Making a $^{64}$Cr Beam with the FRIB Fragment Separator

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Step 1

- We chose, arbitrarily, to make a $^{64}$Cr beam
- Our first info comes from https://groups.nscl.msu.edu/frib/rates/fribrates.html
  - Use an $^{82}$Se beam with 236.6 MeV/u
  - Expect about 1000 pps for year-1 conditions
- Then we set up a first setting
- We assume you have seen the program LISE++
  - lise.nscl.msu.edu/lise.html
Starting

The LISE™ code (v 9.2.60) has been used to estimate fragment transmission.

- The rates are estimated based on the EPAX 2 1⁸⁷² cross section parameterization for fragmentation and the LISE++ SEEER mode R for in-flight fission.
- Reaccelerated and stopped beam rates above 10⁻⁸ are very uncertain. The use of solid catchers may yield higher rates in some cases. This option is not included.
- Year one assumes 10kW and a limited set of primary beams. Year two is 50kW with additional primary beams added.
- Estimated rates may change as the various assumptions are tested and refined.

For further information regarding these calculations, please refer to the readme file (PDF - 420 KB).
Step 2 – Calculate Purity
Step 3 – Improve Purity
Step 4 – Improve Purity Further
Resulting Purity
Smaller Momentum Acceptance
Result With Smaller Acceptance
Made 64Cr from 82Se primary beam (10 kW)

- Single wedge → about 1100 pps, purity a few percent
- Two wedges → about 900 pps, purity about 50%
- Two wedges with tweaking slits → about 700 pps, purity about 80%

Alternative setting with narrow momentum acceptance
  - 1% acceptance (after target) → about 0.4% width after compression
  - Rate about 180 pps, purity about 98%

These settings could serve different types of experiments

There are a few other factors that could come into play. Your FRIB beam physicist will look into these on a case-by-case basis and optimize the setting to optimally support your experiment