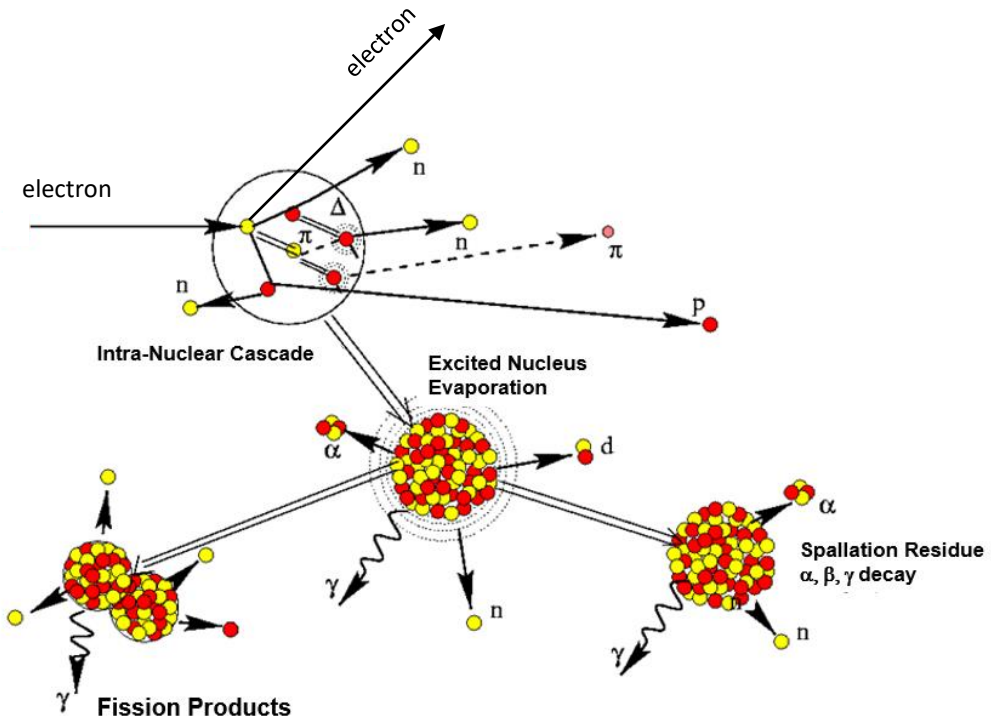
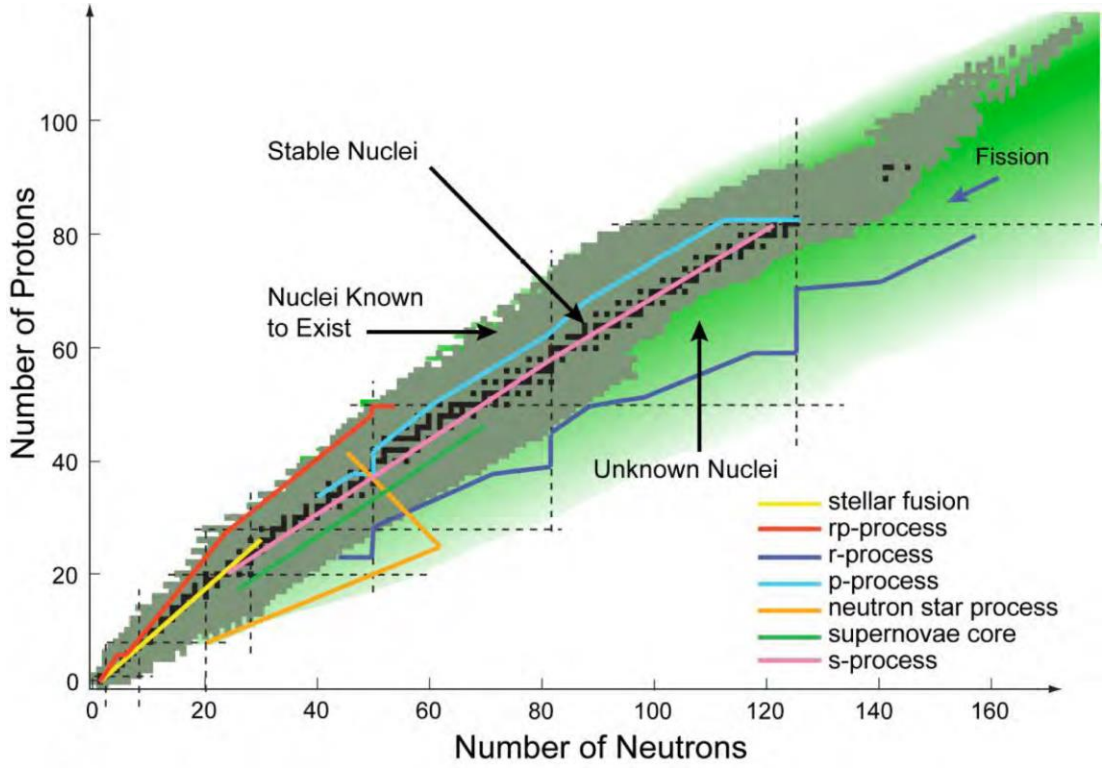
# Exotic Nuclei at the EIC

