**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, with ~40 < KE < ~180 MeV.

**Target System Concept**

Graphite target (ρ ~ 1.8 g/cm³), 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 $\mu^+$.

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 Concept for a Muon Collider/Neutrino Factory**

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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, and air activation.
- $\beta^*$ and beam emittance at the target.
- To preserve liquid-metal-jet upgrade option, need related infrastructure installed at $t = 0$.

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**Target System Optimizations**

- High-Z favored.
- Optima for graphite target: length = 80 cm (for $\rho = 1.8$ g/cm³), radius ≈ 8 mm (with 2mm (rms) beam radius $\sigma_r$), tilt angle = 65 mrad.
- Nominal geometric rms emittance $\epsilon_{\perp} = 5$ µm.
- $\beta^* = \sigma_r^2/\epsilon_{\perp} = 0.8$ 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.