



Summary of WP3

J. Pozimski



Overview

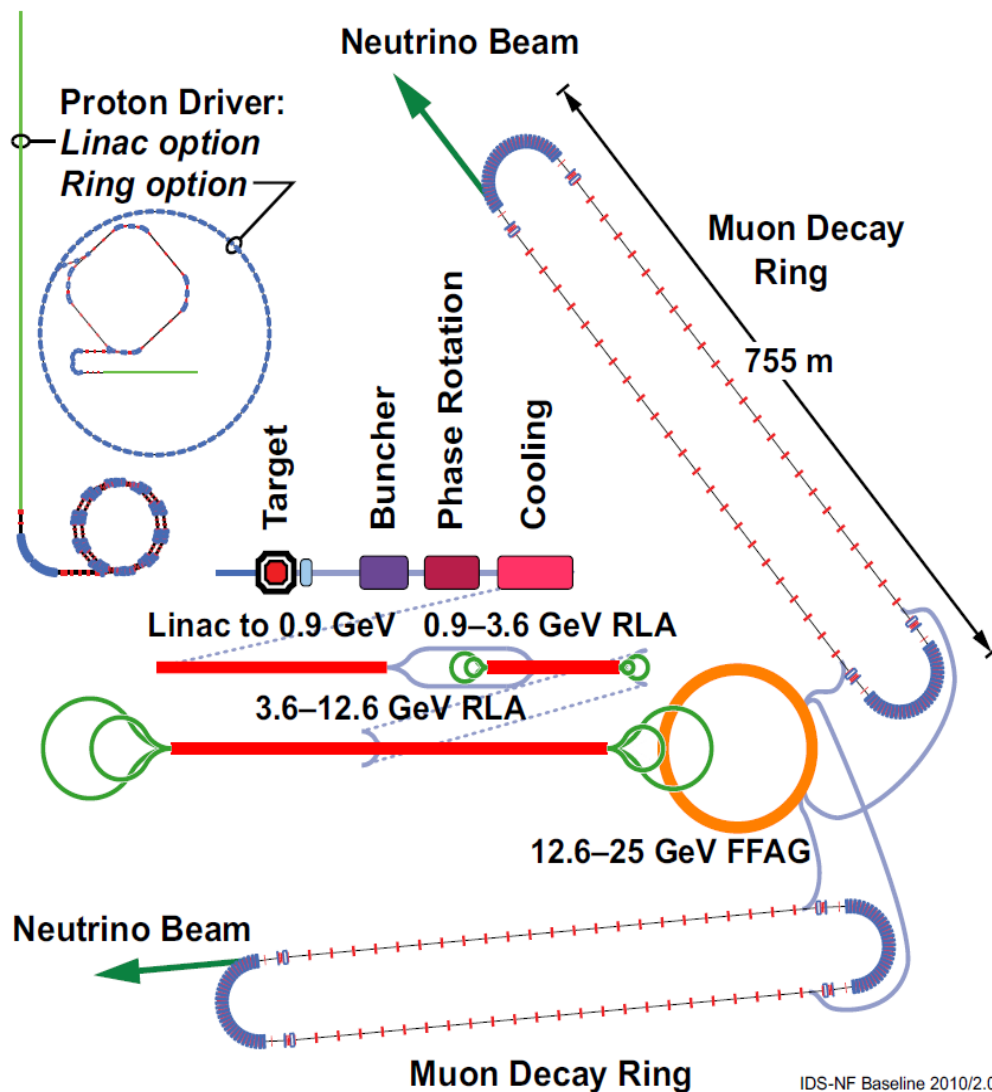


Status of WP3:

Milestones
and
Deliverables

IDR

Costing





WP3 - Milestones



Milestone	month (from start)
Evaluation of baseline front-end	15 ✓
Evaluation of acceleration systems	18 ✓
Evaluation of performance of alternative cooling and acceleration	24 ✓
Specification of proton-beam handling system	24
- Report written and ready for submission	
Benchmark costing for muon front-end and acceleration systems	30
- work in progress	
Initial health-and-safety evaluation of proton-beam handling system	38
- work in progress	
Cost and Performance evaluation complete	40
Comparison of physics performance of all facilities	43



WP3 - Deliverables



- 1 Completed review of ionisation-cooling and muon front end **15 month** ✓ D5
- 2 Completed review of muon acceleration **18 month** ✓ D6
- 3 Completed simulation of baseline and alternative ionisation-cooling channel, including a cost and performance analyses for reference muon front end.
30 month - work in progress, simulations complete
- 4 Completed simulation of baseline and alternative muon acceleration system and the decay rings and evaluation of reference design for spent proton-beam handing system, including a cost and performance analyses.
38 month
- 5 Complete end-to-end simulation and evaluation of the performance of the Neutrino Factory as input to the comparison
42 month



