

EVAPORATOR SETUP

- Klaus Dehmelt
- eRD6 Meeting
- November 30, 2020



Stony Brook University

The State University of New York

ION BEAM ASSISTED E-BEAM EVAPORATION

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- **Evaporator**
 - Vacuum generator
 - ✦ Roughing pump (scroll pump)
 - ✦ Molecular turbo pump
 - ✦ Cryogenic vacuum pump
 - Electron Gun → thin film evaporation
 - Ion beam → ion implantation

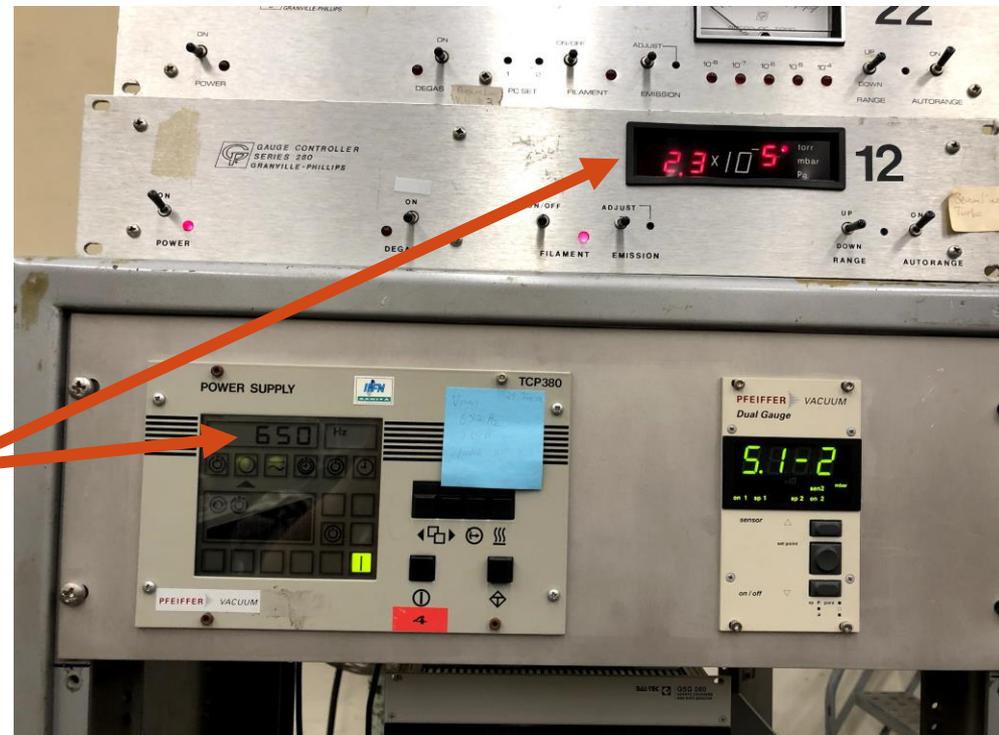


VACUUM GENERATOR

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- Vacuum generator
 - Fighting against large number of leak sources
 - Finally eliminated all minor and one dominant source

Turbo pump went to full speed
Generated few 10^{-5} Torr (few 10^{-5} mbar) and falling \rightarrow outgassing



