

SNuMI scenarios

	Slip-stacking in Recycler Ring	Momentum stacking in Accumulator 1
Booster batch intensity	4.3E12	4.6E12
No. Booster batches	12	18
Booster average rep rate (Hz)	10.5	15
MI cycle time (s)	1.333	1.333
MI intensity (ppp)	4.9E13	8.2E13
Beam power to NuMI (kW)	700	1200
Protons/hr	1.3E17	2.2E17

SNuMI *preliminary* cost estimate

- **Booster:** repetition rate upgrade to 15 Hz
- **Main Injector:** RF and shielding upgrades
- **Recycler:** new injection and extraction transfer lines, RF systems
- **Accumulator:** new injection and extraction lines, new RF systems
- **NuMI:** upgrade primary proton line, new target and horn, target chase cooling, installation of Helium bags, work cell upgrade

Includes only M&S, no inflation, no contingency

	700 kW cost estimates (k\$)	1 MW cost estimates (k\$)
Booster	600	
Main Injector	700	12500
Recycler	5700	1000
Accumulator		15000
NuMI	2900	3500
TOT	9900	32000

SNuMI preliminary time scale

❖ Main assumptions:

- **2010**: year-long shutdown to complete all upgrades required for 1 MW
- **2011**: start using the Recycler at 400 kW and gradually implement slip-stacking over multi-batches up to 700 kW beam power
- **2012**: short shutdown to fix eventual problems and start momentum stacking in Accumulator, increasing beam power to 1 MW
- **2013**: run steadily at 1 MW
 - **capability actually up to 1.2-1.3 MW**

❖ Efficiency factors:

- **Complex uptime: 0.85**
- **Average to peak performance: 0.9**
- **NuMI line uptime: 0.9**

Year	Running time (weeks)	Initial power (kW)	Final power (kW)	Integrated protons/year
2011	44	400	700	5.3×10^{20}
2012	38	700	1000	7.3×10^{20}
2013	44	1000	1000	9.9×10^{20}