(Yellow Report section 7.5.6)

Barak Schmookler
Pawel Nadel-Turonski
Abhay Deshpande
Oleg Tarasov
Mark Baker
Ben Collis

# Production of Exotic Nuclei at the EIC




An example:
r-process is essential for understanding stellar nucleosynthesis. That, in turn, requires an understanding of the properties of the isotopes in its path.

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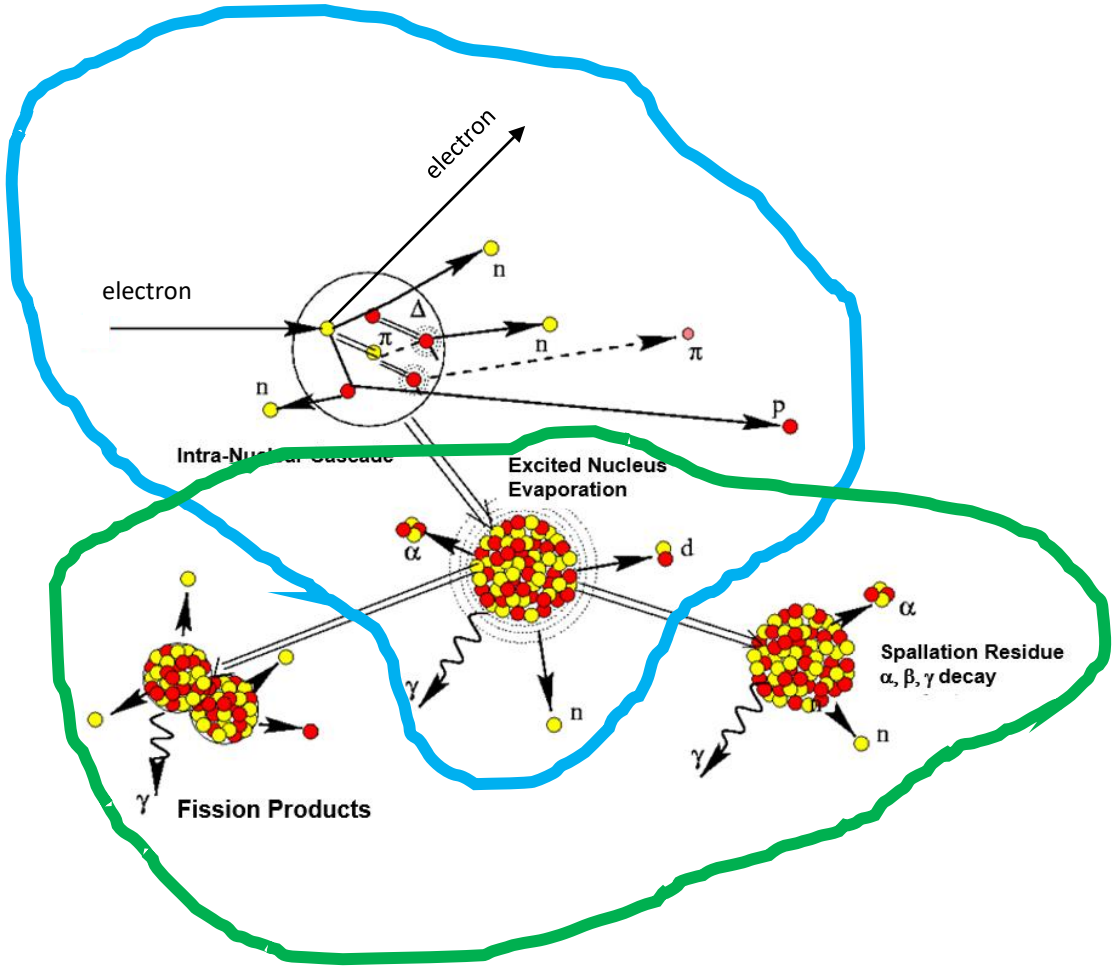