VACUUM GENERATOR

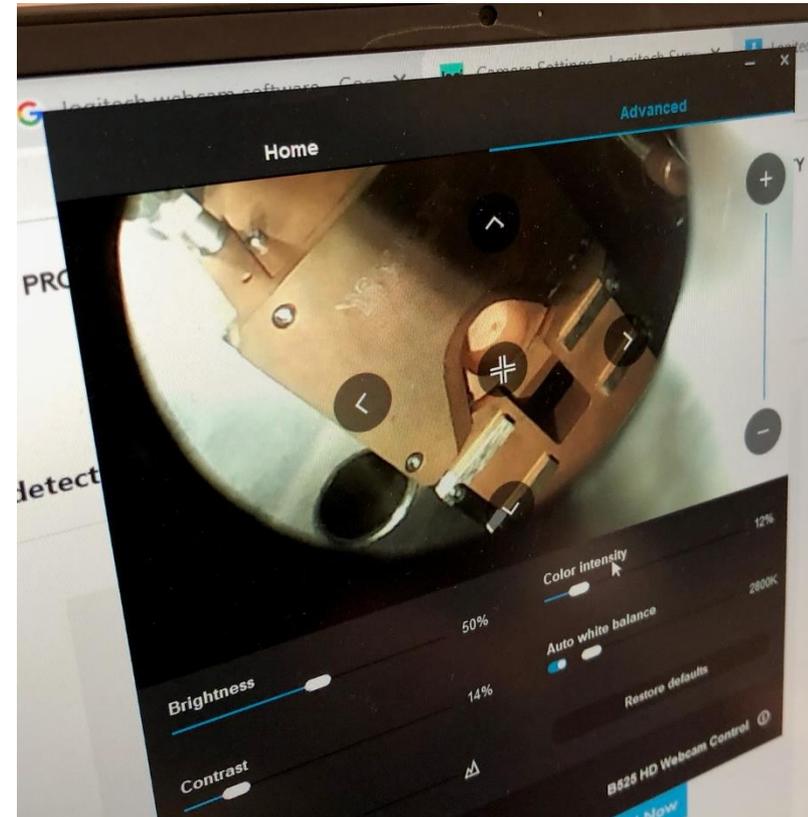
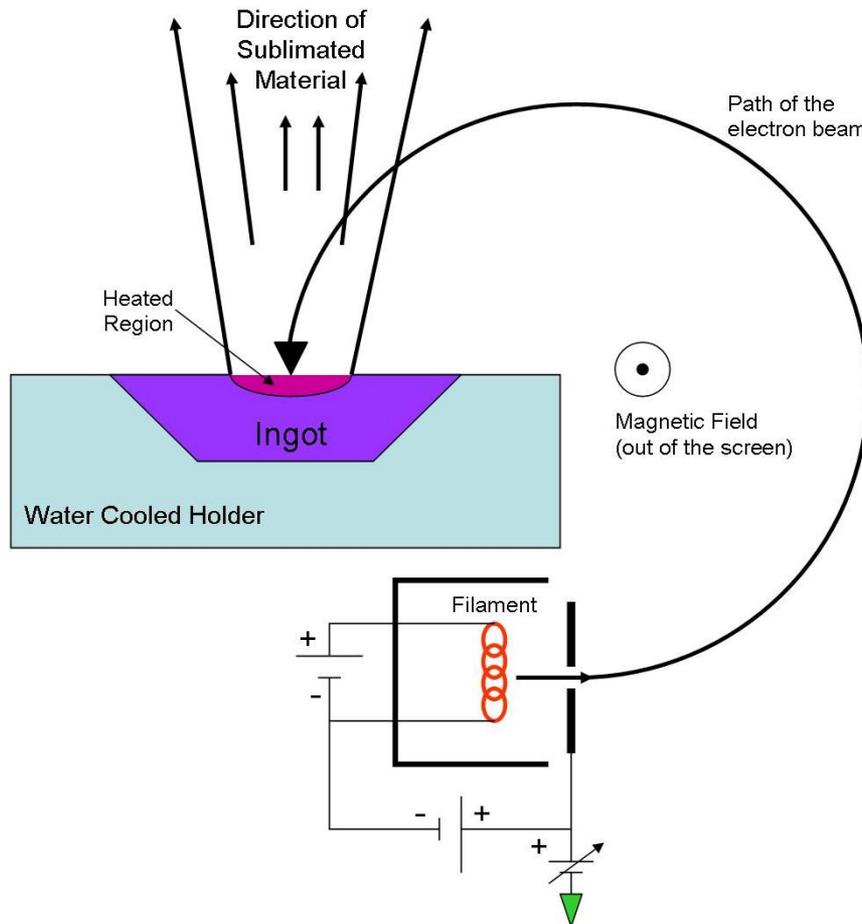
4

- **University-wide power cut!**
 - Destroyed vacuum gauge controller
 - Fortunately found an old analog controller
 - Cryo-pump running
 - Vacuum $\sim 5 \times 10^{-7}$ Torr and falling

PHYSICAL VAPOR DEPOSITION

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- Preparing for e-beam evaporation