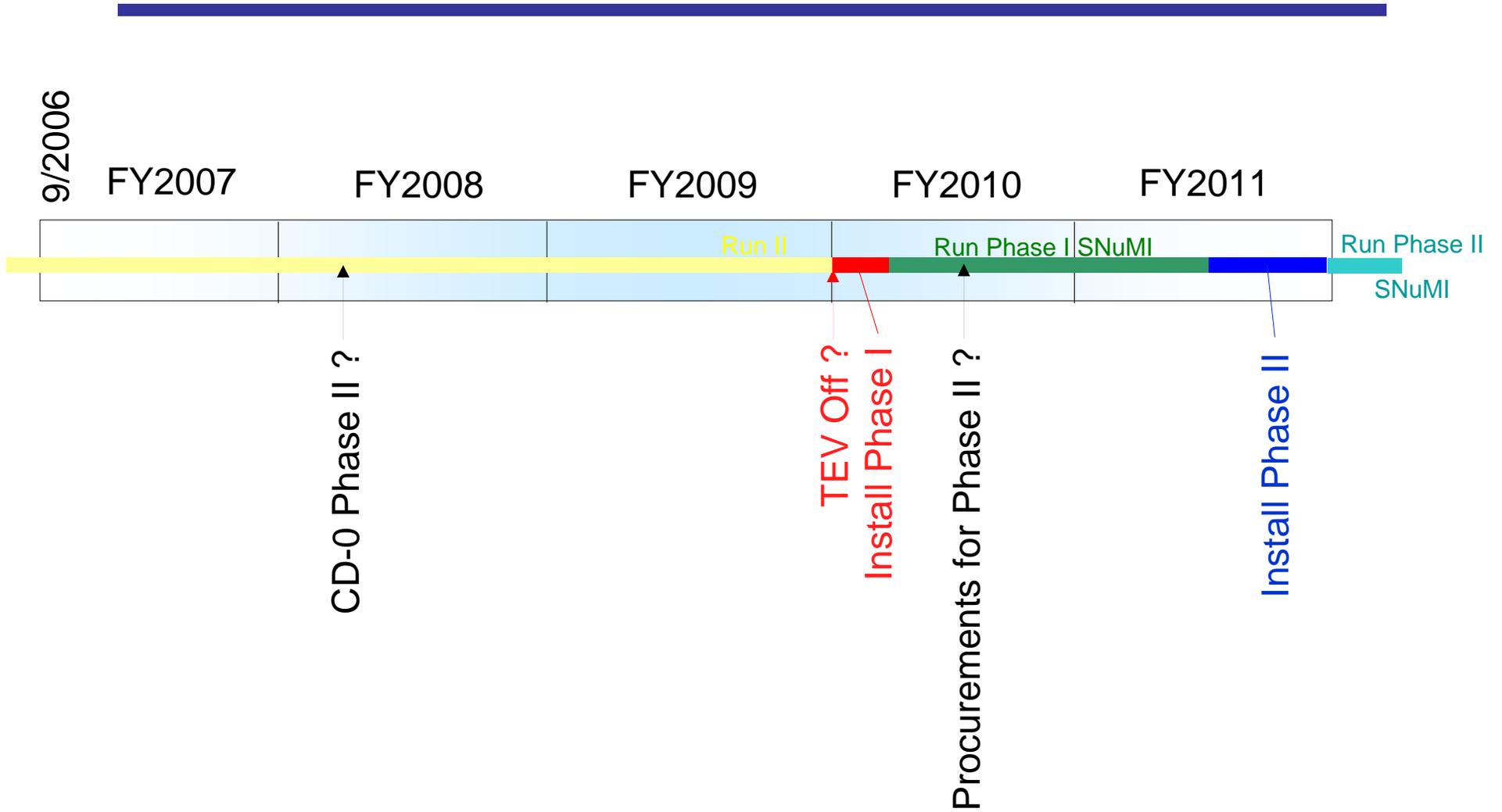
Phase I - 700kw

- Scope
 - Primarily technical (beamline) work, but < \$5mill of civil construction is possible for MI-10 and MI-40.
- Cost - on the scale of the Proton Plan
 - \$15 to \$20 mill M&S with cont.
 - \$5 to \$10 mill SWF with cont.
- Schedule
 - Some upfront work will take place but the majority of the spending will be in FY09 and FY10.
 - Assume installation takes place in a 3 month shutdown immediately following the end of collider operations.
- PM approach as a "Campaign"
 1. We do not have time to take the 413.3 CD approach.
 2. Many subprojects are still being fleshed out and will require more R&D to converge on the final solution.
 3. Use AIPs' for the Civil construction.
- Readiness for Director's review in November
 - A little less complete than the Proton Plan was for it's Director's Review.

Phase II - 1.2 MW

- Scope
 - Primarily technical work, but < \$10mill of civil construction is possible for enclosures.
- Cost - tough to say at this time.
 - Over \$50 mill M&S with cont.
 - Over \$15 mill SWF with cont.
- Schedule
 - FY10 and beyond.
 - We may run Phase I for a year or so while we gear up for a longer (6 month) shutdown to install Phase II upgrades
- PM approach as a "MIE"? (Looking for guidance from the Director's Review panel)
 1. We may have time to take the 413.3 CD approach if we get CD-0 in spring 2008. Assumes 2.5 years to get to CD-3
 2. It is possible we will not have a firm grip on all costs by Spring 2008 . Many upgrade decisions could depend on accelerator performance over the next few years.
 3. Use AIPs' for the Civil construction. Not sure if we can bury Civil work in a MIE.??
- Readiness for Director's review in November
 - We will be able to talk about this at a high level.
 - Will have a high level WBS.
 - We hope to identify any showstoppers by then.

Strawman Timeline



CD-1 review

- ❖ **CD-1 review: Approve Preliminary Baseline Range**
 - Critical decision prerequisites
 - Conceptual Design Report
 - Project Data Sheet for design
 - Acquisition plan
 - Preliminary Project Execution Plan and baseline range
 - Verification of mission need
 - Preliminary Hazard Analysis Report