Search for cluster structure in ^{14}O using resonant α scattering

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Nuclear Structure 2016
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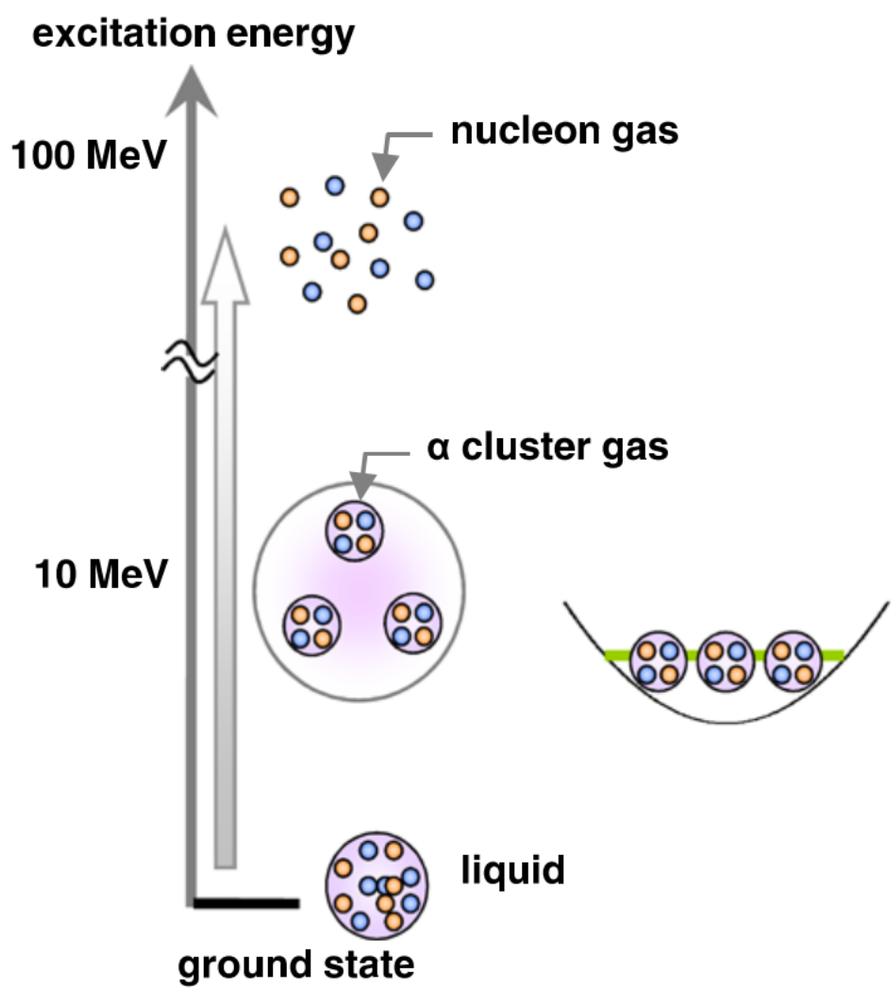
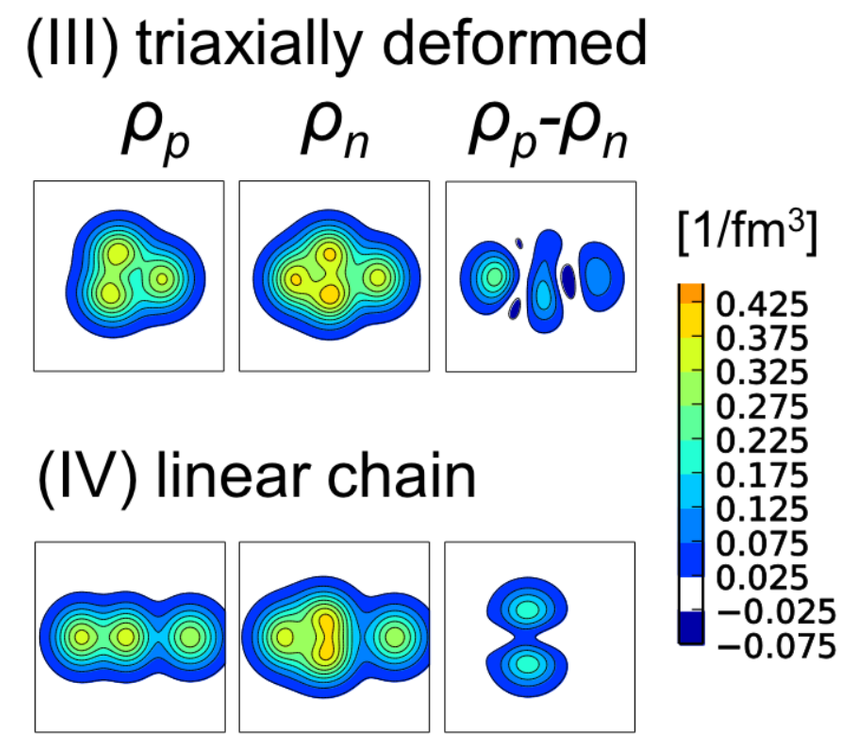
Clustering in Nuclei