Major achievements



- Benchmarking Fluka results with Mars and comparison with HARP data
- Investigation of particle dynamics in the baseline muon front end lattice and investigation of the performance of alternative lattices
- Studies of power deposition in the target and pion capture area due to secondary radiation
- => trigger for significant change in design of target& capture area => revaluation of capture
- Studies of solid and liquidized power jet targets for mercury risk mitigation
- Detailed studies of fringe field effects in linac, benchmarking of Optima against MADX , GPT and G4beamline
- Modelling of accelerator components (cavities, solenoids, dipoles, quadrupoles and sextupoles), calculation of field maps and comparison with study 2a results
- Multi-particle simulations of the muon linac using field maps, comparison of gained results from various software packages with good agreement in transversal and longitudinal particle dynamics and particle loss pattern.
- Detailed studies of beam injection and extraction into the FFAG, first preliminary studies of kicker and septum design as well as kicker electronics.
- => trigger for significant change in FFAG design.
- First studies of combined function FFAG magnets and particle tracking in fieldmaps
- Detailed studies of beam loading effects in the muon accelerator
- Test of data exchange between accelerator sections for the end to end simulations
- Studies of beam instrumentation in decay rings



Publications / Presentations



.....talks at NUFACT, etc.....

2 EUROv Deliverables :

C. Rogers and G. Prior, Review of the Neutrino Factory Muon Front End, Euronu Milestone Report, 2010.

J. Pozimski, M. Aslaninejad, C. Bontoiu, J. Pasternak, D. Kelliher, H. Witte, Review of the Neutrino Factory Muon Accelerator, Eurov Milestone Report, 2010.

.... many publications

- [1] D. Neuffer, et al., Muon Capture in the Front End of the IDS Neutrino Factory, Proceedings IPAC'10 conference 2010 Kyoto, Japan,
- [2] A. Alekou et al., Alternative Muon Front-end for the International Design Study (IDS)_Proceedings IPAC'10 conference 2010 Kyoto, Japan,
- [3] A. Alekou et al., Muon Cooling Performance in Various Neutrino Factory Cooling Cell Configurations using G4MICE , Proceedings IPAC'10 conference 2010 Kyoto, Japan
- [4] M. Aslaninejad et al., Solenoid Fringe Field Effects for the Neutrino Factory Linac - MAD-X Investigation, Proceedings IPAC'10 conference 2010 Kyoto, Japan



Publications



- [5] C. Bontoiu et al. Beam Dynamics Studies for the First Muon Linac of the Neutrino Factory, Proceedings IPAC'10 conference 2010 Kyoto, Japan
- [6] J. Pasternak et al., Injection/Extraction System of the Muon FFAG for the Neutrino Factory, Proceedings IPAC'10 conference 2010 Kyoto, Japan
- [7] J. Pozimski et al., Investigation of Beam Loading Effects for the Neutrino Factory Muon Accelerator, Proceedings IPAC'10 conference 2010 Kyoto, Japan
- [8] M. Apollonio et al., Muon Polarimeter in a Neutrino Factory Decay Ring , Proceedings IPAC'10 conference 2010 Kyoto, Japan
- [9] G. P. Škoro et al., Overview of Solid Target Studies for a Neutrino Factory, Proceedings IPAC'10 conference 2010 Kyoto, Japan
- [10] T. R. Edgecock et al., Tungsten Behavior at High Temperature and High Stress, Proceedings IPAC'10 conference 2010 Kyoto, Japan....

.....and the IDR..... but need to ensure that all is documented on web



Original Goals :

Complete design of Neutrino factory accelerator complex

Produce cost estimate

Achieved :

Practically complete lattice design

Redesign of target area identified (new design now available)

