

WBS	Req.	Parameter	Base Value	Unit	Comment
1. 4.		<b>LINAC</b>			
1. 4.	x	Output energy	1000 MeV		
1. 4.		Output energy 95% probability uncertainty +/-	15 MeV		OK
1. 4.		Average beam current	1.56 mA		
1. 4.	x	Average macropulse current	26 mA		for Pklystron =550 +/- 5 kW
1. 4.		Peak macropulse current	38.2 mA		
1. 4.		Protons per micro bunch			
1. 4.	x	RF duty factor	7.2 %		HV Gate Duty Factor
1. 4.		Peak total RF power	MW	???	
1. 4.		Average total RF power	MW	???	
1. 4.		Average beam power	1.56 MW		expected value
1. 4.	x	Specified ac wall power for RF	MW	???	
1. 4.		Simulated output H&V rms norm emittance w/ errors and wo/ jitter	0.41 pi-mm-mrad		Under study
1. 4.		Simulated output transverse centroid jitter +/-	0.20 mm		Under study
1. 4.		Simulated output H&V rms norm emittance w/ errors and w/ jitter	0.50 pi-mm-mrad		Under study
1. 4.		Simulated output H Twiss beta	10.1 m		Under study
1. 4.		Simulated output H Twiss alpha	-1.85		Under study
1. 4.		Simulated output V Twiss beta	5.3 m		Under study
1. 4.		Simulated output V Twiss alpha	1		Under study
1. 4.		Simulated output L rms emittance w/ errors	0.6 pi-MeV-deg		Under study
1. 4.		Simulated output rms energy spread	0.33 MeV		Under study
1. 4.		Simulated output total phase width	12.6 deg		Under study
1. 4.	x	Maximum output energy jitter +/-	2.2 MeV		99.99%
1. 4.	x	Total linac length	279.933 m		Excludes 47.346m for 6 more high-beta cryomodules
1. 4.	x	Linac tunnel width x height	14X10 ft		No crane
1. 4.	x	Linac tunnel length	321.781 m		Excludes 9.233 m of DTL in FE bldg and includes 3.735 m of contingency
1. 4.	x	Beam-floor distance	50.0 in		
1. 4.		Quad transverse displacement rms tolerance	0.07 mm		Limit +/- 0.13 mm
1. 4.		Quad tilt rms tolerance	6 mrad		Limit +/- 10 mrad
1. 4.		Quad roll rms tolerance	3 mrad		Limit +/- 5 mrad
1. 4.		Quad gradient rms tolerance	0.14 %		Limit +/- 0.25 %
1. 4.		Distance rms tolerance between end gaps of segs	0.15 mm		Limit +/- 0.25 mm
1. 4.		Tolerance rms between adjacent gaps in a segment	0.03 mm		Limit +/- 0.05 mm
1. 4.		Segment end transverse displacement rms tolerance	0.3 mm		Limit +/- 0.5 mm

1.	4.	2.	<b>DTL ACCELERATOR</b>			
1.	4.	5.	Number of harps	0		
1.	4.	4.	<b>CCL ACCELERATOR</b>			
1.	4.	5.	<b>CCL DIAGNOSTICS</b>			
1.	4.	5.	Number of beam loss monitors	49	according to my notes	
1.	4.		<b>SUPERCONDUCTING RF LINAC</b>			
1.	4.	x	RF frequency	805 MHz		
1.	4.	x	Peak med beta cavity surface field	27.5 MV/ m	Uncertainty is +/- 2.5 MV/m	
1.	4.	x	Peak high beta cavity surface field	35.0 MV/ m	Uncertainty is +2.5 / -7.5MV/m	
1.	4.	x	Medium beta cavity geometrical beta	0.61		
1.	4.	x	High beta cavity geometrical beta	0.811		
1.	4.	x	Number of med beta cryomodules	11		
1.	4.	x	Number of high beta cryomodules	12		
1.	4.	x	Cryomodule length med beta	4.239 m	Includes gate valves	
1.	4.	x	Cryomodule length high beta	6.291 m	Includes gate valves	
1.	4.	x	Warm space between cryomodule valves	1.6 m	Between gate valves	
1.	4.	x	Period length med beta	5.839 m		
1.	4.	x	Period length high beta	7.891 m		
1.	4.	x	<b>Total SRF linac length</b>	157.321 m	23 cryomodules + 22 warm spaces	
1.	4.	x	Length of 186 MeV differential pumping section	2.35 m	<b>CCL to SRF distance</b>	
1.	4.	x	Last warm space for quad	1.6 m	<b>Delete</b>	
1.	4.	x	Length of 969 MeV differential pumping section	3.0 m	<b>Delete</b>	
1.	4.	x	<b>Length for nine additional high beta cryomodules</b>	71.019 m		
1.	4.	x	<b>Total length for SRF linac</b>	235.290 m		
1.	4.		<b>Transition energy between sections</b>	387 MeV	<b>Design value</b>	
1.	4.		Transverse focusing lattice	warm doublets		
1.	4.		Warm beam pipe vacuum	1.00E-09 Torr		
1.	4.	x	Beam height	50.0 inches		
1.	4.		<b>SRF LINAC CAVITIES</b>			
1.	4.		High Beta cavity geometrical beta	0.811		
1.	4.	x	Peak med beta cavity surface field Epeak	27.5 MV/ m	Uncertainty is +/- 2.5 MV/m	
1.	4.	x	Peak high beta cavity surface field Epeak	35.0 MV/ m	Uncertainty is +2.5 / -7.5MV/m	
1.	4.		Epeak/Eacc interior cells med beta	2.63	<b>Delete</b>	
1.	4.		Epeak/Eacc interior cells high beta	2.14	<b>Delete</b>	
1.	4.		<b>Epeak/E0 med beta</b>	1.8414	<b>Add</b>	
1.	4.		<b>Epeak/E0 high beta</b>	1.5346	<b>Add</b>	