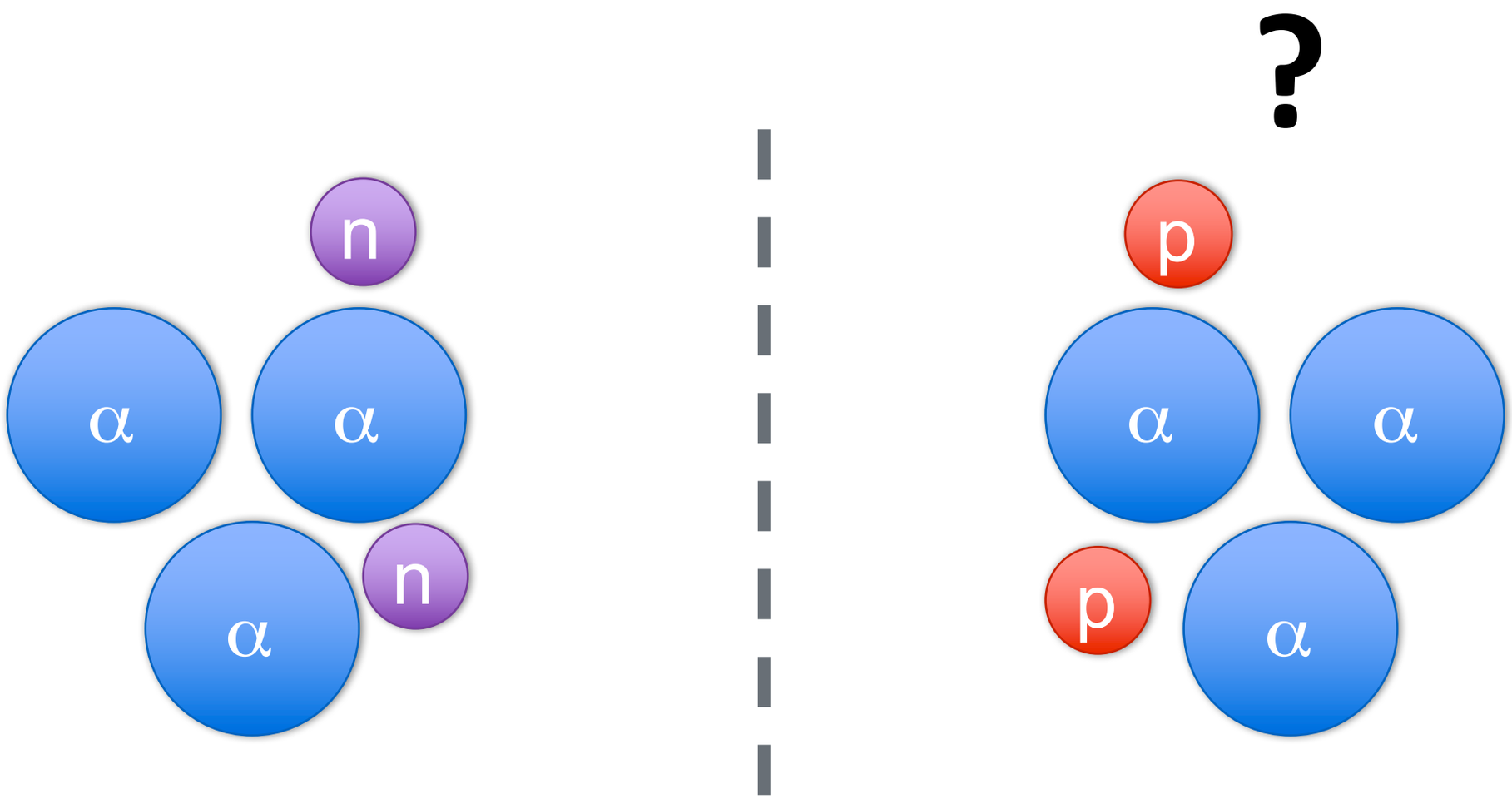
Funaki et al. Prog. Nucl. Part. Phys. 82, 78 (2015)



Suhara and Kanada-Enyo PRC 82, 044301 (2010)

- Nuclear theory: Important paradigm
- Important for nucleosynthesis: e.g. triple-α process
- Nuclear molecules: role of extra nucleons?