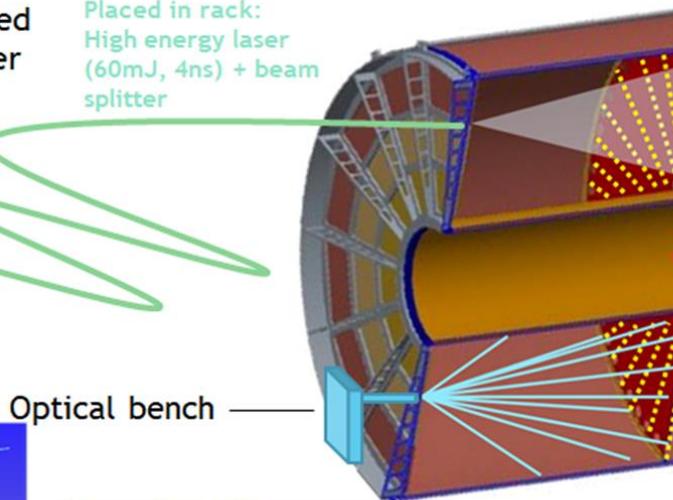
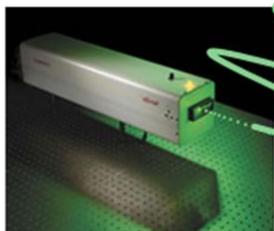
PHYSICAL VAPOR DEPOSITION

6

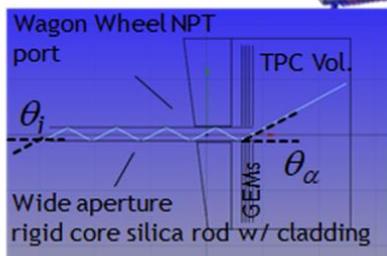
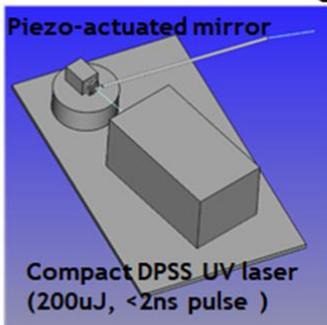
- First project for e-beam evaporation

- 266nm light coupled to fused silica fiber with large N.A.

