



# Preparing Mcencter Secondary to Transport 120 GeV Primary Beam to MC7

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Meeting Title

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## What We Are Trying to Do

The ECA “Precision Neutrino Fluxes for LBNF/DUNE” requires 120 GeV primary beam in MC7. We specify the work and measurements necessary to demonstrate that Accelerator Division is capable of achieving this goal.

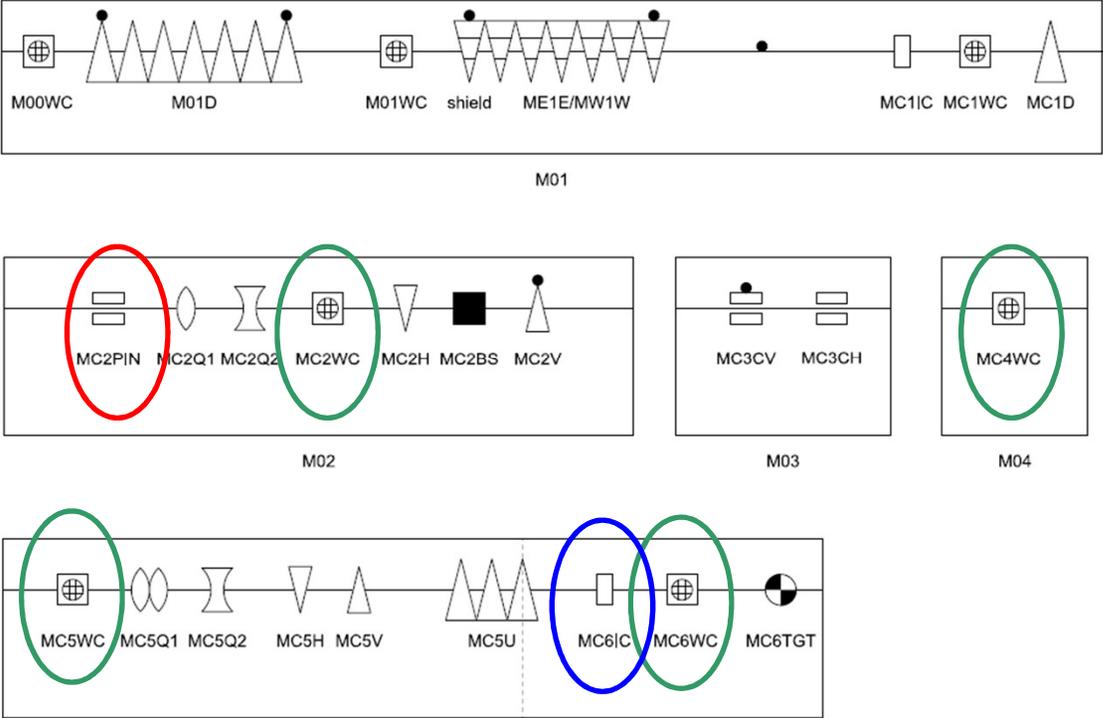
## How We Intend To Do It

Use a pinhole collimator in MC2 (primary beamline) to reduce the primary intensity to an acceptable level for transport and absorption in MC7.

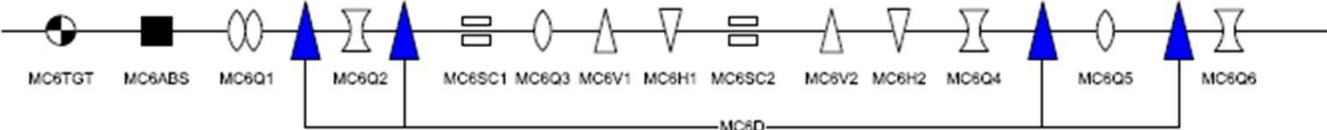
Using the pinhole collimator should also produce a beam of very low divergence, allowing one to run with out quadrupoles.

High likelihood of success. This mode was used for MIPP around 2004.

# Primary Beamline



# Secondary Beamline



## Shielding Considerations

At present, MC7 is limited to  $3.00E6$  particles per four second spill (Memorandum, Wayne Schmitt, November 20, 2018). The secondary intensity assumes 64 GeV particles.

Advised by Radiation Safety, the first step in the process – submitting and “Unreviewed Safety Issue Determination (USID) Form” has begun. First draft of USID submitted to Radiation Safety on Sept. 22.

## Primary Beam Attenuation

Presently, primary beam to MCenter is limited to  $1.70E10$  protons per four second spill. Rates as low as  $1.0E10$  protons per spill are achievable. Based on the shielding considerations, an attenuation factor of approximately  $2E-4$  is required.

The pinhole collimator located in MC2, MC2PIN, will be used to attenuate the primary beam. The resulting beam intensity will be measured using the ion chamber MC6IC, located immediately upstream of the primary target. In conjunction with measuring the intensity at the ion chamber MC6IC, located upstream of the pinhole collimator, one can calculate the attenuation factor.

## Primary Beam Measurements

In addition to measuring the primary beam intensity, the profiles at MC2WC, MC4WC, MC5WC, and MC6WC will be measured. This will allow one to calculate the emittance and divergence of the beam as it leaves the MC2 pinhole collimator.

## Secondary Beamline Power Supplies

The dipole string, MC6D, which selects the secondary energy, will be set to 120 GeV. This is a ramped magnet. Measurements will be made to determine if the current is stable during extraction. Note that this measurement can proceed without beam; only an interlocked enclosure and timeline events are required.

## Primary Beam Transport to MC7

Ideally, the proof-of-principle will consist of transporting primary beam to MC7. The successful transport of primary beam will be verified by recording a profile on MC7WC.

In the event the MC2 pinhole collimator does not achieve adequate attenuation, profile measurements will allow one to characterize the beam and develop a plan for primary beam transport.

END