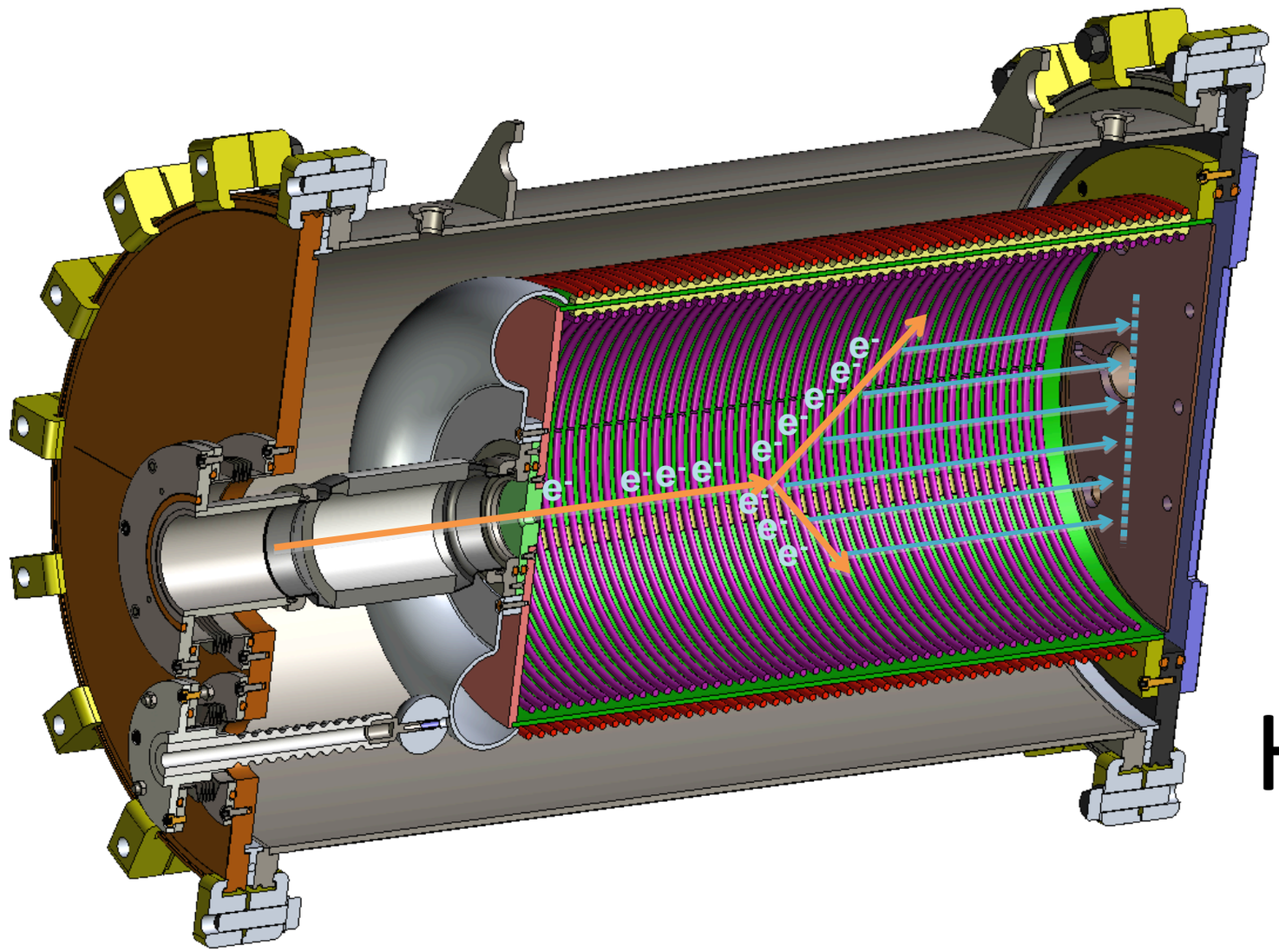
Cluster states: $^{14}C/^{14}O$



- Freer et al. PRC 90 054324 (2014), Fristch et al. PRC 93 014321 (2016)
- Are there isospin analog states to clusters in ^{14}C?

