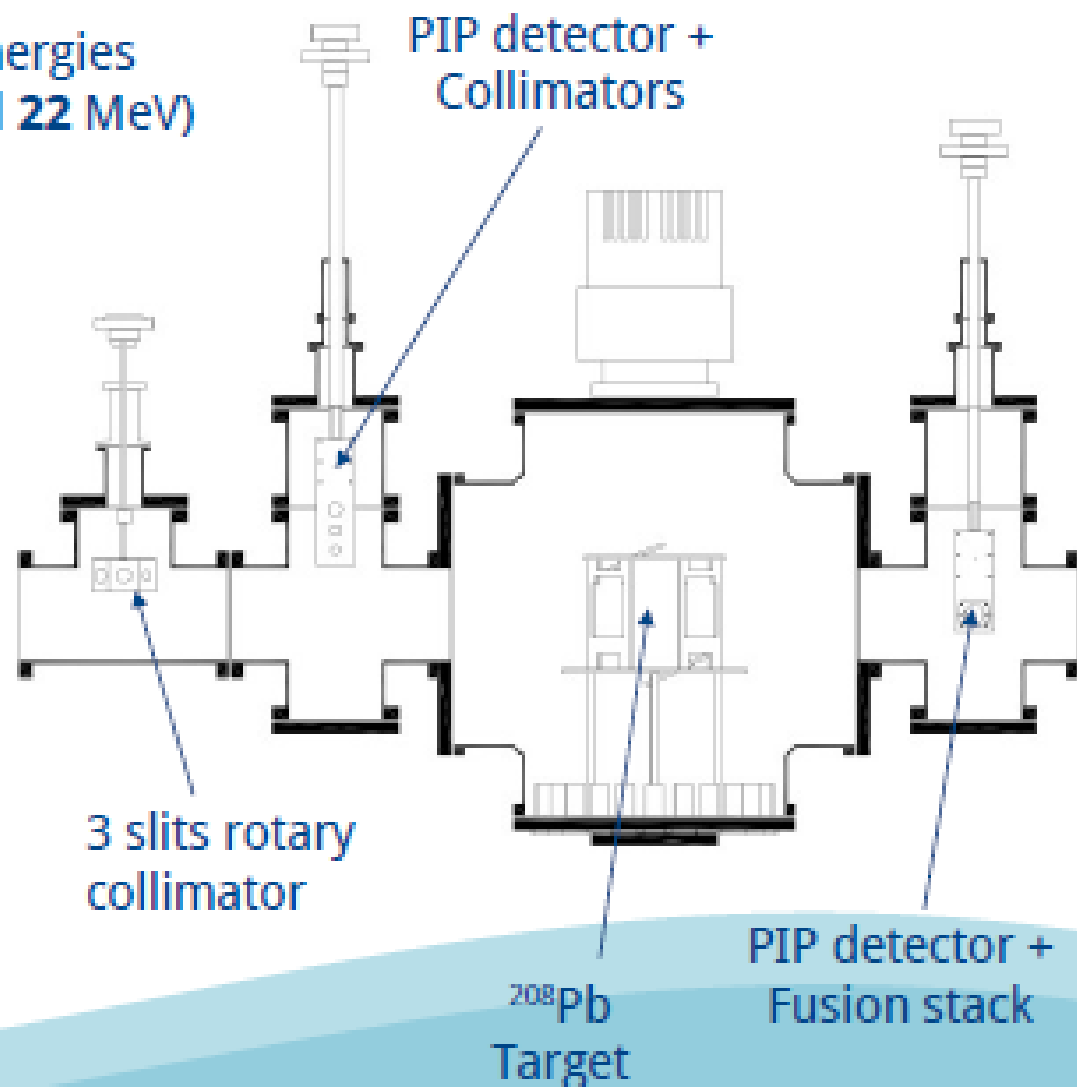
PhD of G. Marquinez Duran, Univ. Huelva

Experiment E587S – GANIL

Study of the $^8\text{He} + ^{208}\text{Pb}$ system at energies around the Coulomb barrier (**18** and **22 MeV**)

