



EUROnu meeting Paris 12-15 June

Beta Beam: timetable and cost

Elena Wildner, CERN

What is meant by time table?

- We consider the lengthiest item to define the time line
- For the R&D we also take the longest time.
- However the R&D is essentially a number of smaller things
- To execute necessary work in the CERN complex: evaluation needed of co-existence constraints (LHC shutdowns, upgrades, integration...)
 - The already existing machines are an asset but also a difficulty since an evaluation of the cost to upgrade or replace equipment is not straight forward
 - We do not consider this here.

List of research topics, non exhaustive, study needed

- Consolidate Production, make scaling
- ECR-Source Consolidation
- Study of RFQ(s) efficiencies
- PS injection
- PS and SPS acceleration (beam transmission)
- Optimization of bunching for maximal neutrino flux
- Shielding in all machines
- Decay Ring dumps/abort
- Decay Ring Instrumentation
- Etc.

List of research topics, non exhaustive, study needed

- Consolidate Production make scaling
- ECR-Source Consolidation

These are all very different
disciplines: different people
=> 3 years R & D

- Decay Ring dumps/abort
- Decay Ring Instrumentation
- Etc.

Planning

The most time demanding item should be pulled out:
Decay Ring

Magnets (CERN magnet group):

magnet design and model construction: 2.5 years

magnet full length prototype: 2 years

series production: tendering (materials, Superconductor and assembly contracts):
0.75 year

series production: production preparation (tooling construction, SC and material deliveries): 1 year

series production:: 3 years (for 152 magnets)

Total: 9.25 years

resistive magnets (series of 30 magnets):

total: 3 years

Planning

R & D 3 years
 DR Magnets 10 years
 Installation in addition 1 year

EUROnu construction planning	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Land negotiations						
Environmental Impact Study						
Building permits						
Detailed design & tendering						
Construction						

The civil engineering can be done the 6 last years during magnet construction

Comissioning: 1 year

Total ~ 15 years

Costing Situation

- Civil Engineering for Beta Beams treated in Special presentation
- Decay Ring Magnet costs available (Magnet group) Powering will come
- Cryostating not yet
- Electricity, maybe... scaling ? can be a jump function
- Linac cost: scaling
- RFQ: Twice the cost as for "normal" Linac
- RCS cost from EURISOL
- Instrumentation: scaling
- Upgrades PS/SPS not available
- Targets (scaling and projections)
- Infrastructure not available, scaling from civil engineering data?
- Decay Ring Instrumentation (scaled)
- ECR costed ok
- RF Decay Ring costed ok

Problems

- Very limited resources (if any) or help to do the costing
- No useful (practical) guidelines

Common guidelines...

RCS	RCS Equipment	Magnets	Dipoles	Dipoles (SYSTEM)	Procurement	Grand Total
					50164	50164
				Dipoles Total	3962956	3962956
			Quadrupoles	Quadrupoles (SYSTEM)	36679	36679
				Quadrupoles Total	1943987	1943987
			Sextupoles	Sextupoles (SYSTEM)	31666	31666
				Sextupoles Total	949980	949980
			Correctors	Correctors (SYSTEM)	23770	23770
				Correctors Total	1259810	1259810
			Bus bars	Bus bars (SYSTEM)	980000	980000
				Bus bars Total	980000	980000

Work with WP3 & WP2 – costing representatives to streamline and share information has been done during this meeting and will progress until we have our internal review

		Painting Kickers (4) + Converters	Painting Kickers (4) + Converters (SYSTEM)	1400000	1400000
			Painting Kickers (4) + Converters Total	1400000	1400000
			Injection System Total	5200000	5200000
	Extraction System	Extraction Septum + Converter	Extraction Septum + Converter (SYSTEM)	2100000	2100000
			Extraction Septum + Converter Total	2100000	2100000
		Extraction Kicker + PFN	Extraction Kicker + PFN (SYSTEM)	5400000	5400000
			Extraction Kicker + PFN Total	5400000	5400000
			Extraction System Total	7500000	7500000
	Vacuum System	Vacuum System (SUBDOMAIN)	Vacuum System (SUBDOMAIN)	4000000	4000000
			Vacuum System (SUBDOMAIN) Total	4000000	4000000
			Vacuum System Total	4000000	4000000
	Control System & Instrumentation	DSC	DSC (SYSTEM)	15000	15000
			DSC Total	450000	450000
		DSC modules	DSC modules (SYSTEM)	50000	50000
			DSC modules Total	1500000	1500000
		Diagnostic system	Diagnostic system (SYSTEM)	2000	2000
			Diagnostic system Total	400000	400000
		Timing + Cabling + Fieldbus	Timing + Cabling + Fieldbus (SYSTEM)	1500000	1500000
			Timing + Cabling + Fieldbus Total	1500000	1500000
		Beam Diagnostics	Beam Diagnostics (SYSTEM)	5000000	5000000
			Beam Diagnostics Total	5000000	5000000
			Control System & Instrumentation Total	8850000	8850000
			RCS Equipment Total	37680000	37680000
			RCS Total	37680000	37680000
			Grand Total	37680000	37680000