Placed in rack:
High energy laser
(60mJ, 4ns) + beam
splitter

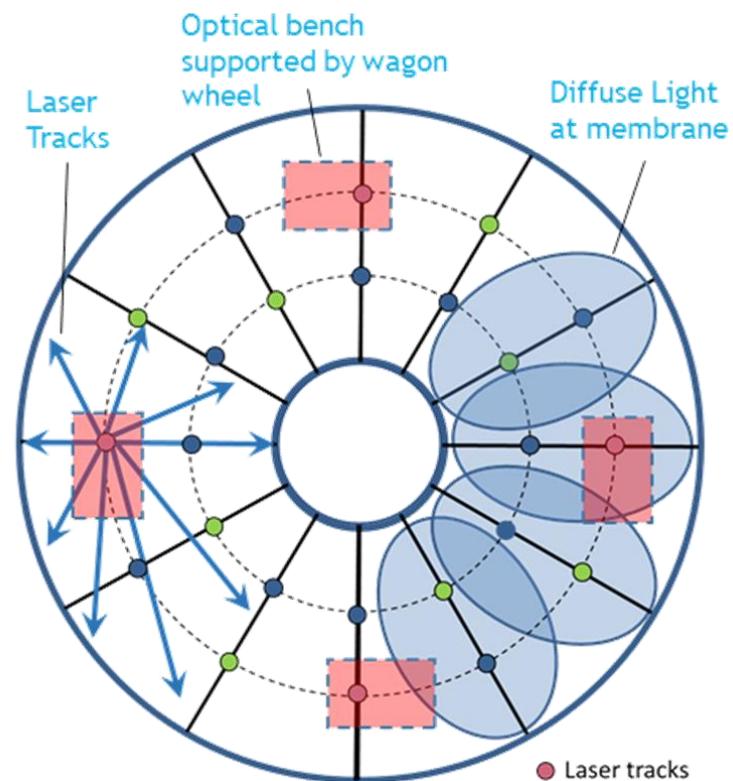


Optical bench



Layout of TPC End Plates entrance ports

- Two rings of 12 ¼" NPT Feedthrough's



- Laser tracks
- Diffuse laser light
- Gas/Services

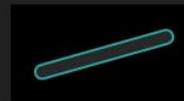
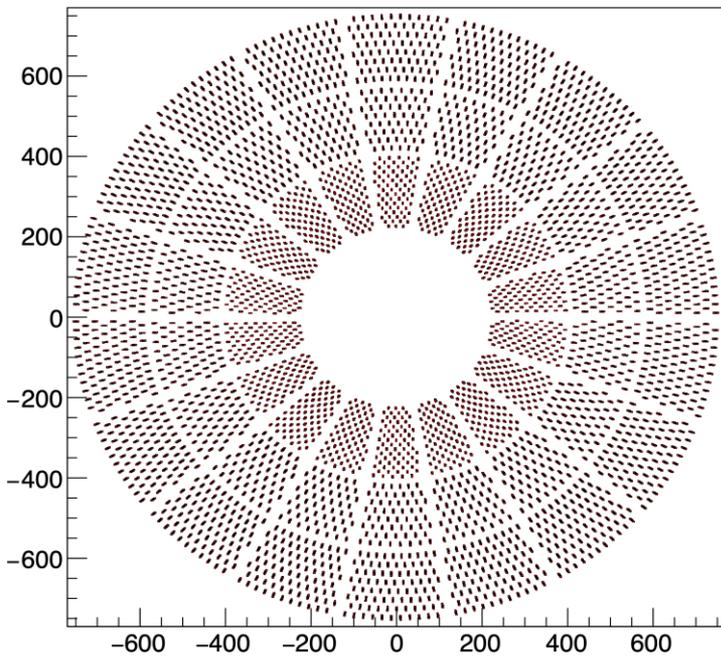
- Rigid "light pipe" delivers laser beam at controlled angles (w/ large N.A.) into TPC volume
- Micro-actuated mirror allows a single laser beam to sweep an entire quadrant of the TPC volume

PHYSICAL VAPOR DEPOSITION

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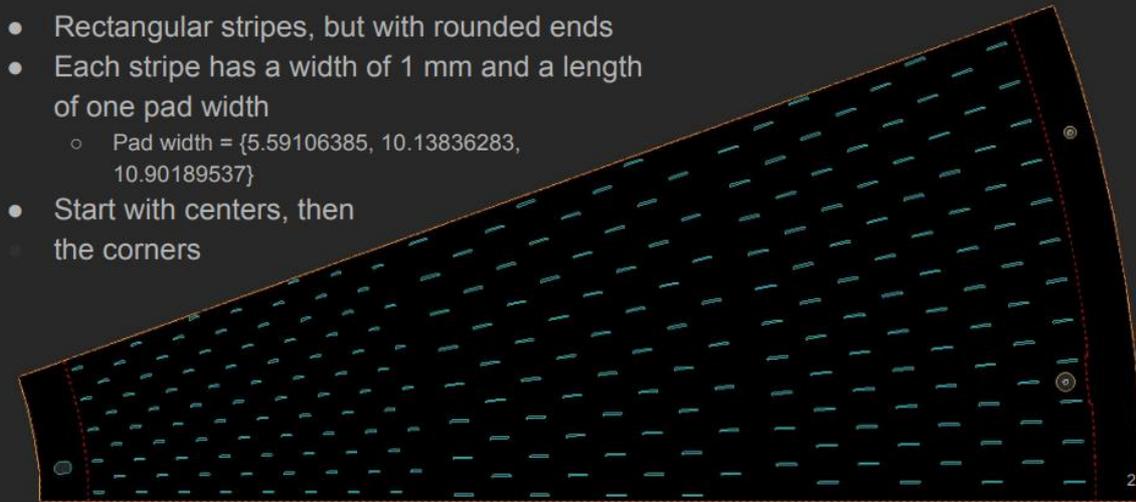
- First project for e-beam evaporation

Pattern1



The Stripe Pattern

- Rectangular stripes, but with rounded ends
- Each stripe has a width of 1 mm and a length of one pad width
 - Pad width = {5.59106385, 10.13836283, 10.90189537}
- Start with centers, then the corners



PHYSICAL VAPOR DEPOSITION

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- First project for e-beam evaporation

equal ϕ = equal time.

equal radius = equal note.