1. 4.	<b>Bpeak/Epeak med beta</b>	<b>2.1006</b> mT//MV/m	
1. 4.	<b>Bpeak/Epeak high beta</b>	<b>2.142</b> mT//MV/m	
1. 4.	Eacc interior cells med beta	10.5 MV/m	<b>Delete</b>
1. 4.	Eacc interior cells high beta	12.8 MV/m	<b>Delete</b>
1. 4.	<b>Eo med beta</b>	<b>13.4 - 16.4</b> MV/m	
1. 4.	<b>Eo high beta</b>	<b>17.9 - 24.4</b> MV/m	
1. 4.	<b>Bpeak med beta</b>	<b>52.0 - 63.5</b> mT	
1. 4.	<b>Bpeak high beta</b>	<b>58.9 - 80.3</b> mT	
1. 4. 5.	<b>SRF LINAC DIAGNOSTICS</b>		
1. 4. 5.	Number of beam position and phase monitors	32	
1. 4. 5.	Number of beam loss monitors	64	
1. 4. 5.	Number of current monitors	<b>6</b>	according to my notes
1. 4. 5.	Number of wire scanners	32	
1. 4. 1.	<b>RF POWER SYSTEMS</b>		
	<b>402.5 MHz klystron total RF power</b>	? MW	<b>add</b>
	<b>805 MHz CCL klystron total RF power</b>	? MW	<b>add</b>
1. 4. 1.	SRF klystron peak power	0.55 MW	Includes 33 & 40% power margin for low & high beta sections respectively
1. 4. 1.	Number of SRF cavities per klystron	1	
1. 4. 1.	<b>Number of SRFL 805 MHz klystrons</b>	<b>92</b>	<b>should be 81</b>
1. 4. 1.	Number of SRF klystrons per transmitter	6 or 5	????
1. 4. 1.	Number of SRF klystrons per HV power conditioner	12 or 11	????
1. 4. 1.	<b>Number of SRF klystron circulators</b>	<b>92</b>	<b>should be 81</b>
1. 4. 1.	805 MHz klystron average RF power	0.35 MW	<b>Delete</b>
	<b>806 MHz klystron total RF power</b>	<b>35.1 MW</b>	<b>add</b>
1. 4. 1.	805 MHz 550 KW klystron efficiency	63 %	
1. 4. 1.	RF module phase dynamic rms tolerance	0.5 deg	Limit +/- 0.75 deg
1. 4. 1.	RF module amplitude dynamic rms tolerance	0.5 %	Limit +/- 0.75 deg
1. 4. 1.	RF module phase static rms tolerance	1 deg	Limit +/- 1.0 deg
1. 4. 1.	RF module amplitude static rms tolerance	0.6 %	Limit +/- 1.0 %
1. 4. 1.	RF segment amplitude static rms tolerance	0.6 %	Limit +/- 1.0 %
1. 4. 1.	RF field response time	100 us	depends on DTL CCL Nb linac
1. 4. 1. x	Klystron gallery width x height	30x20 ft	

## 1. 9. CONTROLS

1. 9.	x	Macropulse rate	subharm of 60 Hz
1. 9.	x	Single macropulse capability	yes
1. 9.	x	Macropulse variable length	0.10 to 1.0 ms
1. 9.	x	Linac beam ramp up	20 us
1. 9.	x	Chopper variable beam pulse length	645 to 65 ns
1. 9.	x	Chopper variable gap length	300 to 880 ns
1. 9.	x	Single mini (or turn) pulse capability	yes