TwinSol and Prototype AT-TPC

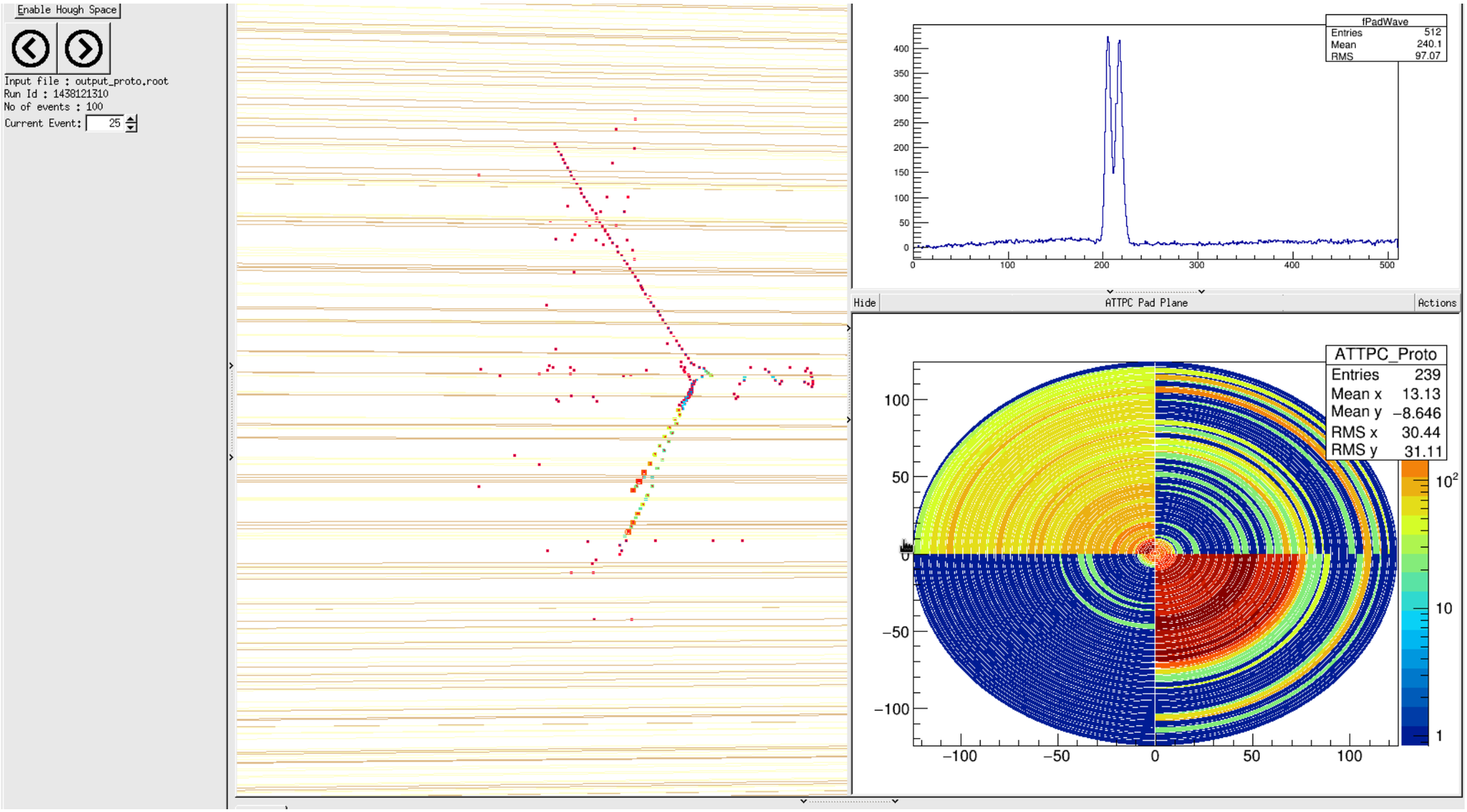
^{10}C



$He:CO_2$

D. Suzuki et al., NIM A, 691 39 (2012)

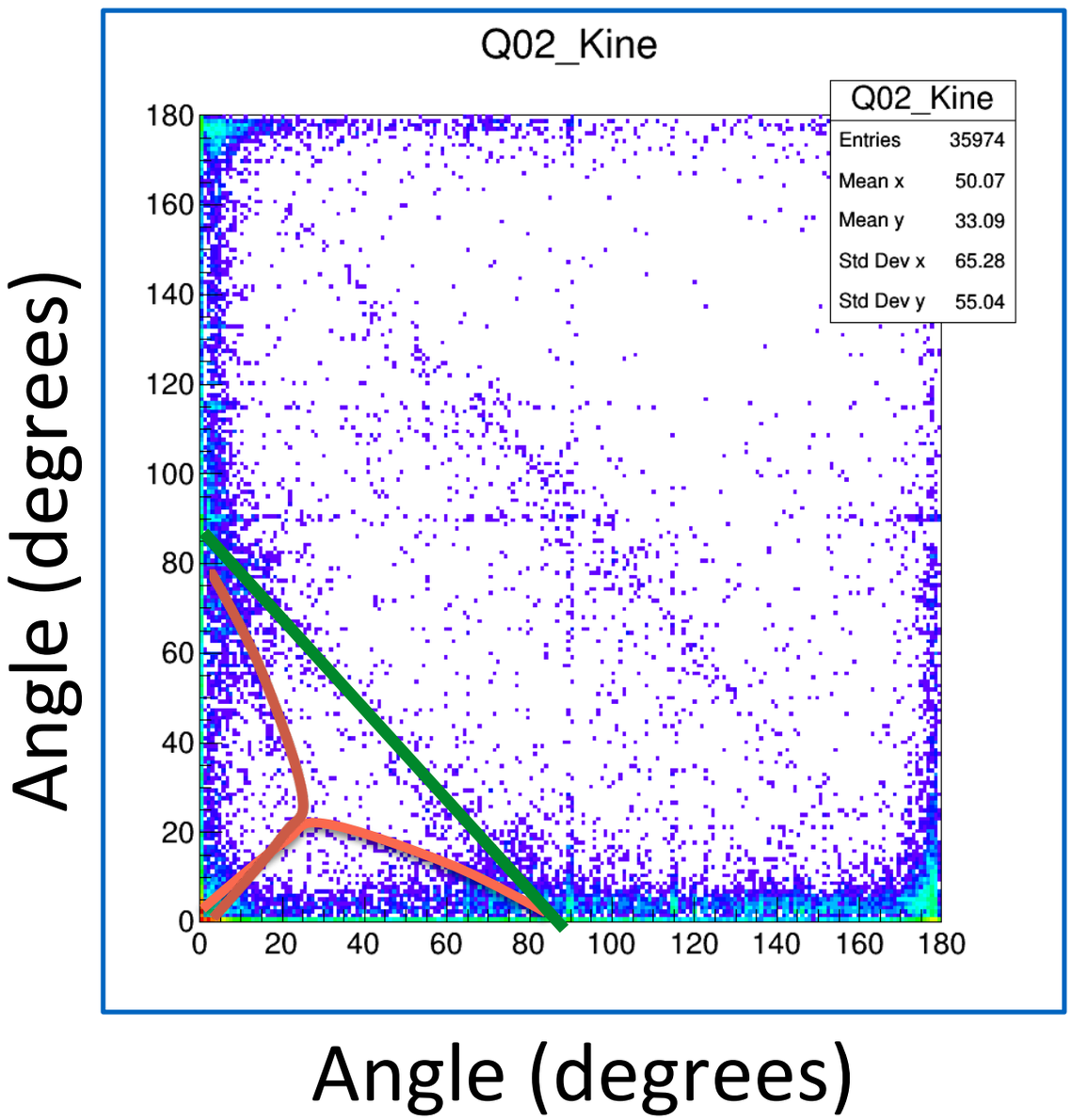
$^{10}C + \alpha$ experiment



Y. Ayyad et al., NSCL

- ^{10}C: 500 pps 4.9 x 10^6 events, 5 days
- Visualization, tracking, analysis: Hough transform

First results and Outlook



- Robust tracking
  - Excitation functions
  - Angular distributions
- Transfer reactions
- Large alpha widths in ^{14}O?