$I \sim 10^5$ pps

Target thickness ~ 1.7 mg/cm²



Detection system concept

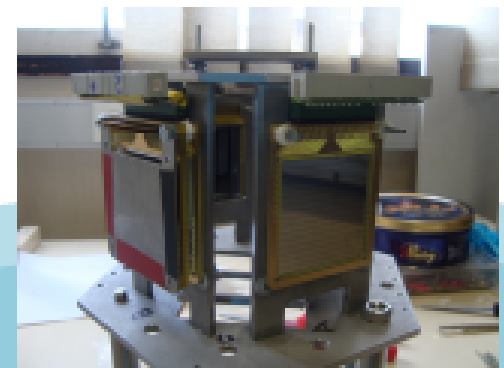
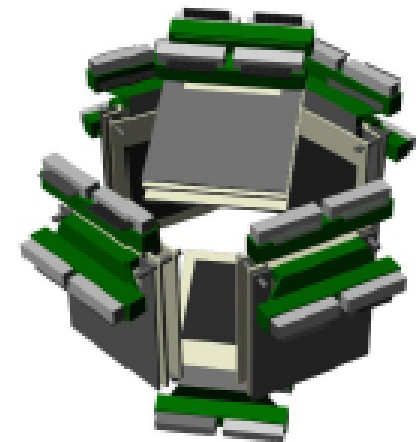
Detection system developed at the University of Huelva (UHU) with the aim of studying structure and dynamics of exotic nuclei using nuclear reactions.

Design requirements:

- Symmetric position of telescopes (scattering angles / beam alignment)
- Maximum angular range
- Angular range overlapping between telescopes
- Large solid angle \Rightarrow Good angular resolution
- Small size \Rightarrow "Plug & Play" Concept

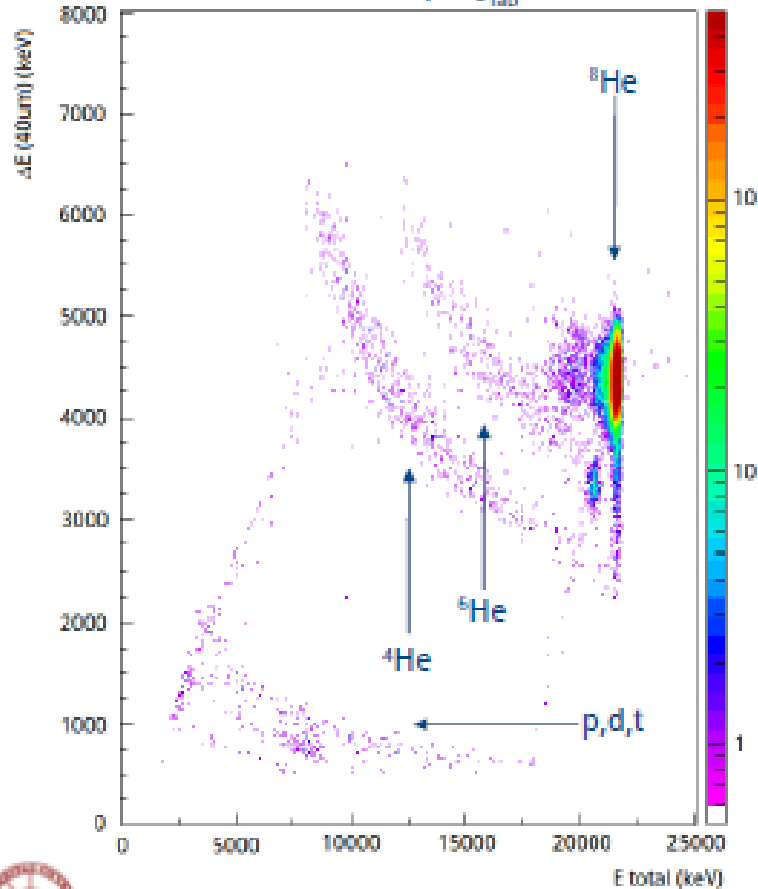
12 DSSSD Si detectors arranged in
6 particle telescopes ($40 \mu\text{m}$ ΔE & 1 mm E)

Total solid angle for the system: 26 % (4π srad)

