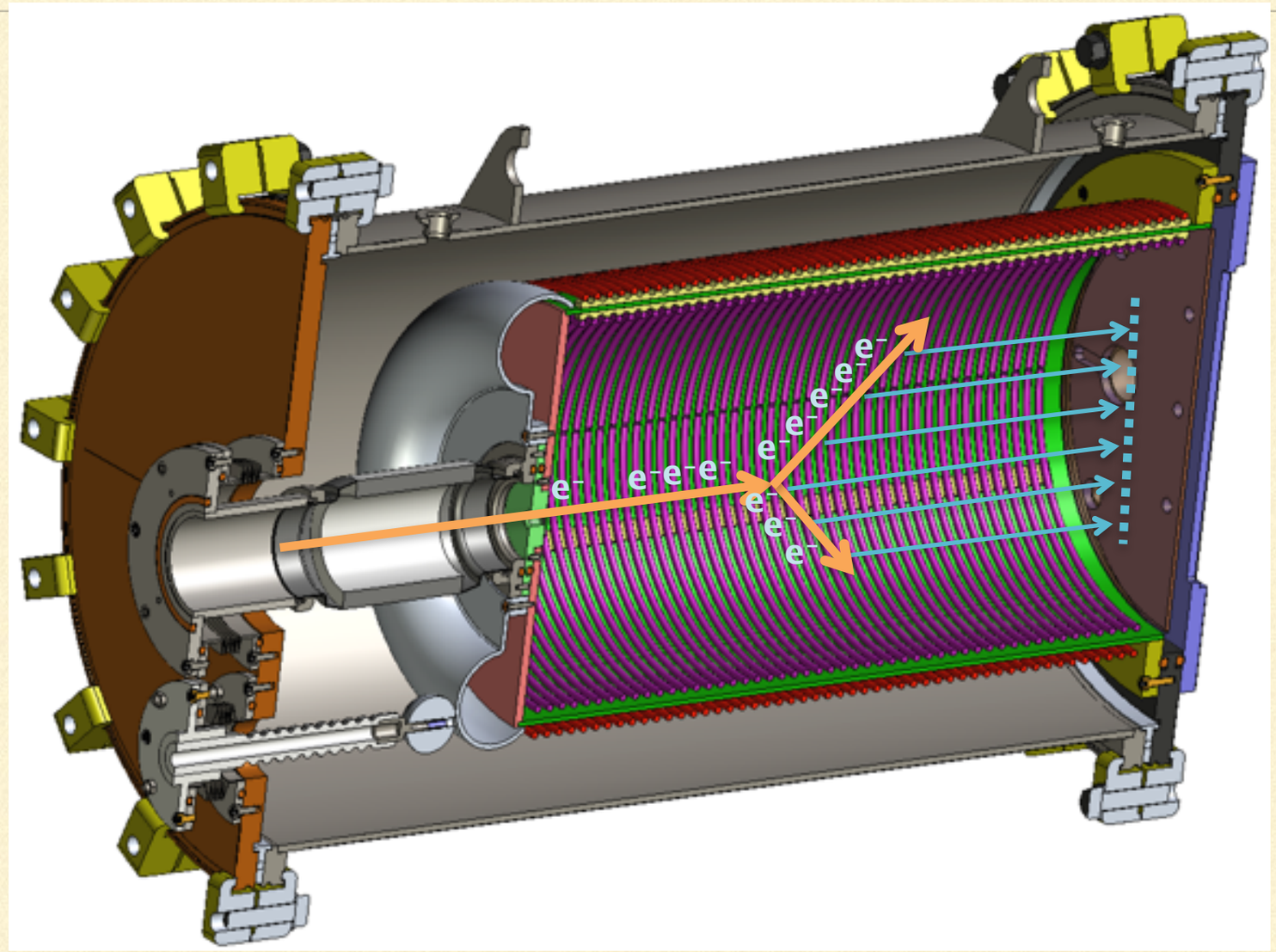
PHYSICS OPPORTUNITIES WITH THE PROTOTYPE AT-TPC AT ATLAS

Tan Ahn
National Superconducting Cyclotron Lab, Michigan State University

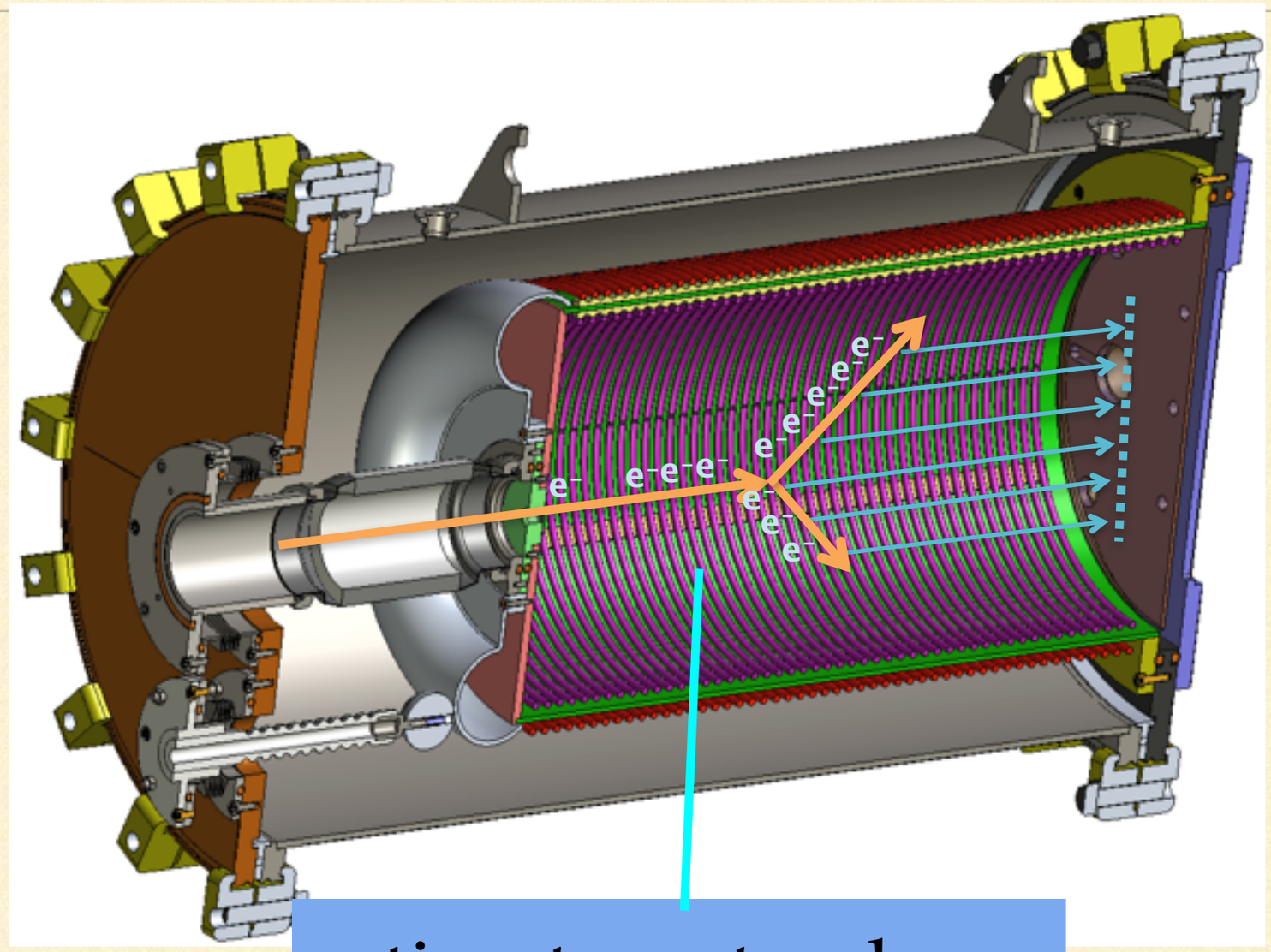
Single-Particle Structure and Reactions Session
ATLAS Users Meeting
May 15, 2014