## Simulation outline

**Hard scattering and Inter-nuclear cascade performed using *BeAGLE*.**

**Evaporation or fission performed using either *FLUKA*, *LISE*$^{++}$, or *ABLA07*.**

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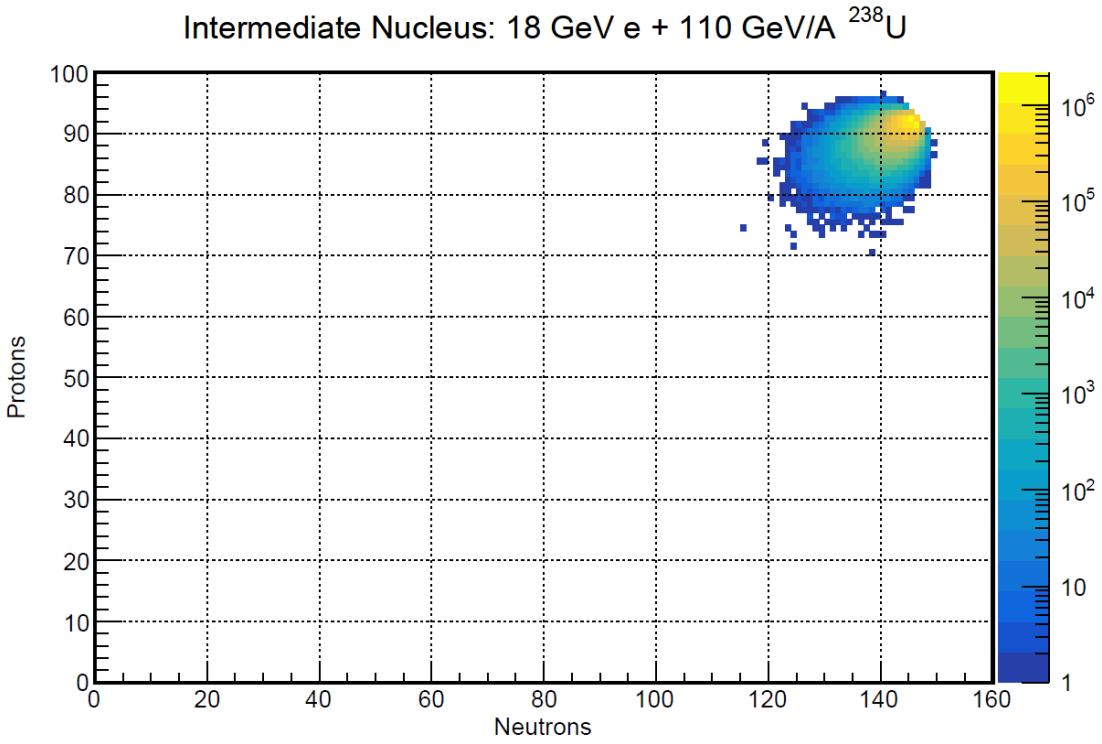
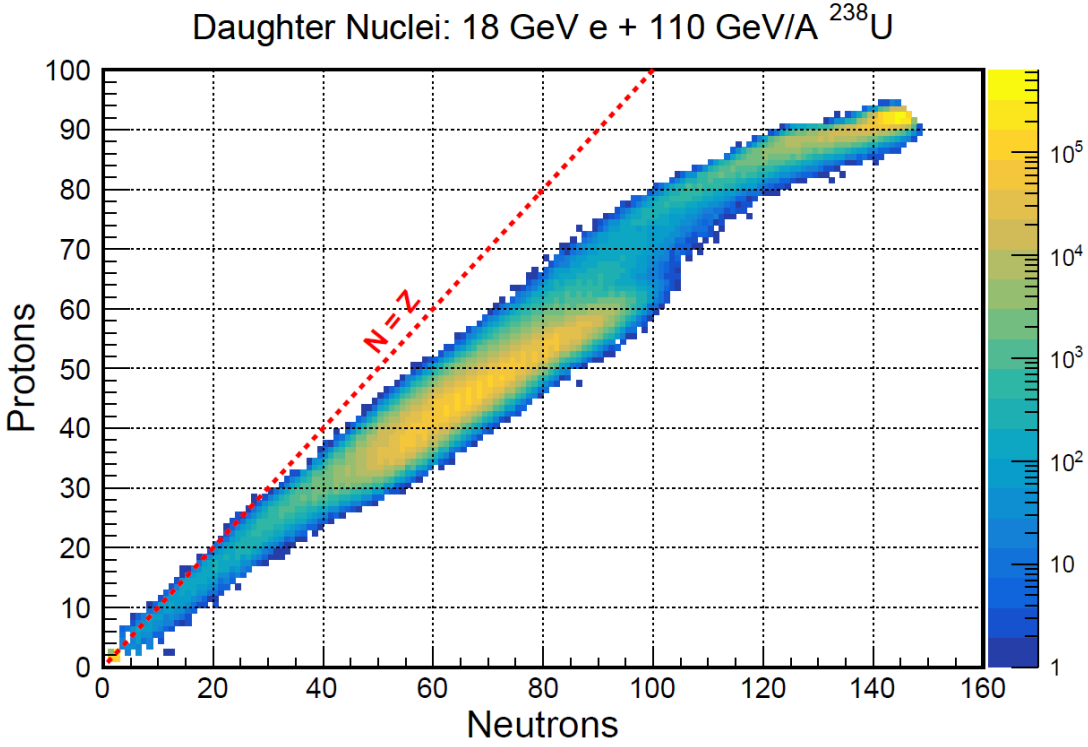