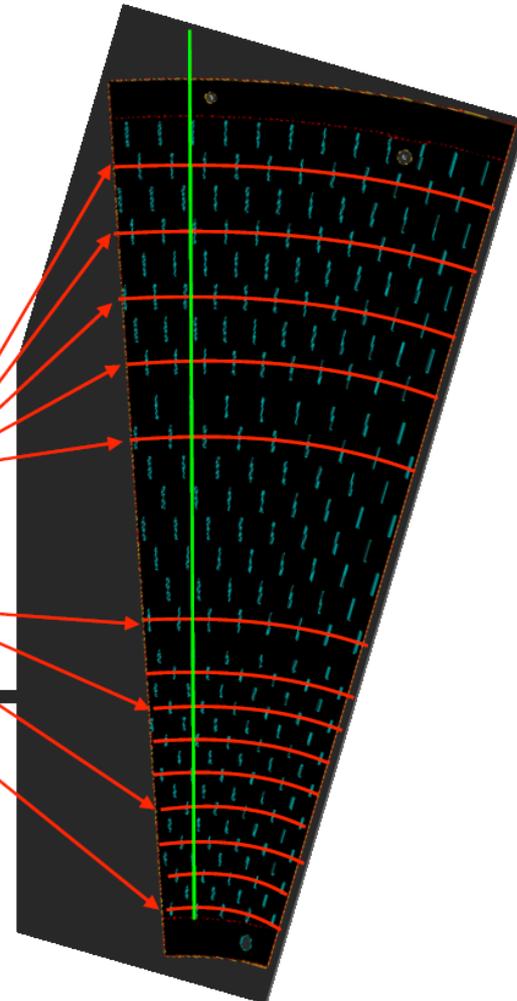
Indicate played notes by making pads wider by small amount in each beat where the note is present.
(possibly use also the adjacent radius in one direction?)

1st Track

2nd Track

4

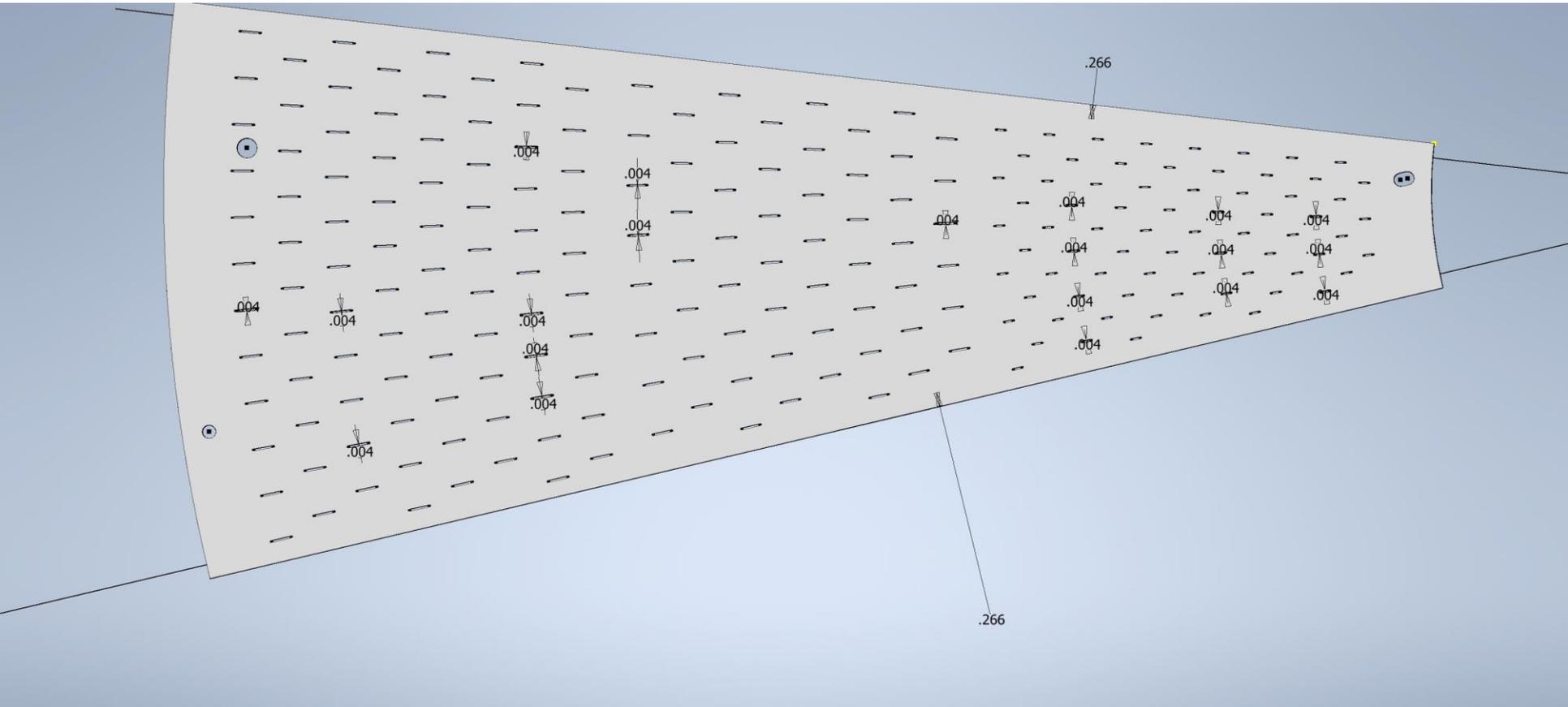
The image shows a musical score with four staves. The first two staves are labeled '1st Track' and '2nd Track'. The first staff has a tempo marking of $\text{♩} = 74$. The score consists of four staves of music in 4/4 time, with various notes and rests. Red arrows point from specific notes in the first two staves to a diagram on the right.