PROTOTYPE AT-TPC



D. Suzuki et al., NIM A 660, 64 (2011)

PROTOTYPE AT-TPC

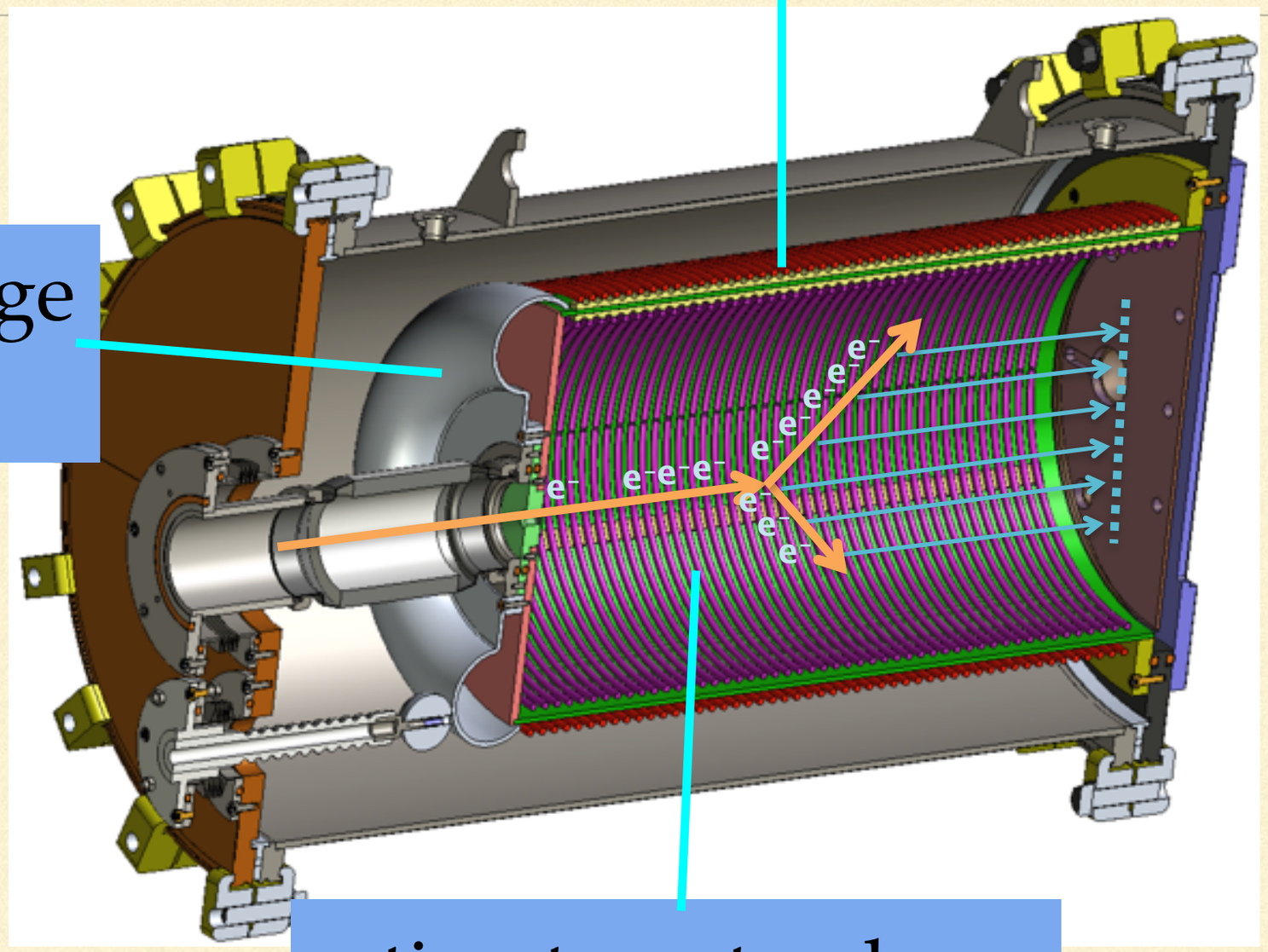


D. Suzuki et al., NIM A 660, 64 (2011)

PROTOTYPE AT-TPC