*FLUKA*



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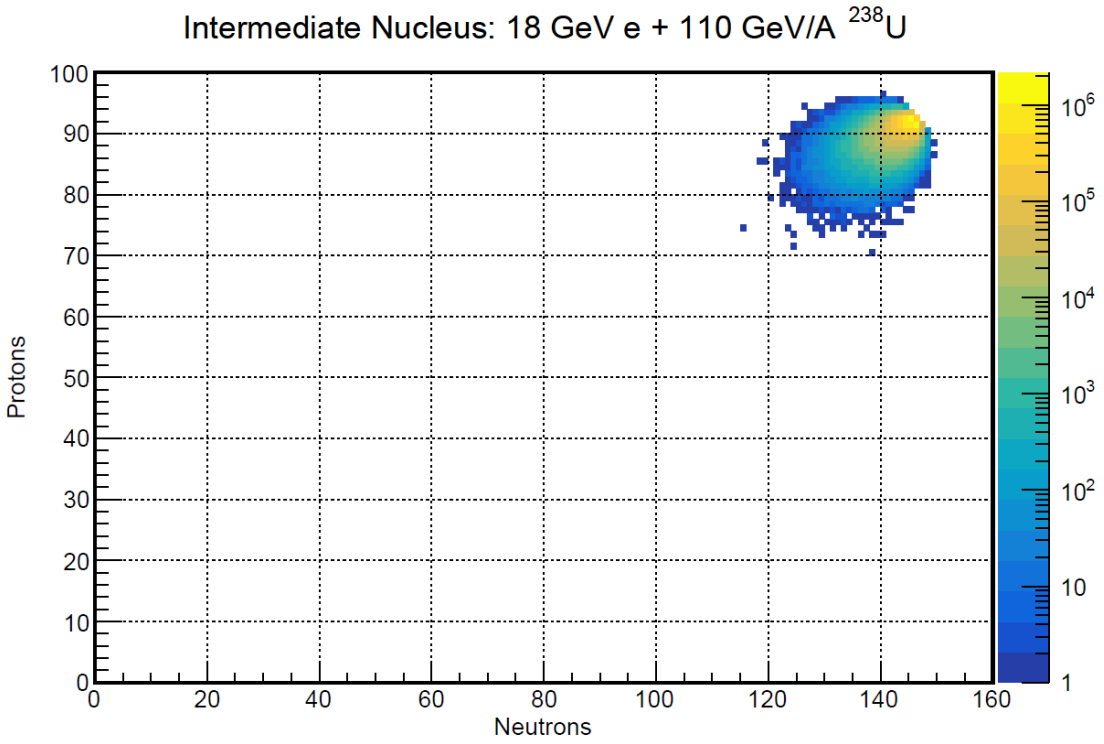
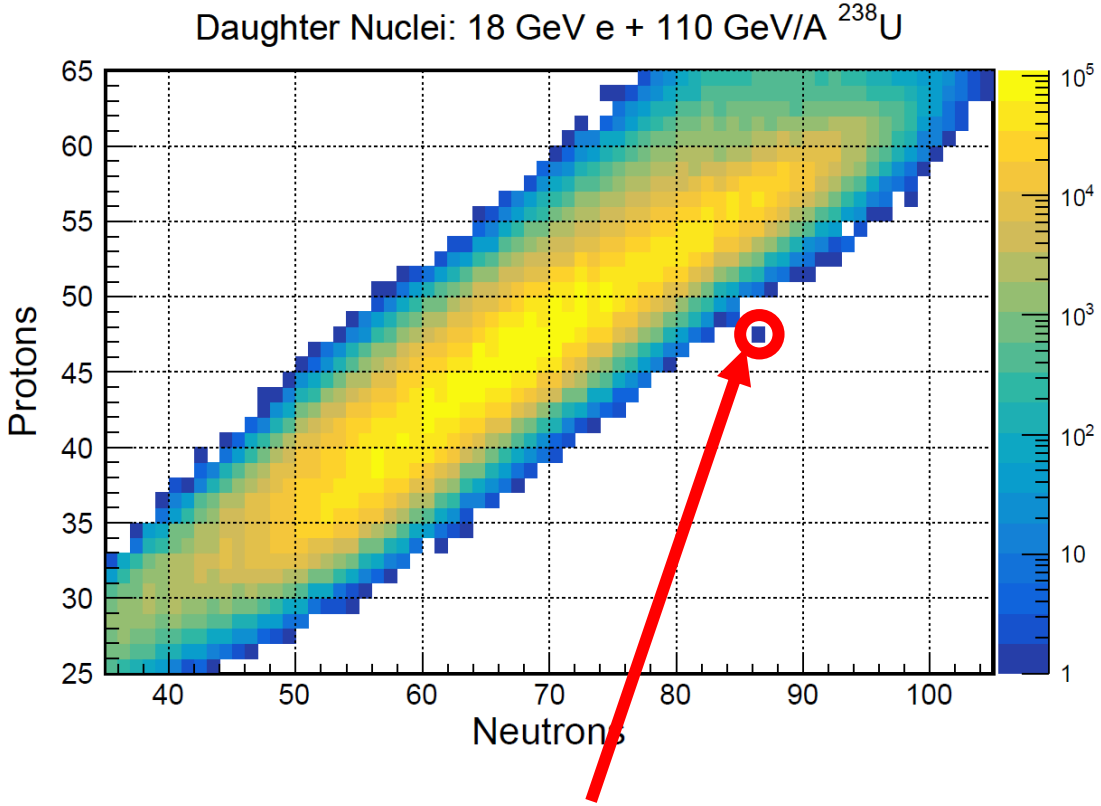



*FLUKA*

Zoom-in on fission region




According to *FLUKA*, the undiscovered isotope $^{137}$Ag can be produced with a few minutes of beam time.

# Detection of Exotic Nuclei at the EIC

- Isotopes will be boosted with a gamma factor of ~100, allowing for detection of particles with lifetimes on the order of 1 ns in the far-forward detectors located 30-50 m from the interaction point.
- The boost of decay photons into the forward direction allows for potential spectroscopic studies of the rare isotopes.
- The forward spectrometer measures the magnetic rigidity of the ion. In order to uniquely identify the isotope, a Cherenkov detector can be positioned behind the Roman pots.
- Detector of the isotopes with small differences in rigidity compared to the beam would greatly benefit from the excellent near-beam acceptance of IR2.
- A second focus on the Roman pots would be highly desirable.