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

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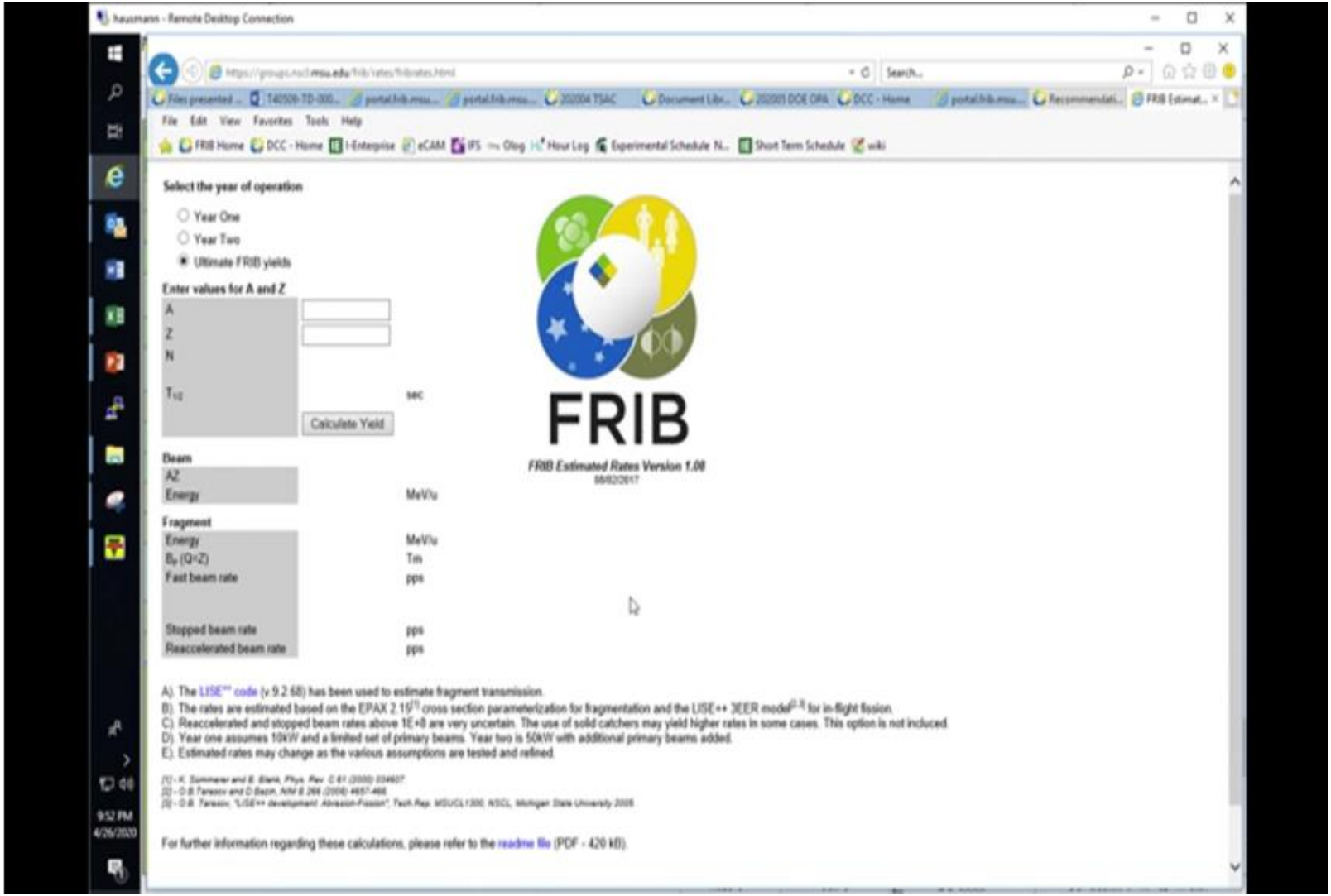
Step 1

- 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


hausmann - Remote Desktop Connection
File Edit View Favorites Tools Help
Select the year of operation
Year One
Year Two
Ultimate FRIB yields
Enter values for A and Z
A
Z
N
T1/2
Calculate Yield
Beam
AZ
Energy
MeV/u
Fragment
Energy
MeV/u
Bρ (Q=Z)
Tm
Fast beam rate
pps
Stopped beam rate
pps
Reaccelerated beam rate
pps
FRIB
FRIB Estimated Rates Version 1.00
A). The LISE++ code (v 9.2.68) has been used to estimate fragment transmission.