field cage

high-voltage cathode



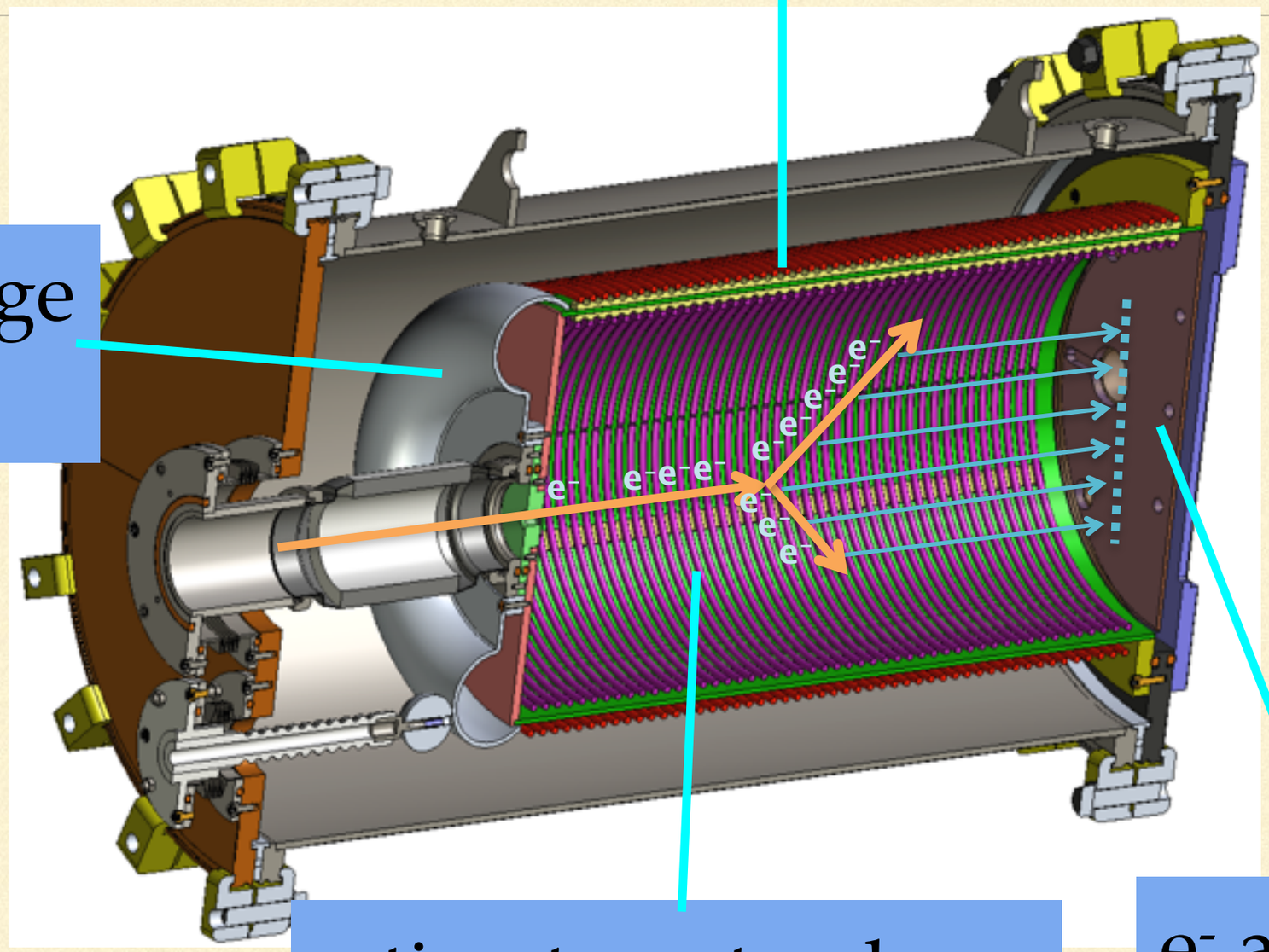
active-target volume

D. Suzuki et al., NIM A 660, 64 (2011)

PROTOTYPE AT-TPC

field cage

high-voltage cathode