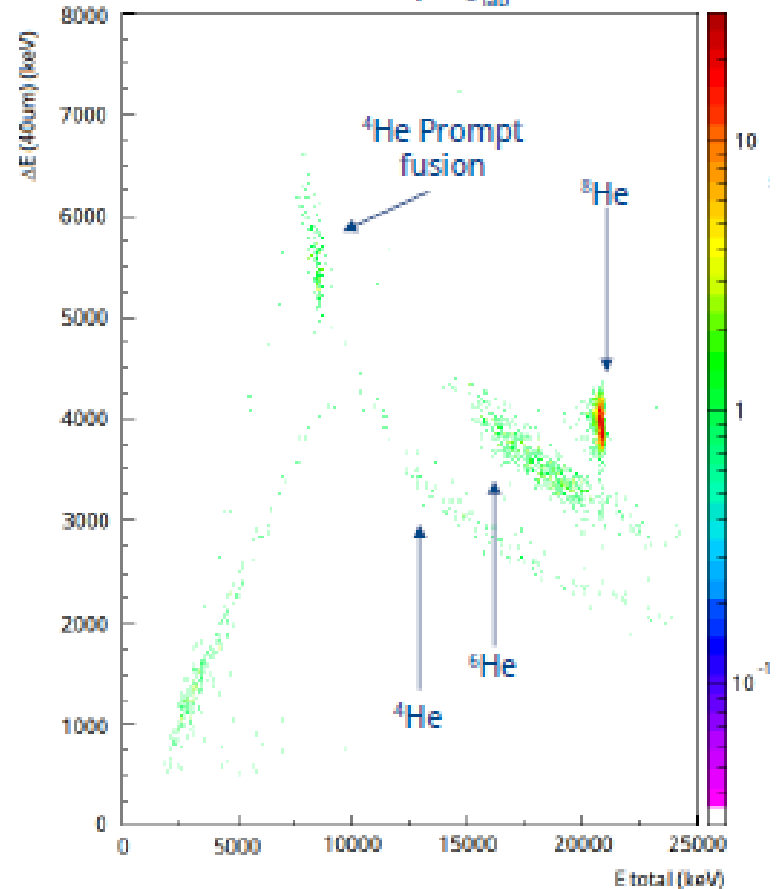


Preliminary Results

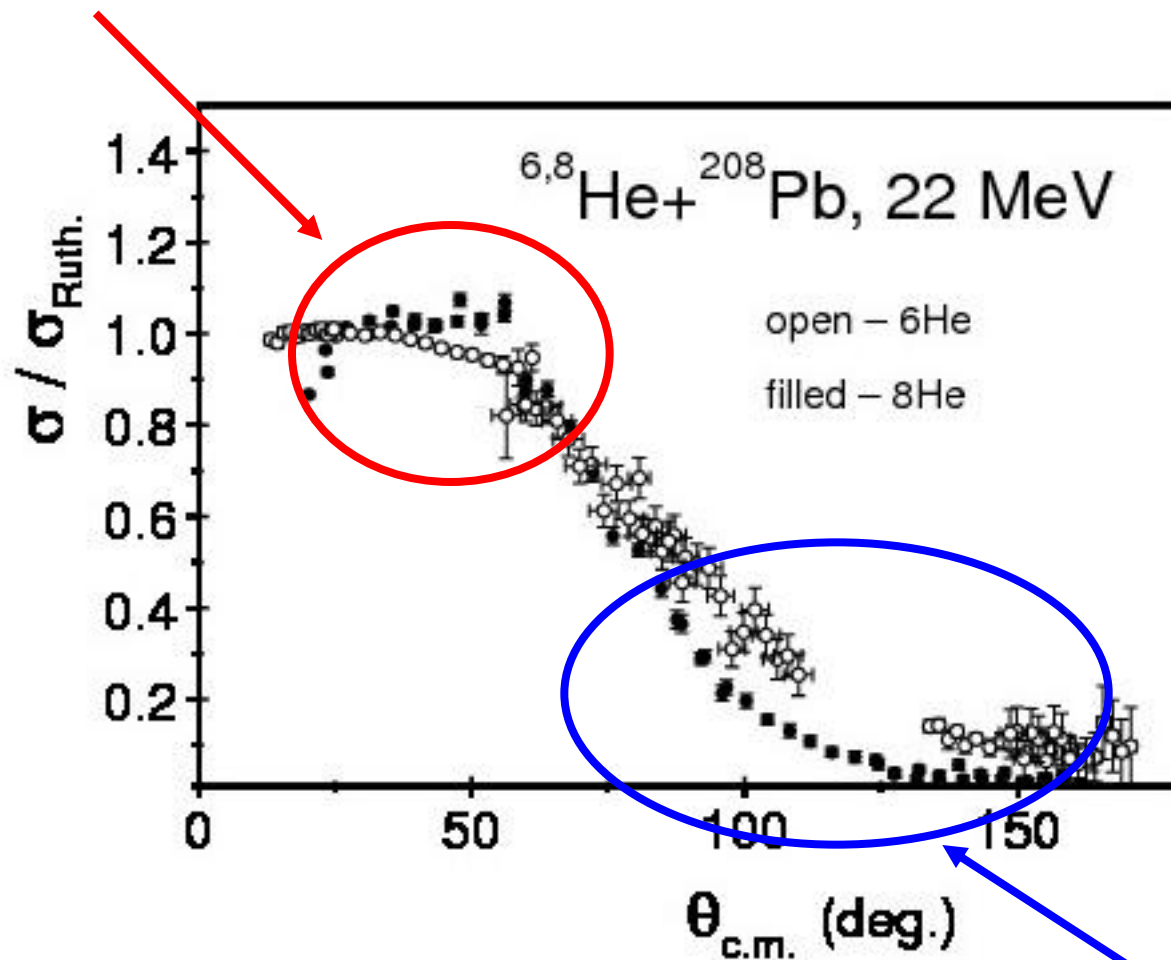
Forward Telescope $\theta_{\text{lab}} = [21^\circ, 25^\circ]$