B). The rates are estimated based on the EPAX 2.15[1] cross section parameterization for fragmentation and the LISE++ JEER model[2,3] for in-flight fission.
C). Reaccelerated and stopped beam rates above 1E+8 are very uncertain. The use of solid catchers may yield higher rates in some cases. This option is not incluced.
D). Year one assumes 10kW and a limited set of primary beams. Year two is 50kW with additional primary beams added.
E). 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).
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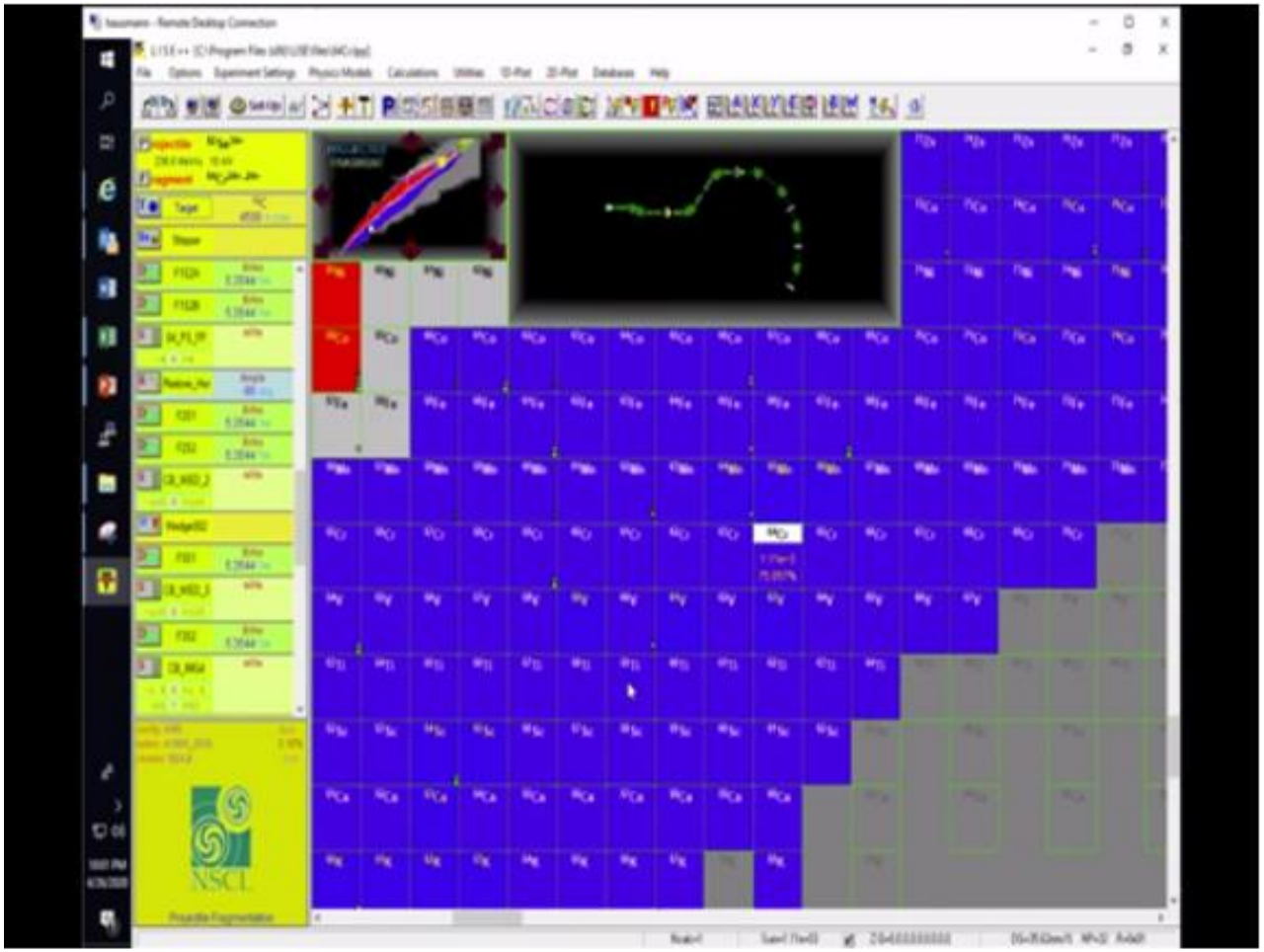
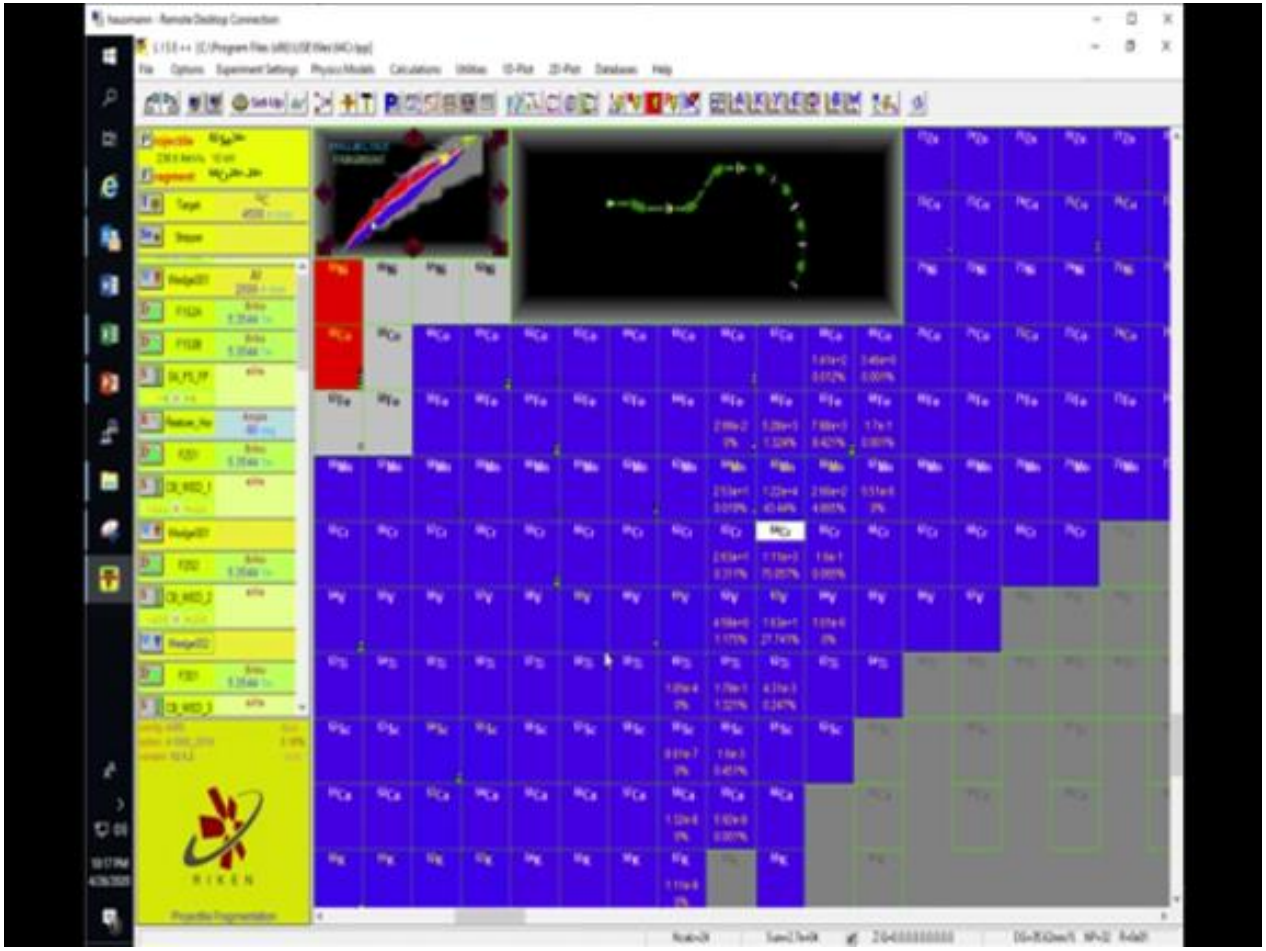
4/26/2020

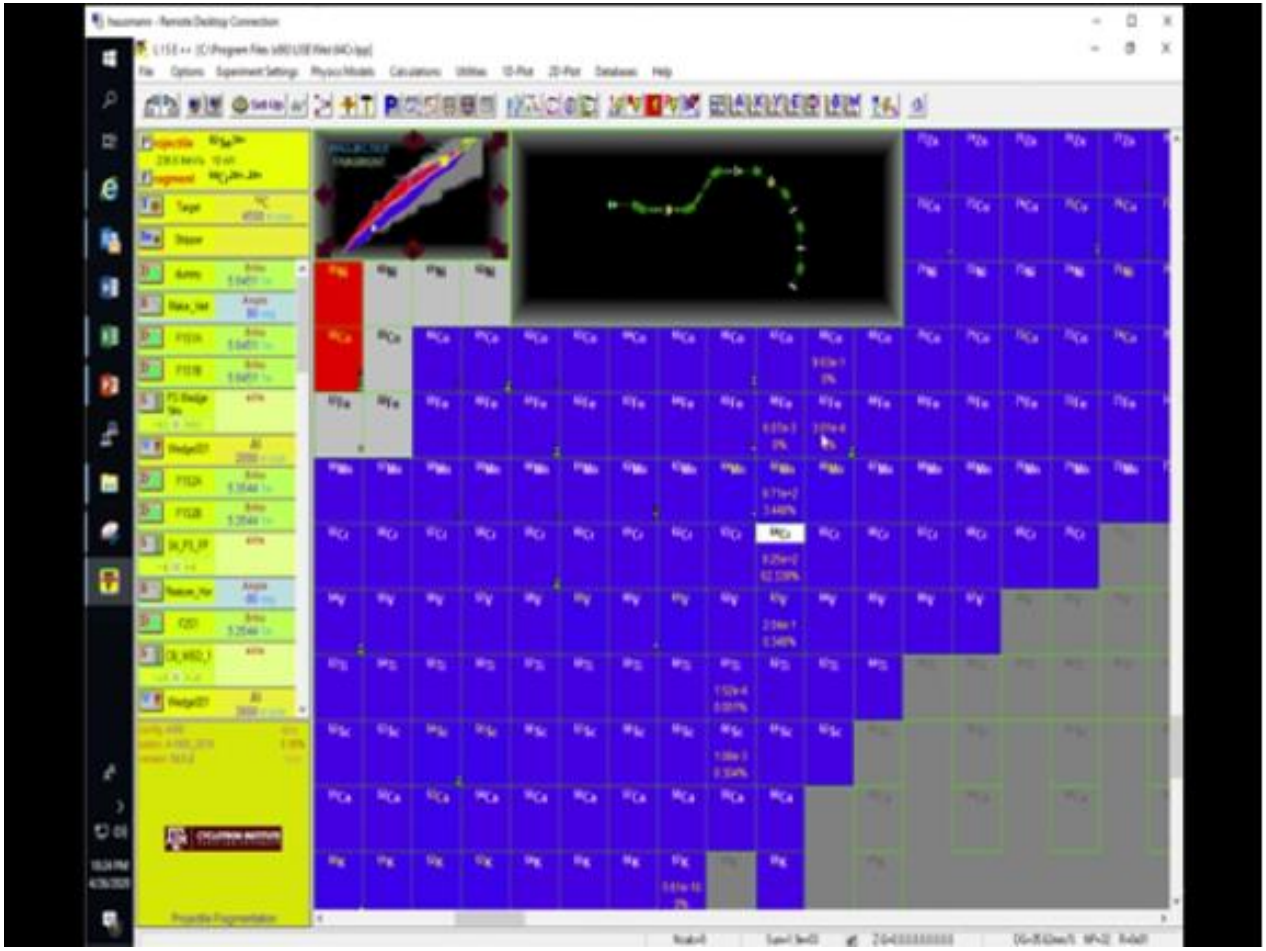