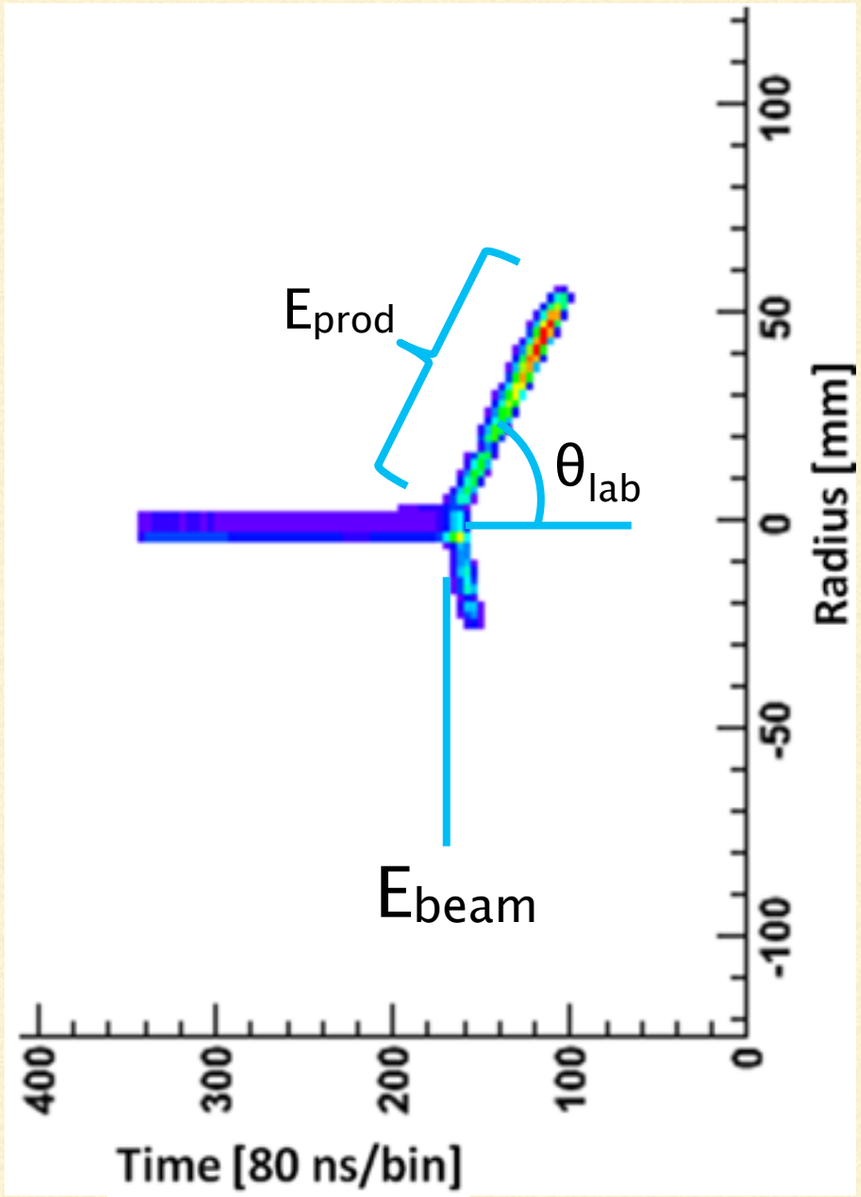


active-target volume

e⁻ amplification Micromegas

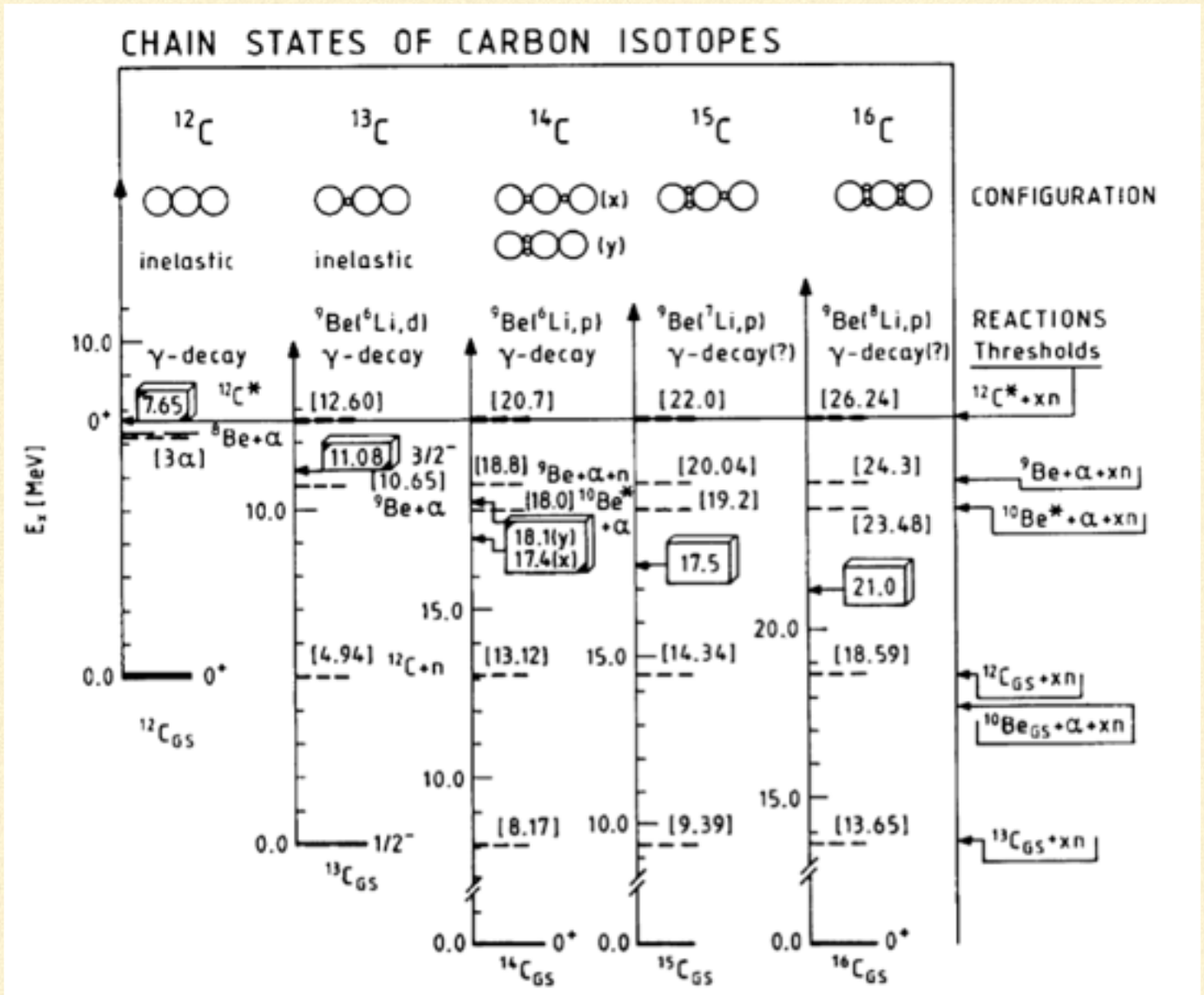
D. Suzuki et al., NIM A 660, 64 (2011)