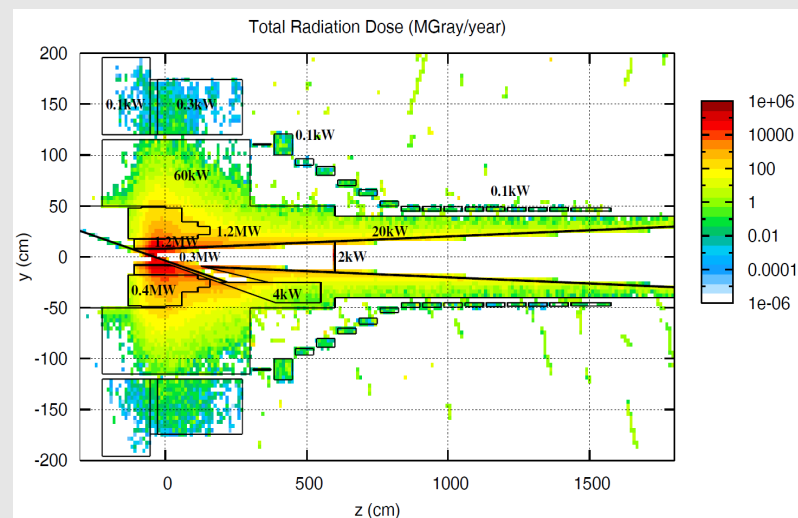
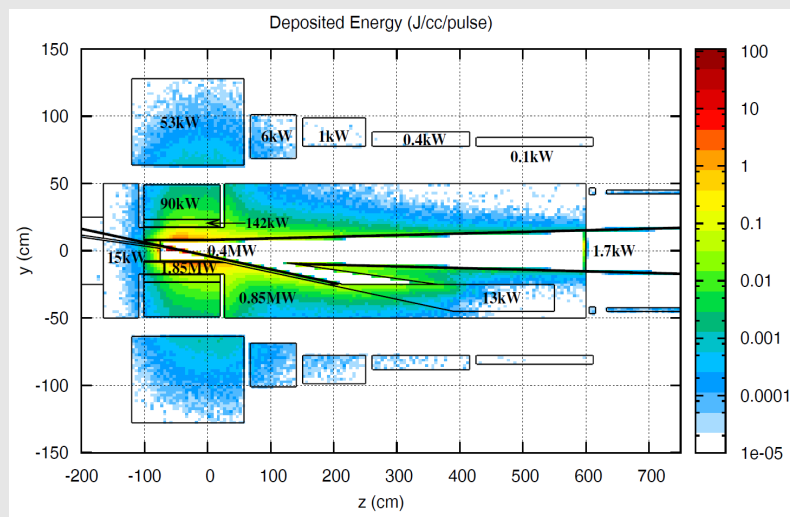
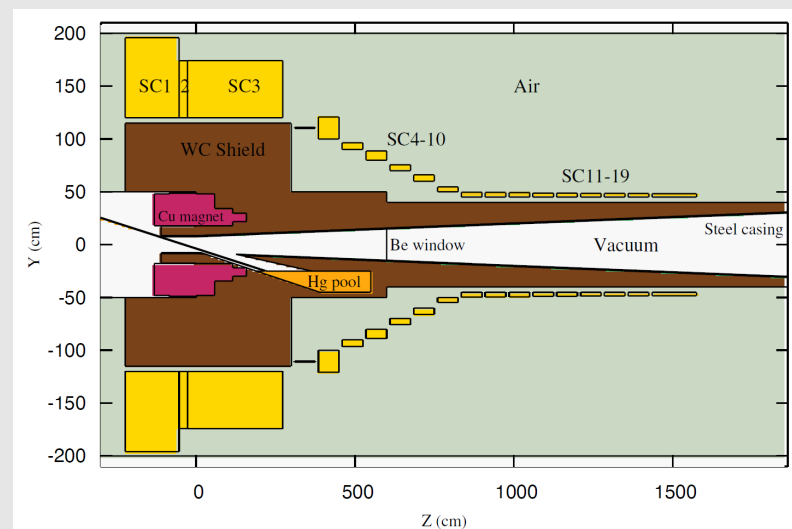
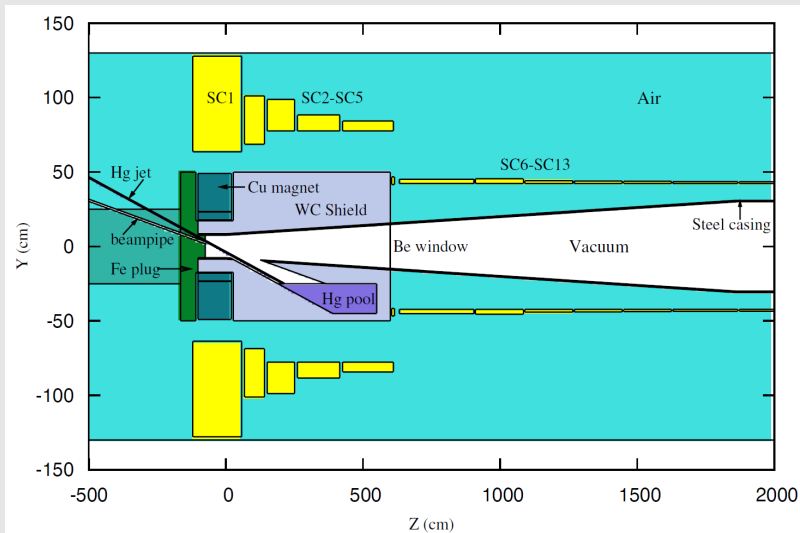
Costing not ready for inclusion => increased effort since then