Step 2 – Calculate Purity



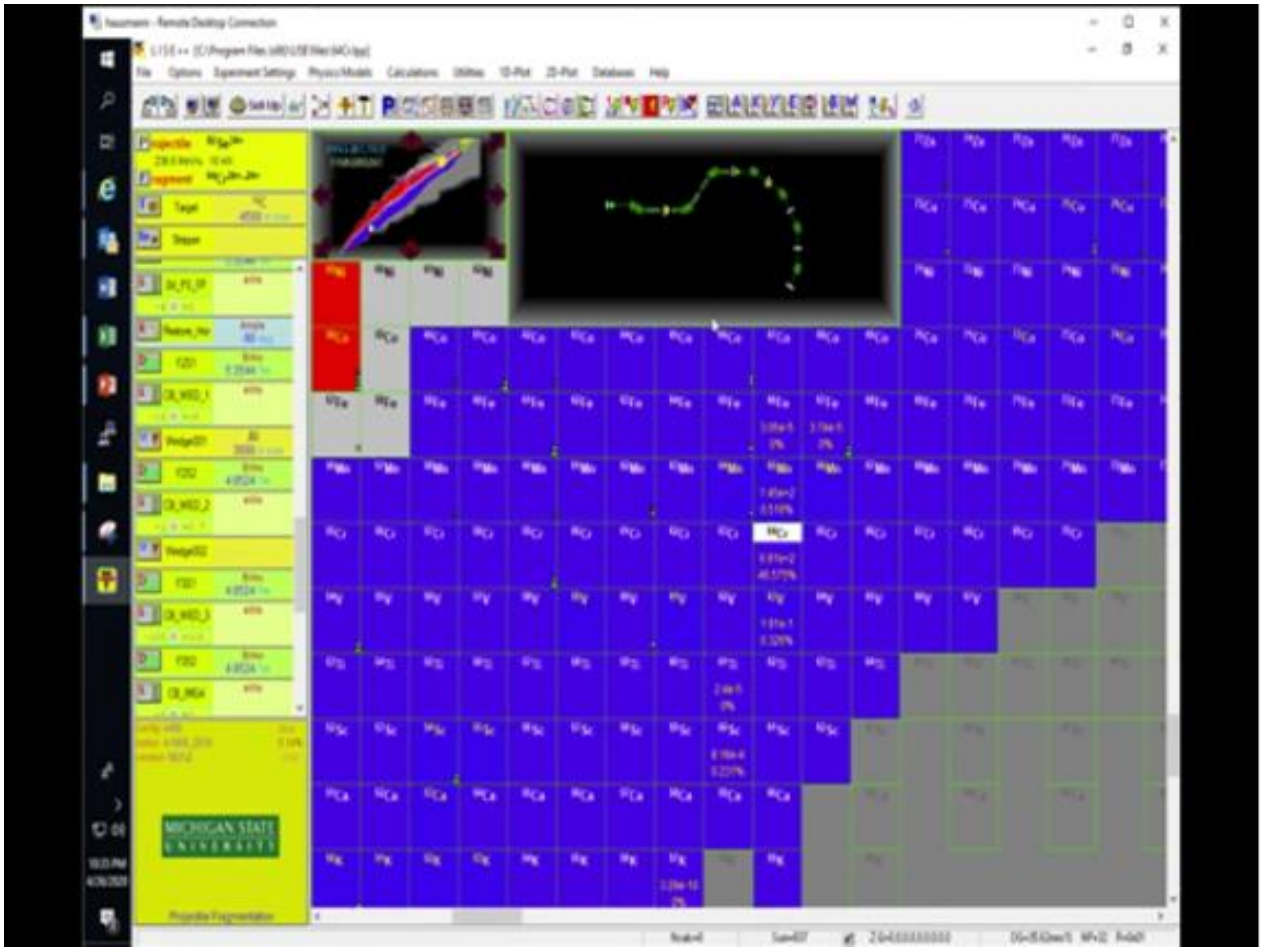
Step 3 – Improve Purity



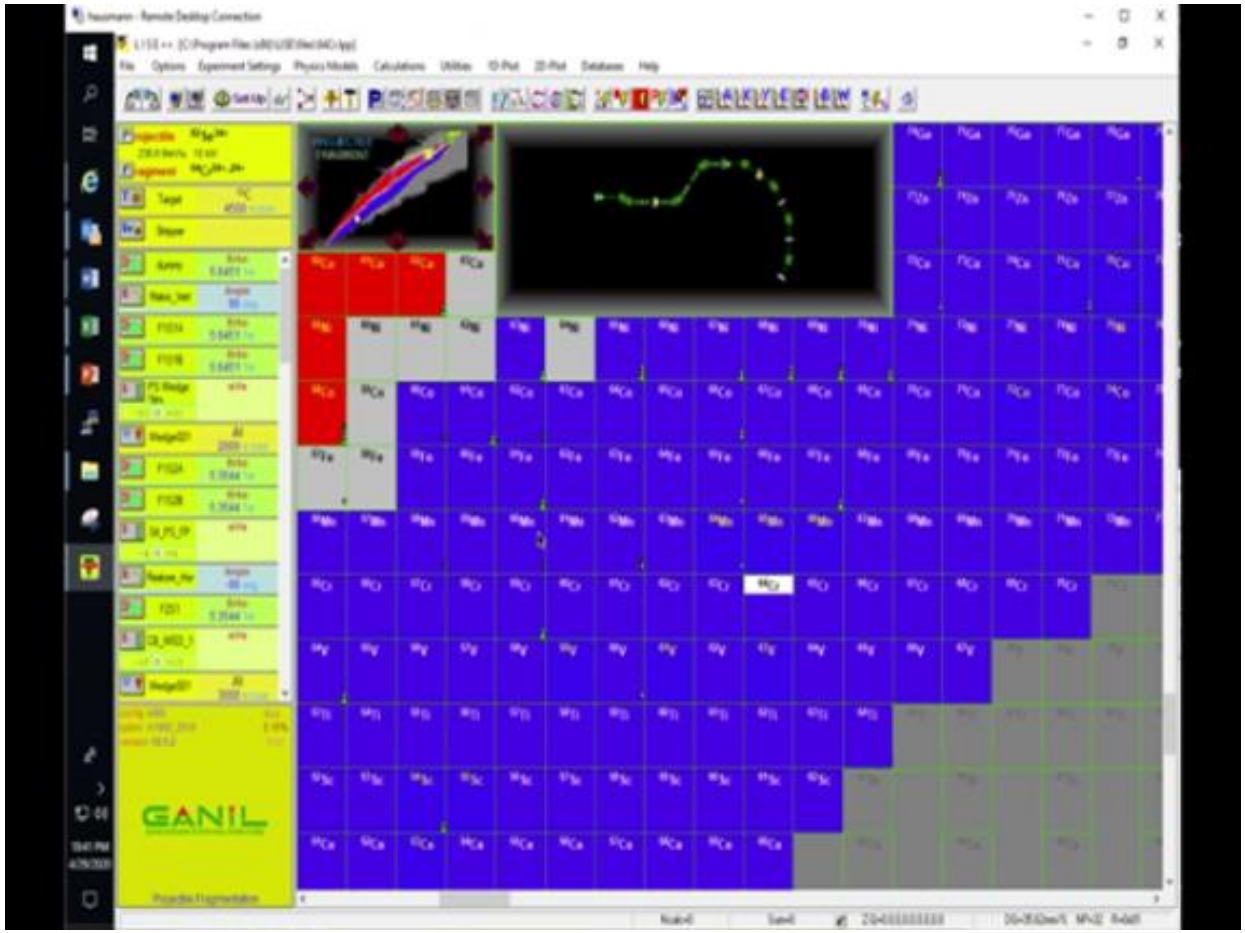
Step 4 – Improve Purity Further