PROTOTYPE AT-TPC



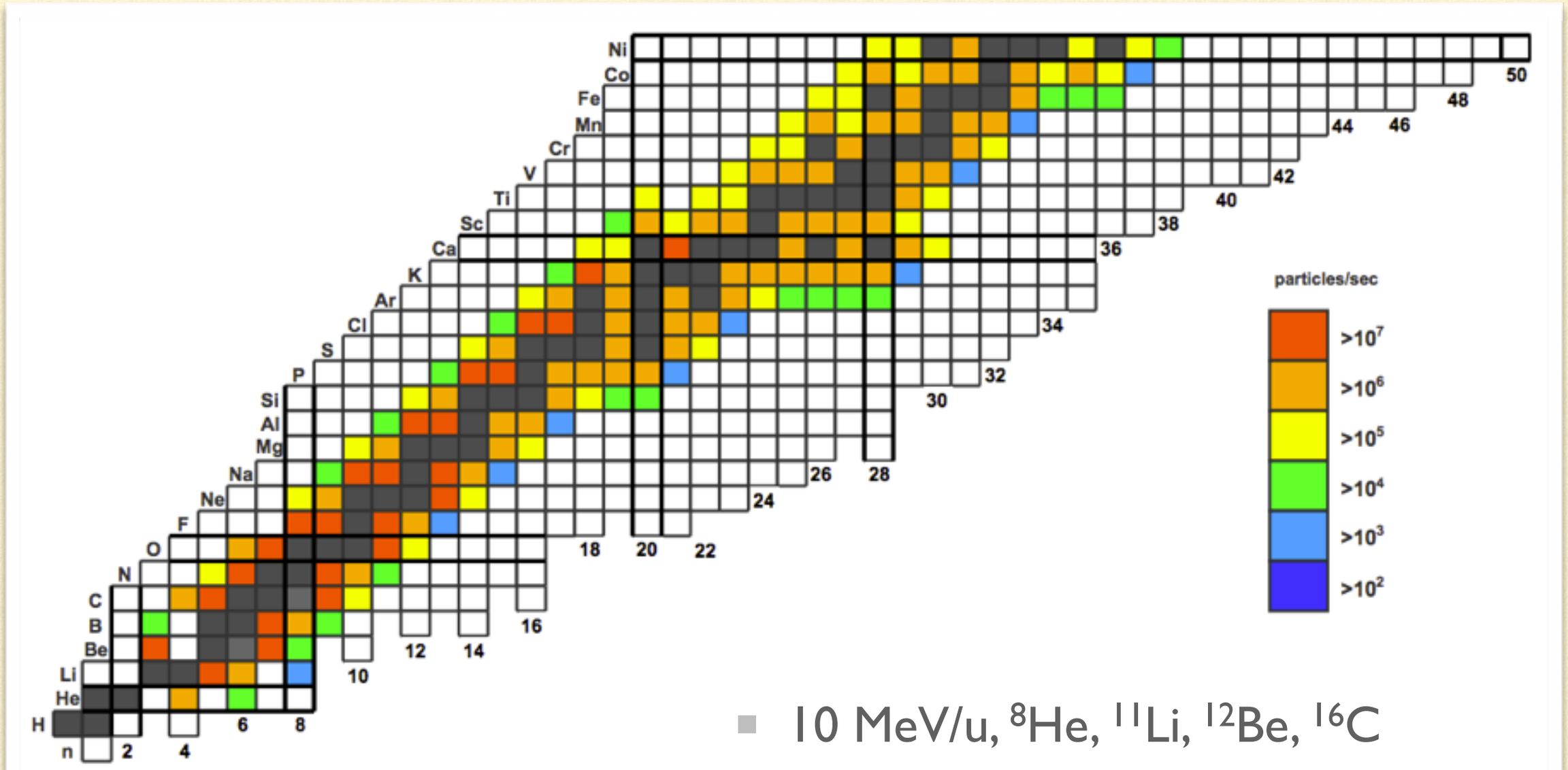
- Active-Target feature to deal with low beam rates
  - Uses position of reaction to measure excitation function
- Cross sections (energy, angle)

ALPHA-CLUSTERING IN LIGHT(ER) NUCLEI



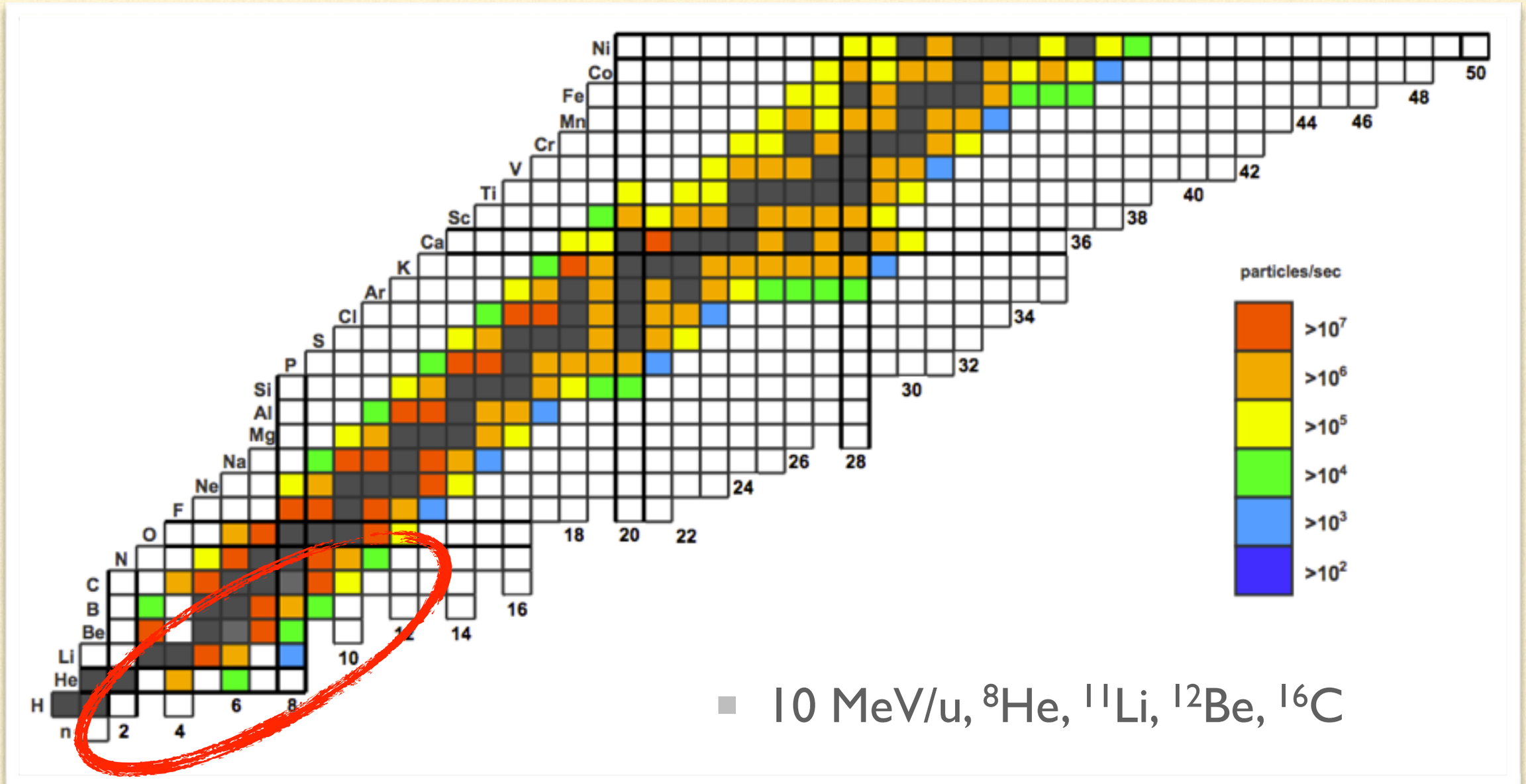
- Alpha-cluster structure of light
- Heavier Be and C isotopes
- Heavier Beams
  - Higher energies for unstable beams