Deliverable :

Specification of proton-beam handling system

J. Back Warwick





Deliverable :

Specification of proton-beam handling system



Region	Normal	30 cm Hg jet	No \underline{B}	No Hg jet	No \underline{B} & No Hg jet
SC1	0.05 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	< 0.01	< 0.01
SC2	0.03 ± 0.01	0.04 ± 0.01	0.03 ± 0.01	< 0.01	< 0.01
SC3	0.26 ± 0.06	0.28 ± 0.06	0.28 ± 0.06	0.22 ± 0.05	0.26 ± 0.06
SC4	< 0.01	< 0.01	0.35 ± 0.06	0.01 ± 0.01	1.1 ± 0.1
SC5	0.07 ± 0.01	0.07 ± 0.01	3.3 ± 0.3	0.09 ± 0.01	9.2 ± 1.0
SC6 to SC10	0.08 ± 0.01	0.10 ± 0.02	0.47 ± 0.08	0.05 ± 0.01	1.0 ± 0.1
SC11 to SC19	0.07 ± 0.01	0.07 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	< 0.01
Shielding	2149 ± 14	2157 ± 15	2096 ± 14	2567 ± 20	1693 ± 12
Inner shield casing	483 ± 7	487 ± 7	301 ± 6	627 ± 9	17 ± 1
Hg jet	319 ± 5	302 ± 5	183 ± 3	—	—
Hg pool	4.4 ± 0.4	5.7 ± 0.5	640 ± 10	13 ± 1	1835 ± 12
Cu magnets	405 ± 7	400 ± 7	329 ± 6	350 ± 6	4.0 ± 0.5
4 mm Be window	2.1 ± 0.2	2.2 ± 0.2	0.02 ± 0.01	0.01 ± 0.01	< 0.01