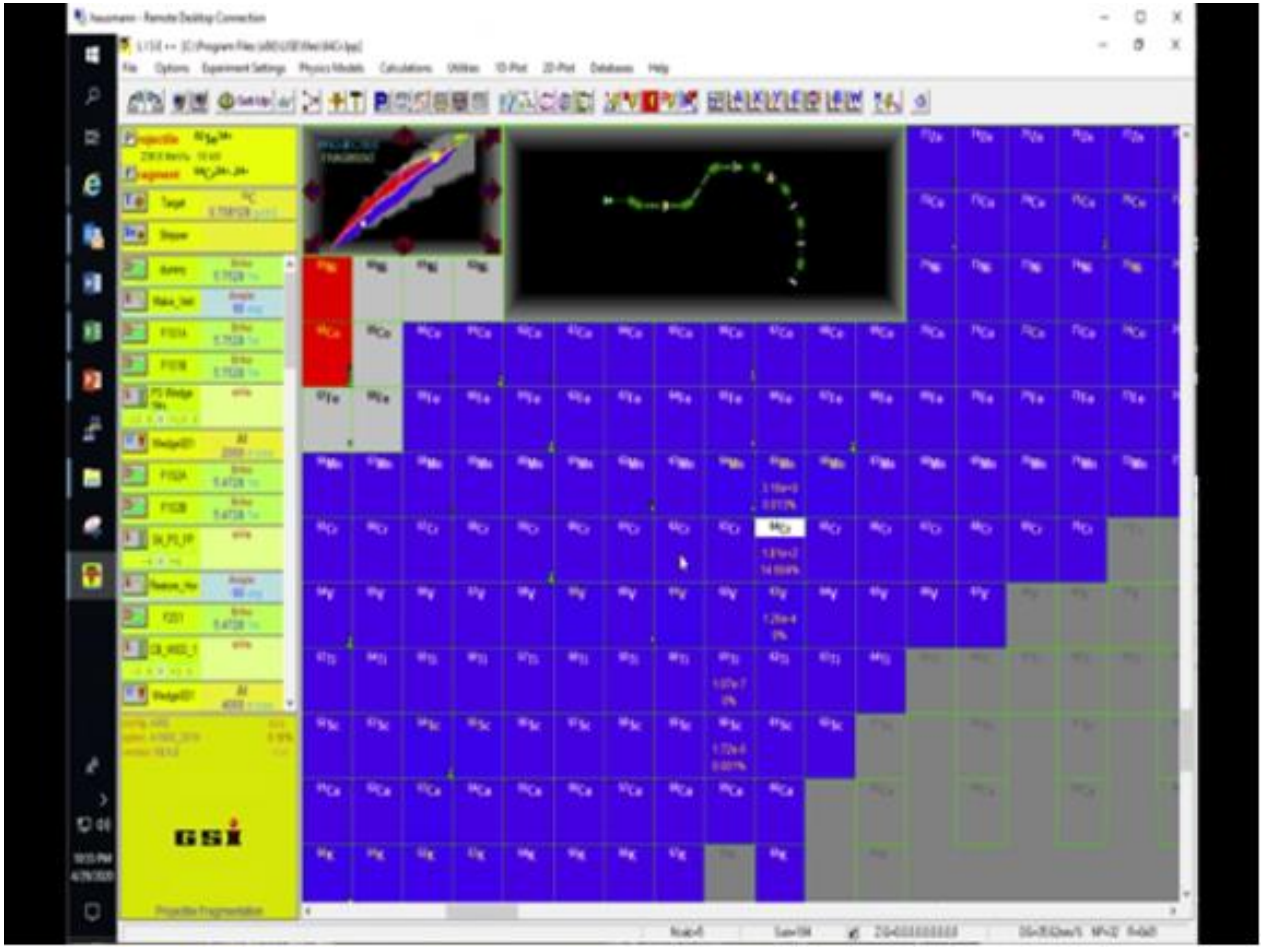
Resulting Purity



Smaller Momentum Acceptance



Result With Smaller Acceptance



Summary

- 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