AIRIS



- 10 MeV/u, ^{8}He, ^{11}Li, ^{12}Be, ^{16}C

AIRIS



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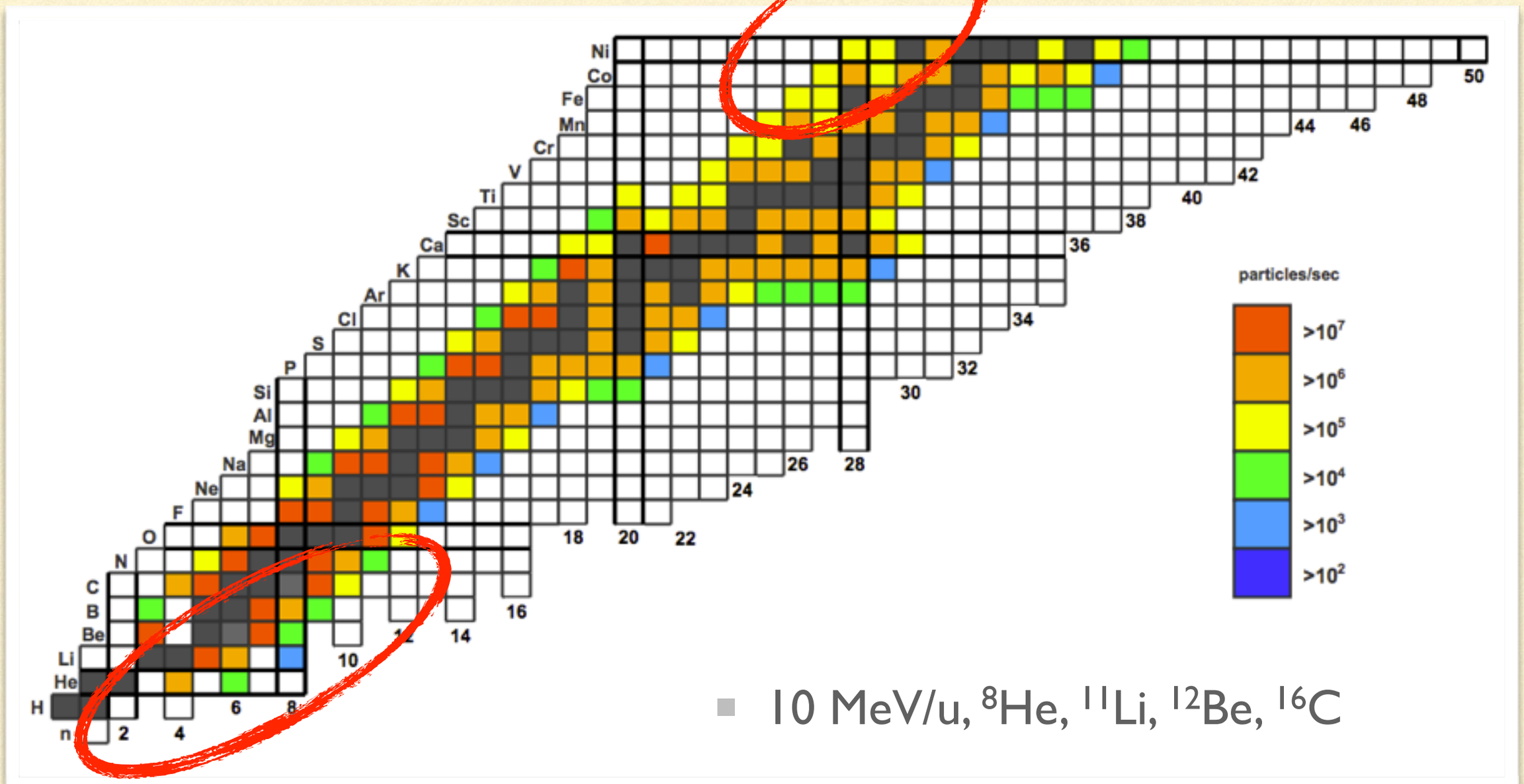