IDR delivers component list for costing

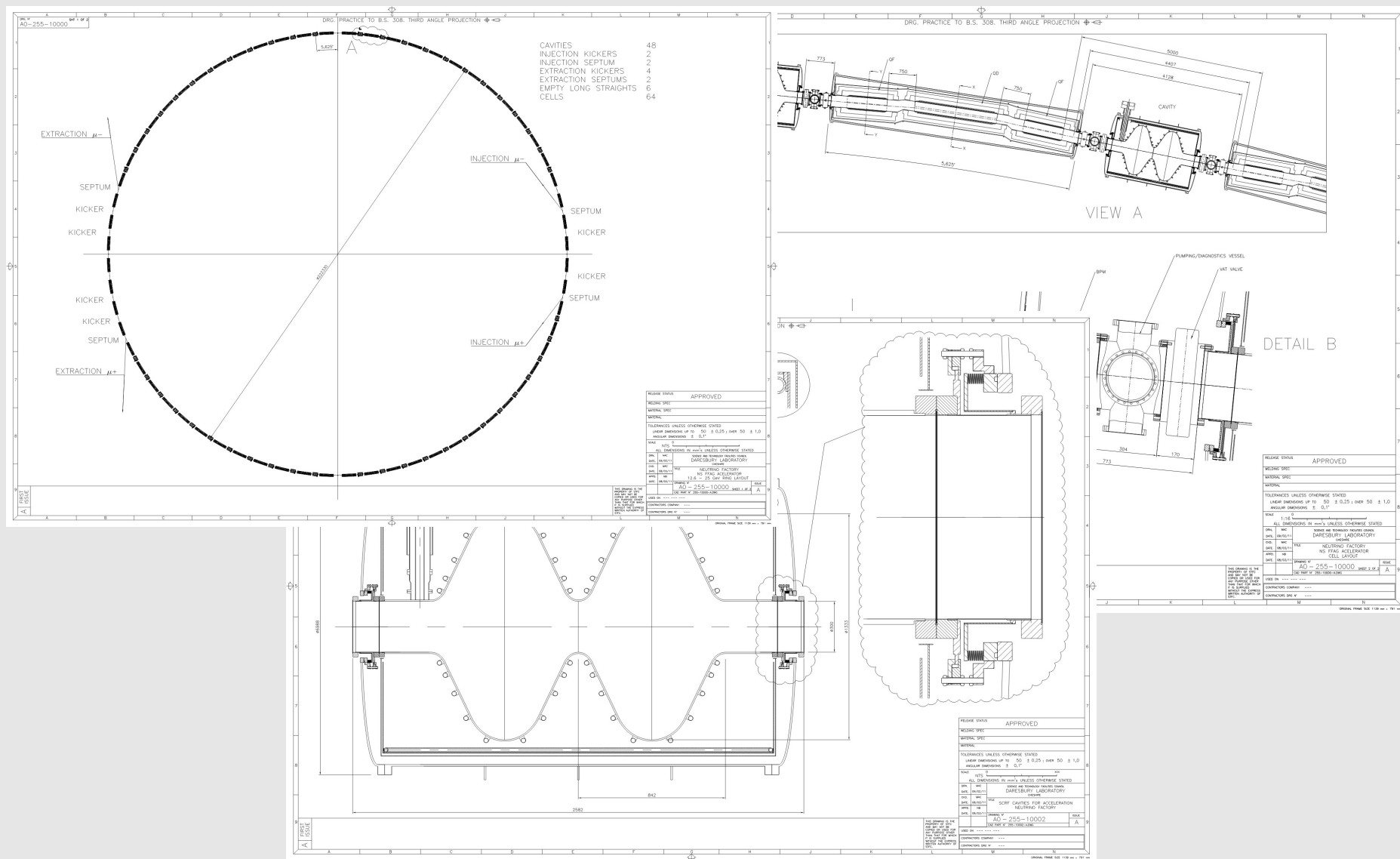


<u>beamline</u>	RF cavities		solenoids	dipoles	quads	sext
	1-cell	2-cell				
pre-accelerator	6	62	25			
inj-chic I				8+3	16	3
RLA I						
linac		24			26	
arc1				35	43	
arc2				49	57	8
arc3				63	71	8
arc4				77	85	8
inj-chic II				8+3	16	3
RLA II						
linac		80			42	
arc1				35	43	
arc2				49	57	8
arc3				63	71	8
arc4				77	85	8
Lambertson				1		



Preparing engineering layout for costing

N. Bliss, STFC daresbury





CERN costing tool now available

Preparing the WBS for data

A. Kurup, Imperial



Costing Tool v 0.10.1 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Costing Tool v 0.10.1

Costing Tool v 0.10.1

Open PBS Save Refresh Crosstab Report Activity Logs Report Data Quality Report Use estimates from: Highest level possible

AJIT KURUP (EN-MEF-LE) Support Logout

Neutrino Factory

Name

- Neutrino Factory
 - 1. Accelerator Complex
 - 1.1. Proton Driver
 - 1.1.1. Ion source
 - 1.1.2. RFQ
 - 1.1.3. DTL
 - 1.2. Target
 - 1.3. Muon front-end
 - 1.4. Linac and RLAs
 - 1.5. FFAG
 - 1.6. Storage Ring
 - 1.7. Accelerator Infrastructure
 - 1.8. Non Accelerator Infrastructure
 - 2. Neutrino Detectors
 - 2.1. Near detector
 - 2.2. Intermediate baseline detector
 - 2.3. Magic baseline detector

PBS Details Upload

RFQ

Domain: Proton Driver

Sub-Domain: RFQ

Tech. responsible: AJIT KURUP (EN-MEF-LE)

Link (EDMS...):

Comments:

Estimate date:

Last update: 17/02/2011

Uncertainty:

Multiplicity: 1

Unit:

Expected offers:

Property	Unit	Estimate	Uncertainty	Comments / references
Industrialisation and tendering				
Start date (relative to project start)	months	6.00	-	
Duration	years	3.00	-	
Material cost	CHF	100.00	Not specified	Simple guess!!
Manpower - Tech.	man-years	2.00	Not specified	
Manpower - Eng.	man-years	300.00	Not specified	
Procurement				
Start date (relative to project start)	years	0.00	-	
Duration	years	0.00	-	
Fixed cost	CHF	0.00	0.00	
Proportional cost	CHF	0.00	0.00	
Manpower - Tech.	man-years	0.00	0.00	
Manpower - Eng.	man-years	0.00	0.00	
Reception				
Start date (relative to project start)	years	0.00	-	
Duration	years	0.00	-	
Fixed cost	CHF	0.00	0.00	

Transferring data from pptvm.cern.ch...

Js J F SL I C



Summary



- IDR nearly ready for publication
- Deliverables D5 & D6 submitted
- Good progress on all fields
- Goal of costing for IDR not yet reached.
- Risk mitigation and fall back options defined
- Next steps : Cost per element evaluation

Evaluation of capture rate

handling of secondaries in the decay
channel

Particle tracking (end to end)