



Progress this week on the Plume

Adam Watts

External Beamlines Department

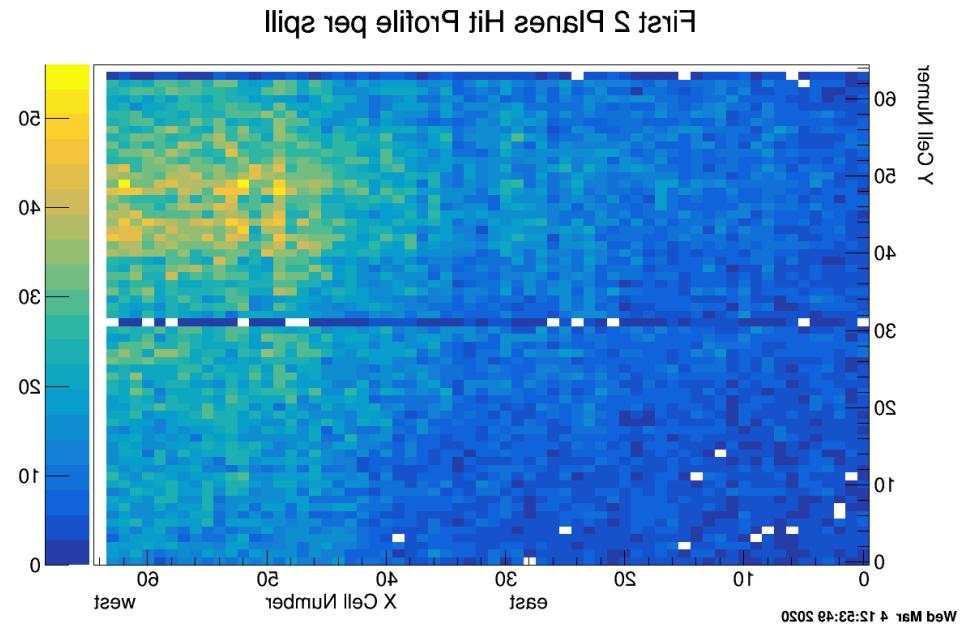
NOvA Test Beam Halo Meeting

3/11/2020

Progress this week

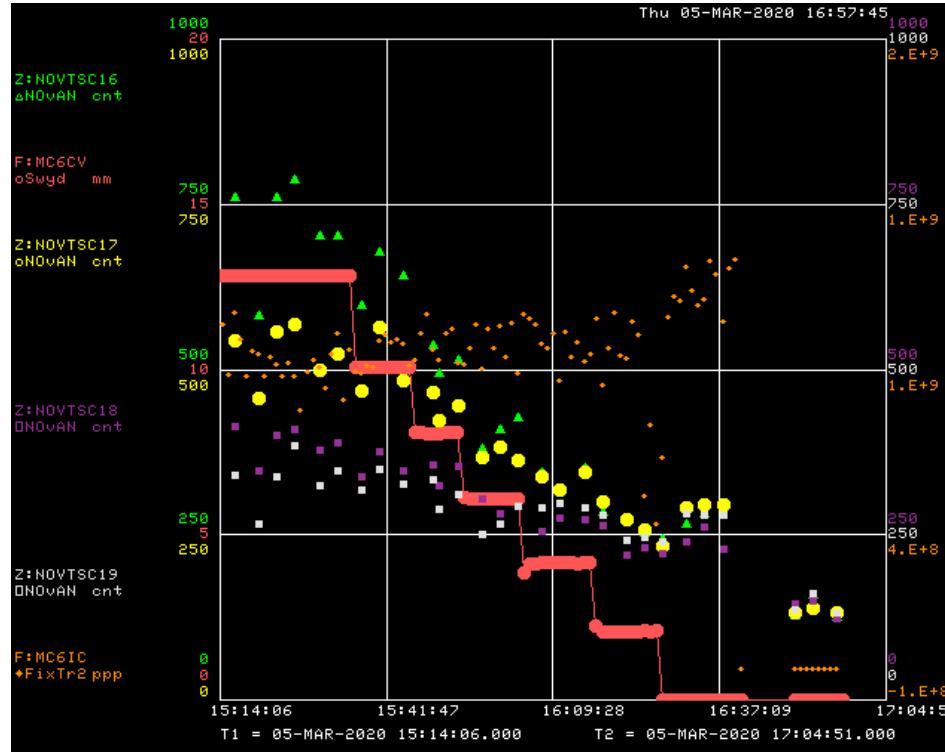
- Collimator scan at 1E9 ppp using scintillators on NOvA detector to show that halo dissipates continuously, may have found more optimal gap setting.
- Verified that halo appears gone with MC6D in negative polarity, all other magnets off.
- Ran at negative polarity 64 GeV/c secondary mode, tuned up on target. Halo appeared gone, but secondary rates too low to be useful, even with MC6CV collimator wide open. Shutoff?
- Mike and Andrew slide MWPC in MC7 upstream end up and down to see if they could identify the plume; they could not.
- Carol and Adam accessed MC6 and MC7 to do a radiation survey and better understand the geometry of the shielding and line-of-sight to the plume. No obvious holes in shielding identified.