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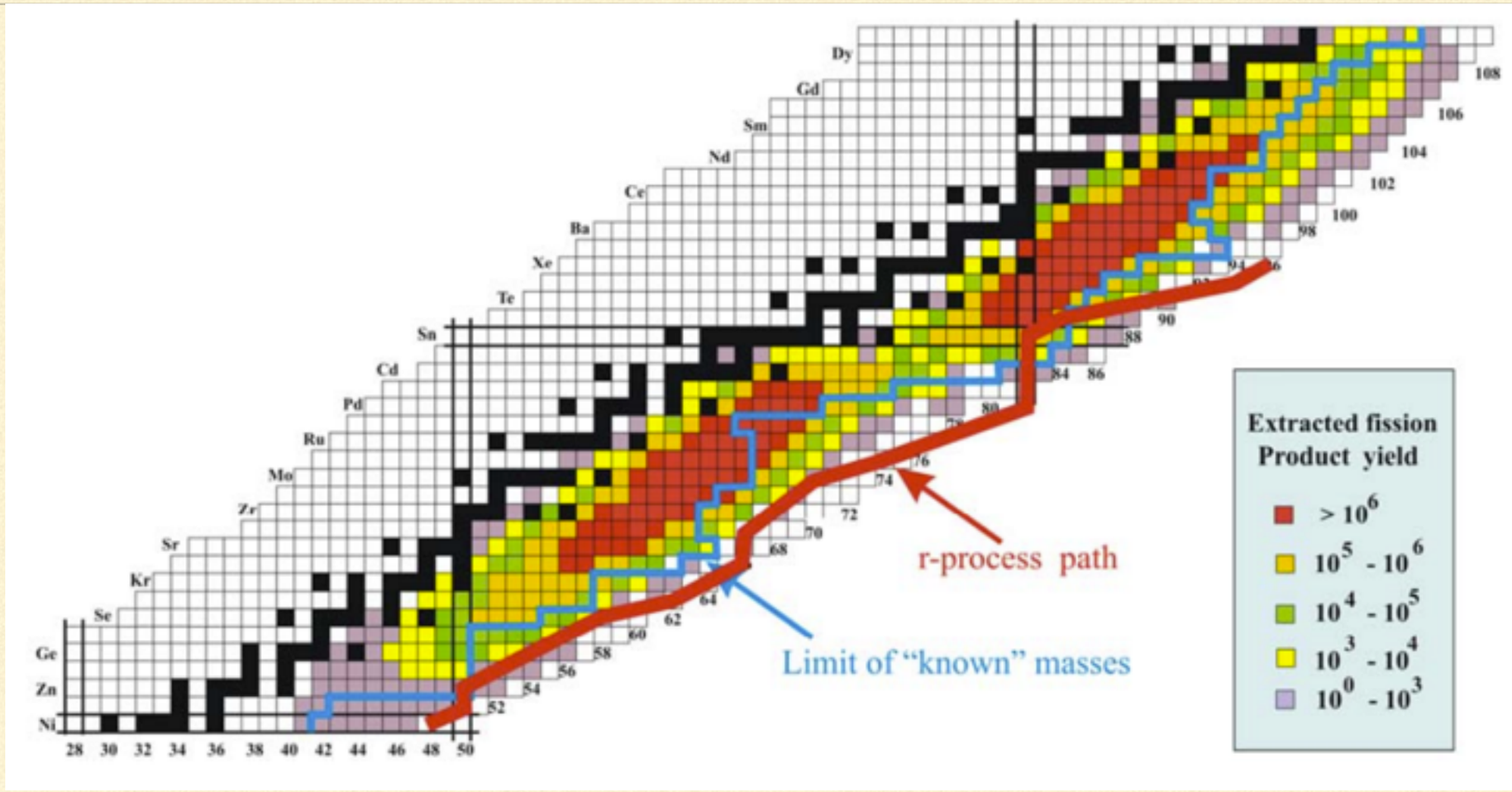
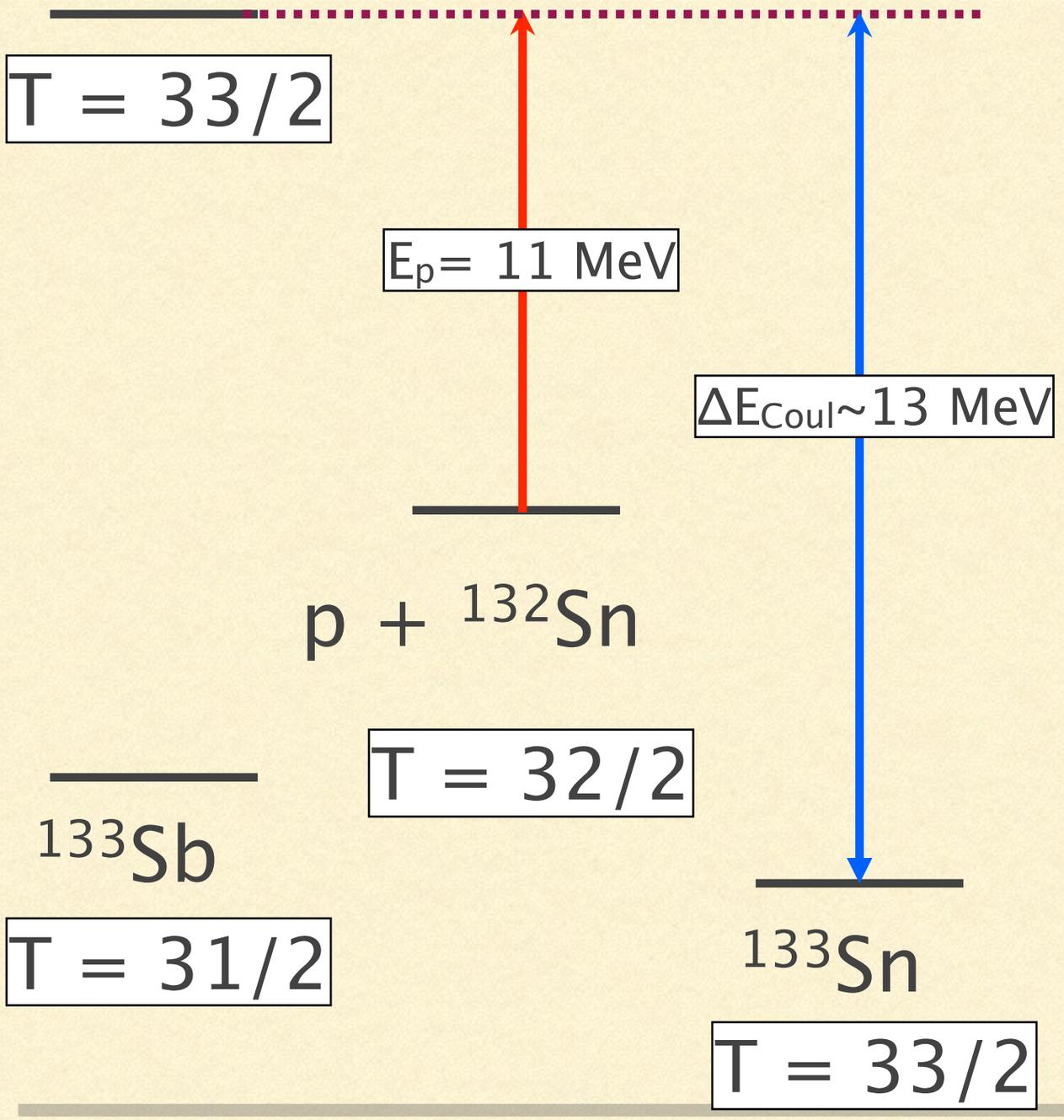
CARIBU: EVOLUTION OF SINGLE-PARTICLE STRUCTURE