Bottom Telescope $\theta_{\text{lab}} = [73^\circ, 77^\circ]$

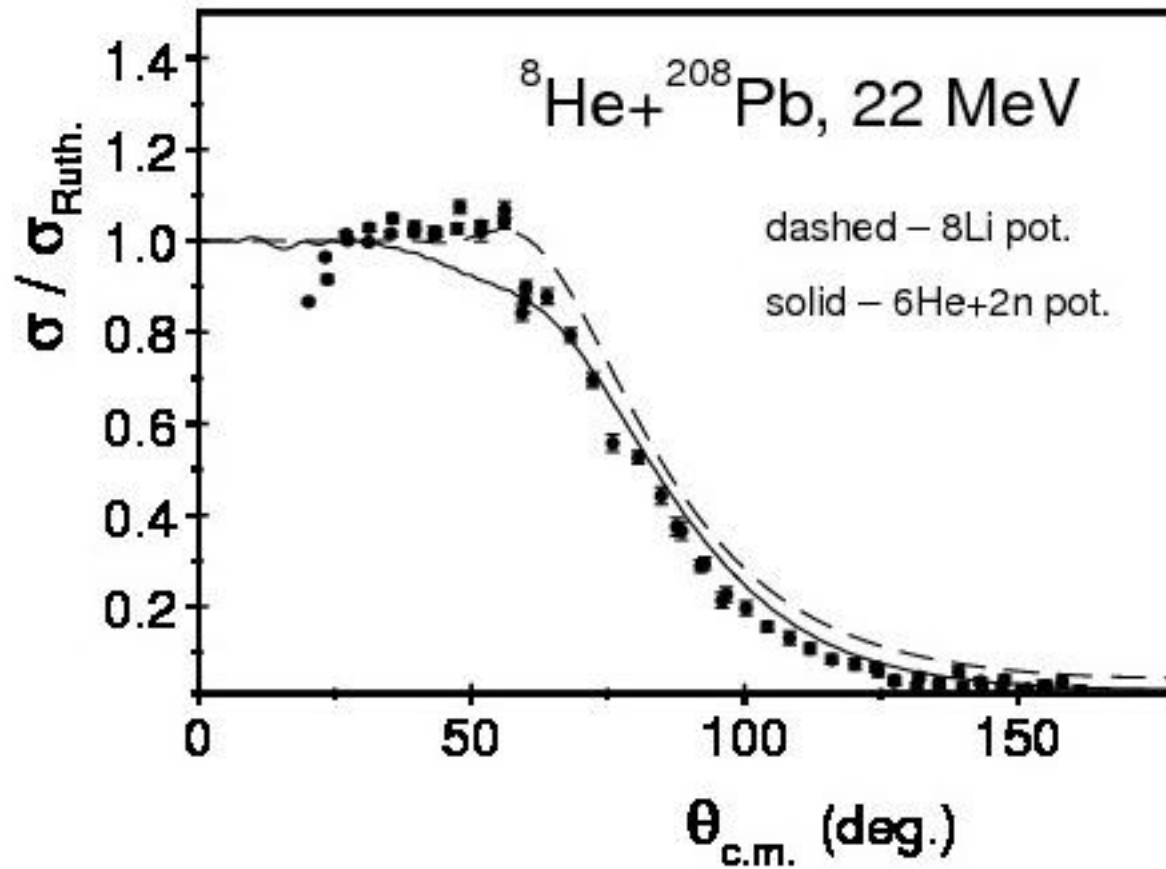


Effect of breakup
less pronounced



Stronger effect of n-
transfer

Two extreme cases



What else to do

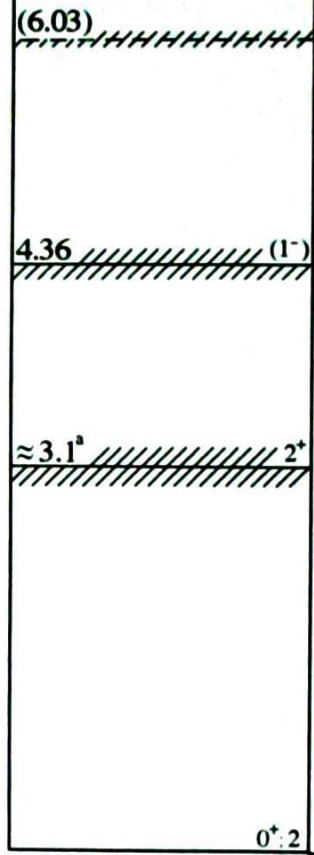
- Get ${}^{4,6}\text{He}$ yields
- Run CRC calculations

Thanks to the E587S collaboration

I. Martel¹, K. Rusek⁵, L. Acosta¹, M.A.G. Álvarez², R. Berjillos¹, M.J.G. Borge³, A. Chbihi⁴, C. Cruz³, M. Cubero³, J. Dueñas¹, J.P. Fernández García², B. Fernández Martínez², J.L. Flores¹, J. Gómez Camacho², N. Keeley⁵, J.A. Labrador², G. Marquínez-Durán¹, M. Marques⁶, M.Mazzocco⁷, A. Pakou⁸, V.V. Parkar¹, N. Patronis⁸, V. Pesudo³, D. Pierroutsakou⁹, R. Raabe¹⁰, A.