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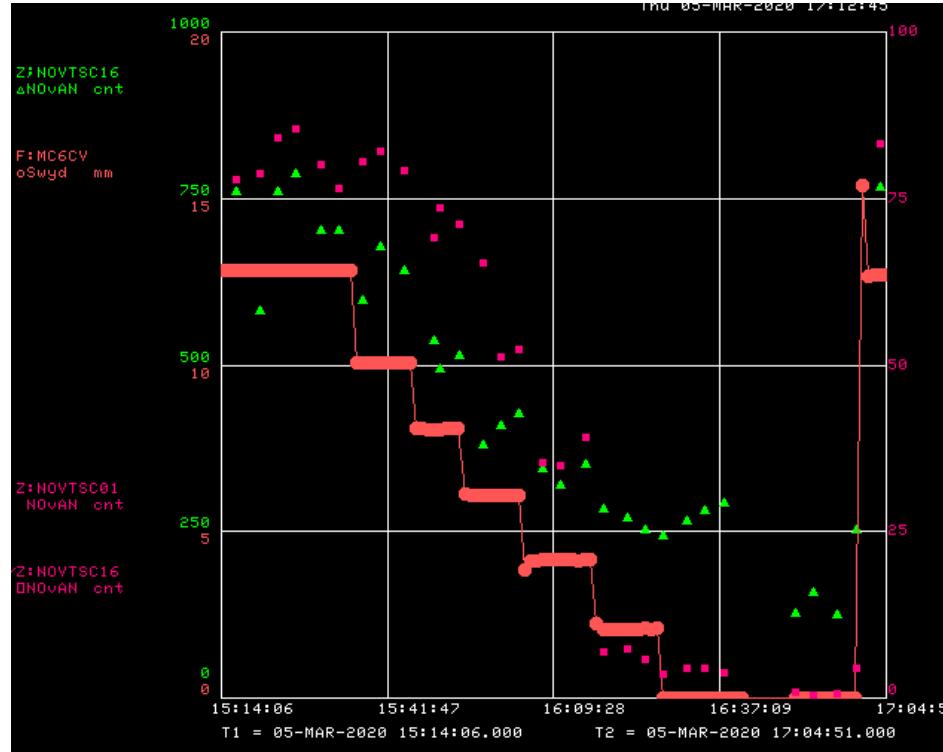
- Plot of upper-west quadrant scintillator counts (F:NOVTSC16) at peak of plume suggests 8mm MC6CV collimator opening is better balance between secondary rate on target (F:NOVTSC01) and plume intensity.
- Not a solution, but a potential bandaid while we figure out the plume.
- Ran this way overnight; NOvA folks, was this helpful in any way?

