**Specifications from the Muon Accelerator Staging Scenario**

6.75 GeV (kinetic energy) proton beam with 3 ns (rms) pulse.

1 MW initial beam power, upgradable to 2 MW (perhaps even to 4 MW).

60 Hz initial rep rate for Neutrino Factory;

15 Hz rep rate for later Muon Collider.

The goal is to deliver a maximum number of soft muons, \( 40 < KE < 180 \text{ MeV} \).

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**Target System Concept**

Graphite target (\( \rho \sim 1.8 \text{ g/cm}^3 \)), radiation cooled (with option for convection cooling); liquid metal jet as option for 2-4 MW beam power.

Target inside high-field solenoid magnet (20 T) that collects both \( \mu^+ \) and \( \mu^- \).

Target and proton beam tilted with respect to magnetic axis.

Superconducting magnet coils shielded by He-gas-cooled W beads.

Proton beam dump via a graphite rod just downstream of the target.

Some of the proton and \( \pi/\mu \) transport near the target is in air.

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**Target System Optimizations**

High-Z favored.

Optima for graphite target: length = 80 cm (for \( \rho = 1.8 \text{ g/cm}^3 \)), radius = 8 mm (with 2mm (rms) beam radius), tilt angle = 65 mrad.

Nominal geometric rms emittance \( \epsilon_{\perp} = 5 \mu\text{m} \).

\( \beta^* = \sigma_r^2/\epsilon_{\perp} = 0.8 \text{ m} \).

Graphite proton beam dump, 120 cm long, 24 mm radius to intercept most of the (diverging) unscattered proton beam.

The 20 T field on target should drop to the ~2 T field in the rest of the Front End over ~5 m.

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**Issues for Further Study**

Thermal “shock” of the short proton pulse on the graphite target.

Probably OK for 2 MW and 60 Hz operation; 15-Hz option needs study.

Cooling of target, and the W beads.

Lifetime of target against radiation damage.

Beam windows.

\( \beta^* \) and beam emittance at the target.

To preserve liquid-metal-jet upgrade option, need related infrastructure installed at \( t = 0 \).