PHYSICAL VAPOR DEPOSITION

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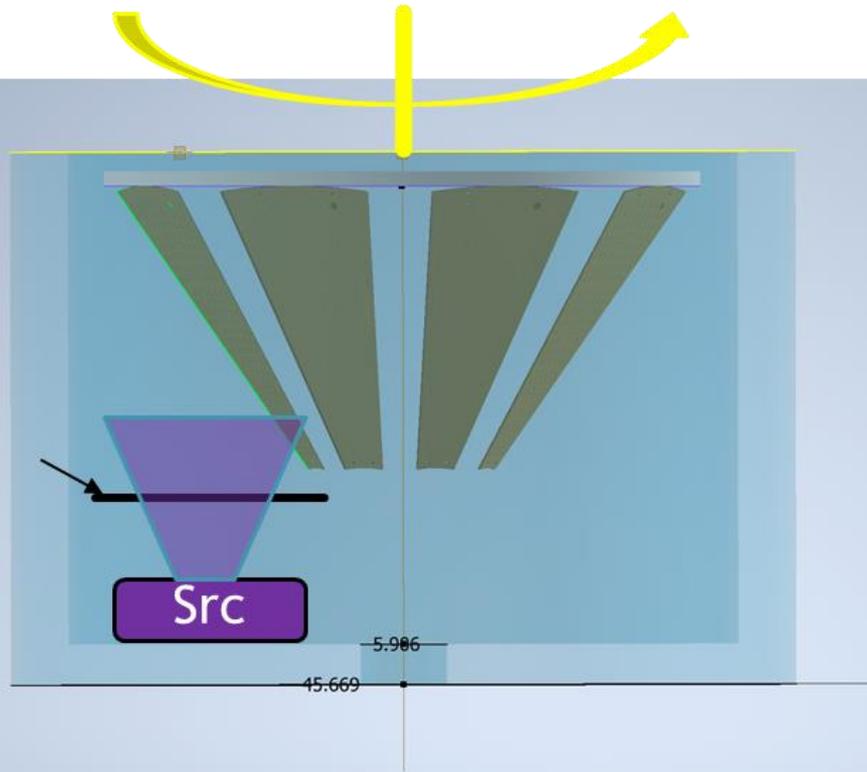
- First project for e-beam evaporation



PHYSICAL VAPOR DEPOSITION

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- First project for e-beam evaporation



- ▶ Uses the Csl evaporator (from HBD days)
 - ▶ Upgraded for e-beam source.
 - ▶ Cr followed by Al
- ▶ Multiple panels in one step.
- ▶ “Mask” asserts pattern of Al stripes.



OUTLOOK

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- Get familiar with IBA-PVD procedure
- Main purpose of PVD device
 - Coating of di-electric mirrors for RICH-mirrors Al/MgF₂ → VUV
- Project flexibility
 - As indicated above: Cr/Al coating for laser calibration
 - Variety of coatings → DLC?