M. Sánchez-Benítez¹, R. Silvestri⁹, L.Standylo⁵, I. Strojek⁵, N.Soic¹¹, O. Tengblad³, R. Wolski¹², A.H. Ziad²

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⁵University of Warsaw (Poland), ⁶LPC, Caen (France), ⁷INFN-LNL, Legnaro (Italy), ⁸University of Ioannina (Greece), ⁹INFN Napoli (Italy), ¹⁰Instituut voor Kern-en Stralingsfysica, Leuven (Belgium),
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$$\frac{3.112184}{{}^4\text{He} + 4n}$$

$$\frac{2.140}{{}^6\text{He} + 2n}$$

$$\frac{2.574}{{}^7\text{He} + n}$$

$$\frac{-23.721}{{}^7\text{Li} + {}^{11}\text{B} - {}^{10}\text{C}}$$

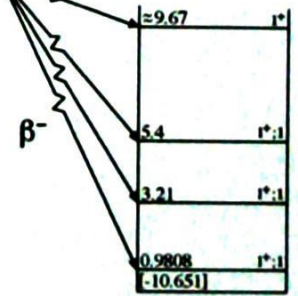
$$\frac{-25.133}{{}^9\text{Be} + {}^{13}\text{C} - {}^{14}\text{O}}$$