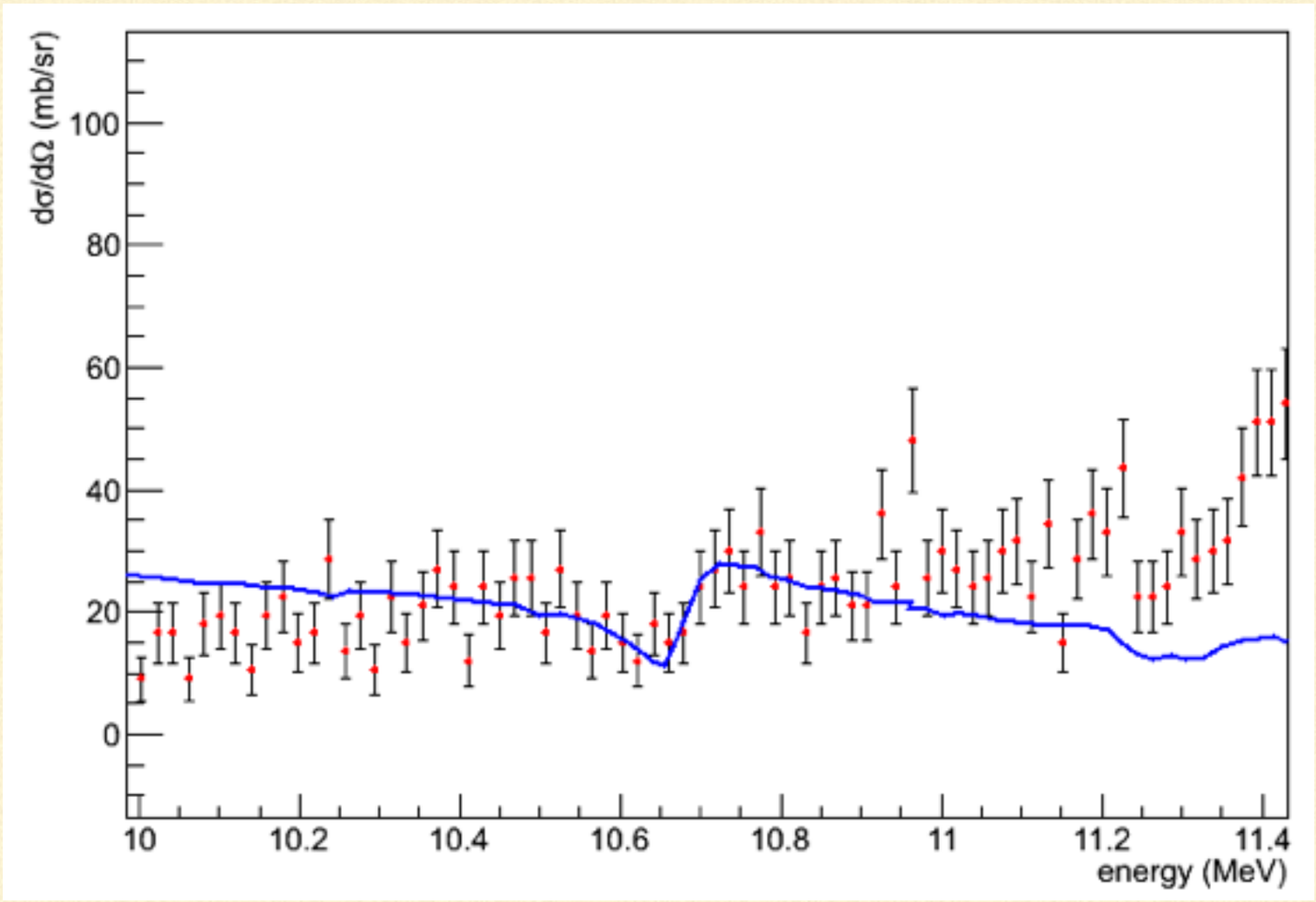
- Around ^{132}Sn, doubly magic
- Around A ~ 90: ^{93}Kr isotopes, open questions in evolution of structure, onset of collectivity
- Level density, 100 - 200 keV resolution

SINGLE-PARTICLE STRUCTURE TEST EXPERIMENT ^{124}SN(P, P)^{124}SN



- Isobaric analog resonances using proton elastic scattering
- ^{124}Sn(p,p)^{124}Sn test experiment
- ~12 MeV/u
- Isobutane (C_4H_{10}) at 70 Torr
- Running time (42 hours)

RESULTS



- Cross section at 120 deg COM
- 2560 pps in detector
- 4.46 x 10^6 events
- 75.4% live time

SUMMARY AND OUTLOOK

- Scientific Potential
  - AIRIS: Cluster structure of light nuclei
  - CARIBU: Evolution of single-particle structure
  - Prototype AT-TPC: 10^3 - 10^4 pps beam rates
- Clean beams: Isobar contamination
- Time structure of beam: Instantaneous beam rates (duty cycle >10%)