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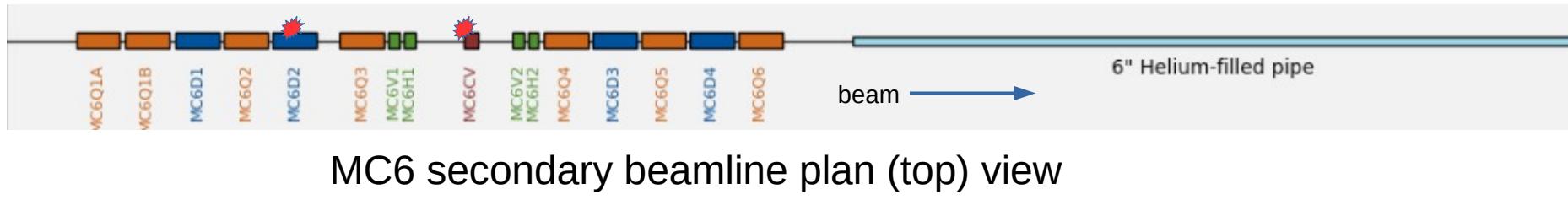
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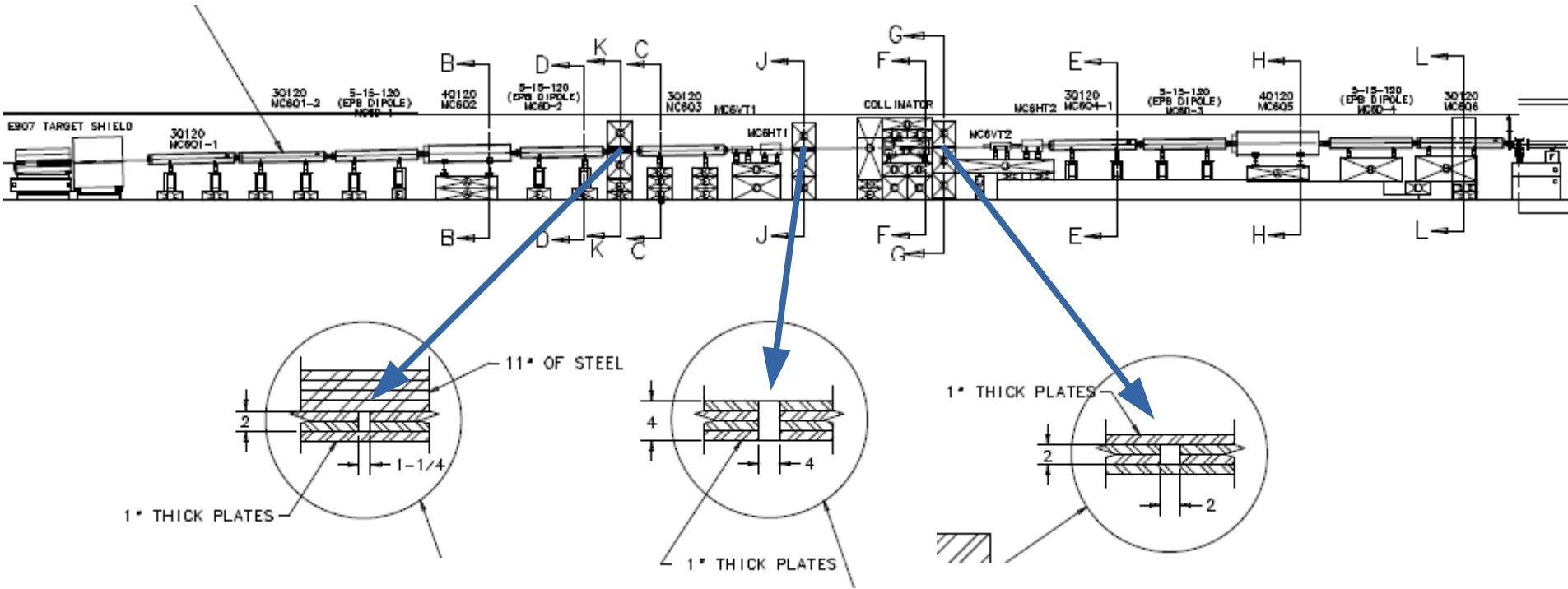
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Hot spots in MC6 secondary beamline



- Asymmetric hot spots verified on West side, upstream $\frac{1}{4}$ of MC6D2, as well as West and $\sim 1\text{cm}$ high on MC6CV upstream face.
- Same spots were identified before target position/angle scan, appear unchanged.
- May suggest horizontal alignment issue, consistent with target angle scan results.
- Will work with alignment stationing data to draw line-of-sight from plume upstream.

MC6 secondary beamline apertures



- Optics model suggests we're likely dumping remaining primary beam at the upper aperture of the "K" scraper (120 GeV beam height is 1.8" from center line).
- Radiation survey couldn't determine asymmetry in radiation pattern at K scraper, but plenty of radiation was apparent.

Suggested next steps

- Moving scintillator array to trace back origin point of plume (Mike/Andrew/Evan in progress).
- MC2 pinhole collimator in beam, can check for obvious alignment issues, see if impacts plume.
- Scrutinize alignment data to determine possible errors and line-of-sight between beamline loss points and plume. *In particular, are the scrapers in MC6 aligned?*
- Remove MC6 primary target, keep secondary beamline tuned to 64 GeV/C, see if plume remains.