$$\frac{-28.264}{{}^9\text{Be} + {}^7\text{Li} - {}^8\text{B}}$$

$$\frac{-24.602}{{}^9\text{Be} + {}^9\text{Be} - {}^{10}\text{C}}$$

$$\frac{-26.999}{{}^{10}\text{Be} + {}^{12}\text{C} - {}^{14}\text{O}}$$

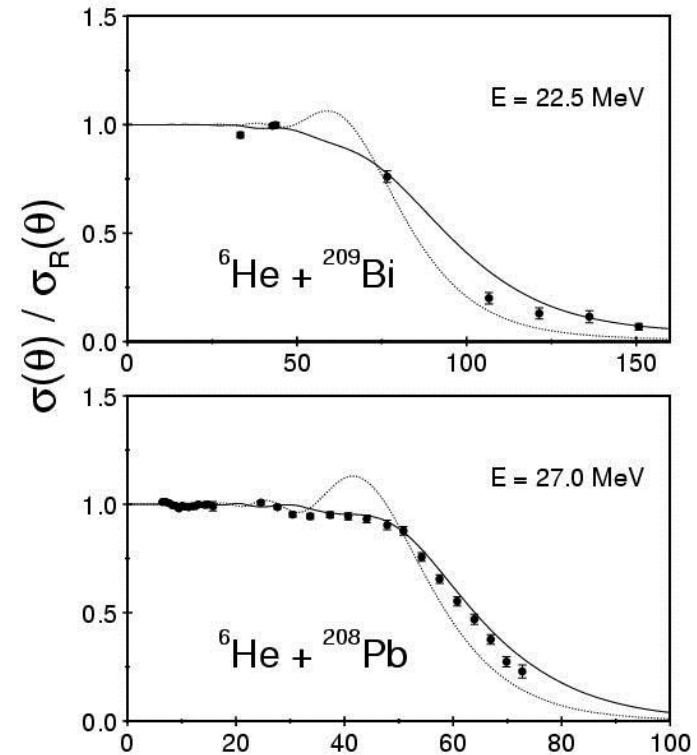
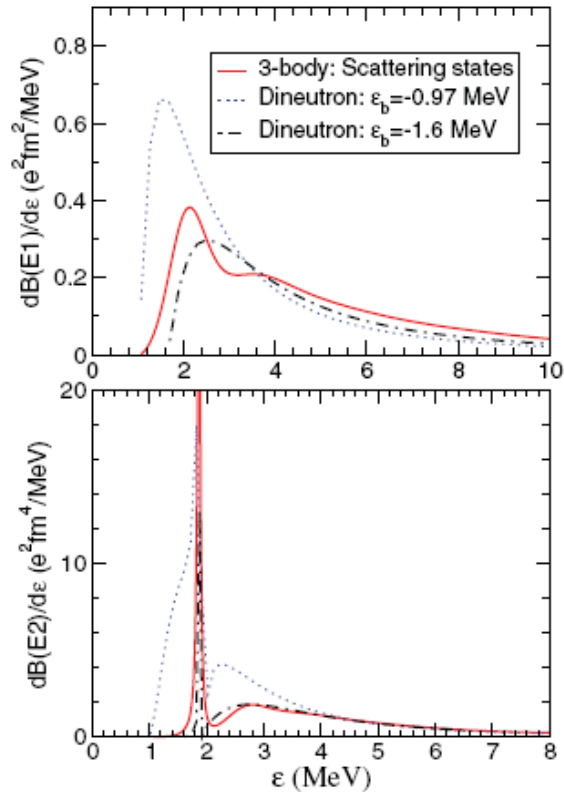
${}^8\text{He}$
08.04



${}^8\text{Li}$

β^-

Elastic scattering: a tool to study structure of radioactive nuclei



Structure of ${}^6\text{He}$ is "reflected" in elastic scattering close to the barrier