





Run Number	LC description	Simulated % time down incl forced MD	Simulated % time fully up integrating lum or sched MD	Simulated % time integrating lum	Simulated % time scheduled MD	Simulated % time opportunistic MD
ILC1	2 tunnels with min in accel tunnel; conventional e+; Nominal MTBFs	30,1	69,9	67,5	2,4	4,6
E+ source studies						
ILC2	ILC1 but table A MTBF's	14,9	85,1	80,0	5,1	1,9
ILC3	ILC2 but with undulator e+ and no keep alive e+ source	20,5	79,5	68,6	10,9	1,6
ILC4	ILC2 but with undulator e+ and keep alive e+ source 1	16,5	83,5	78,0	5,5	1,7
ILC5	ILC2 but with undulator e+ and keep alive e+ source 2	17,0	83,0	78,3	4,8	2,8
ILC6	ILC2 but with undulator e+ and keep alive e+ source 3	16,8	83,2	78,5	4,8	2,6
ILC7	ILC2 but with undulator e+ and keep alive e+ source 4	20,4	79,6	69,1	10,5	1,6
Tunnel configuration study						
ILC8	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	30,5	69,5	64,2	5,3	2,2
ILC9	1 tunnel w/ mods in support buildings; no robots; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	26,5	73,5	68,1	5,5	2,0
ILC10	everything in 1 tunnel; with robotic repair ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	22,0	78,0	73,0	5,1	2,4
ILC11	2 tunnels w/ min in accel tunnel; support tunnel only accessible with RF off; undulator e+ w/ keep alive 2	22,9	77,1	72,3	4,8	2,7
ILC12	2 tunnels with min in accel tunnel; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	17,0	83,0	78,3	4,8	2,8
ILC13	2 tunnels w/ some stuff in accel tunnel; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	21,3	78,7	73,8	4,8	2,7
ILC14	2 tunnels w/ some stuff in accel tunnel w/ robotic repair; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	17,0	83,0	78,2	4,8	2,8
ILC15	ILC9 but table B MTBFs and 6% linac energy overhead	14,7	85,3	79,4	6,0	1,5
ILC16	ILC15 but table C MTBFs and 3% linac energy overhead	15,2	84,8	79,2	5,6	1,9
Sensitivity Studies						
ILC5	ILC2 but with undulator e+ and keep alive e+ source 2	17,0	83,0	78,3	4,8	2,8

ILC17	ILC5 but no hot spare klystron/modulator where there are single points of failure	18,8	81,2	77,0	4,2	3,3
ILC18	ILC5 but 'commissioning' (0.5xMTBF, 2xMD, 2xTuneTime)	44,9	55,1	45,5	9,6	4,9
ILC19	ILC3 but 'commissioning' (0.5xMTBF, 2xMD, 2xTuneTime)	52,8	47,2	25,4	21,8	2,7
ILC20	ILC5 but MTTRs twice as fast	12,9	87,1	81,8	5,3	2,2
ILC21	ILC5 but recovery time halved	12,6	87,4	82,5	4,9	2,6
ILC22	ILC5 but 3 hour cooldown instead of 1	18,2	81,8	77,1	4,7	2,8
ILC23	ILC5 but with DR in separate tunnel	16,9	83,1	79,0	4,1	3,4
ILC24	ILC5 but with both DR in same non-linac tunnel	22,0	78,0	73,3	4,8	2,7
ILC5.20	ILC2 but with undulator e+ and keep alive e+ source 2	16,0	84,0	77,9	6,2	1,3
ILC5.6	ILC2 but with undulator e+ and keep alive e+ source 2	16,0	84,0	77,8	6,2	1,3
ILC5.3	ILC2 but with undulator e+ and keep alive e+ source 2	17,7	82,3	76,7	5,6	1,9
ILC5.2	ILC2 but with undulator e+ and keep alive e+ source 3	19,7	80,3	74,9	5,4	2,1
ILC5.1	ILC2 but with undulator e+ and keep alive e+ source 4	29,9	70,1	66,8	3,2	4,3
Linac, DR, BDS all 1 tunnel						
ILC8.20	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	28,4	71,6	66,3	5,3	2,2
ILC8.6	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	28,7	71,3	66,0	5,3	2,2
ILC8.3	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	31,5	68,5	63,2	5,3	2,2
ILC8.2	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	35,7	64,3	59,0	5,3	2,2
ILC8.1	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	46,4	53,6	48,8	4,8	2,7
Linac, DR, BDS all 1 tunnel, table C MTBFs						
ILC25.20	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	14,4	85,6	79,6	6,1	1,4
ILC25.6	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	14,6	85,4	79,3	6,1	1,5
ILC25.3	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	17,5	82,5	76,9	5,7	1,9

ILC25.2	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	20,9	79,1	73,6	5,4	2,1
ILC25.1	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	30,7	69,3	63,9	5,5	2,1
	Linac, DR, BDS all 1 tunnel, table C MTBFs, idealize klyclus					
ILC25.20	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	13,2	86,8	80,5	6,2	1,3
ILC25.6	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	13,2	86,8	80,6	6,3	1,2
ILC25.3	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	14,0	86,0	80,0	6,0	1,6
ILC25.2	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	15,6	84,4	78,5	5,9	1,6
ILC25.1	everything in 1 tunnel; no robots ; undulator e+ w/ keep alive 2; Tuned MTBFs in table A	25,7	74,3	68,8	5,5	2,0

Simulated % time useless down	Simulated number of accesses per month	energy overhead (%)
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25,5	7,7	
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13,0	2,9	
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18,9	3,3	
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14,8	3,4	
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14,2	3,4	
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14,2	3,4	
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18,8	3,3	
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28,3	18,1	
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24,4	11,1	
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19,5	5,9	
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20,2	3,7	
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14,2	3,4	
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18,7	9,7	
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14,3	3,5	
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13,1	5,6	
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13,3	6,5	
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14,2	3,4	
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15,5	3,3
40,0	4,2
50,1	3,5
10,7	3,4
10,0	3,6
15,4	3,3
13,5	3,4
19,2	3,2

14,6	20
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14,7	6,0
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15,8	3,0
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17,6	2,0
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25,7	1,0
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26,2	20
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26,5	6,0
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29,3	3,0
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33,5	2,0
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43,7	1,0
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12,9	20
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13,2	6,0
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15,6	3,0
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18,9	2,0
28,6	1,0
12,0	20
11,9	6,0
12,5	3,0
14,0	2,0
23,7	1,0

Device	Improvement factor A for 2 tunnel conventional e+ source	Improvement factor B for 1 tunnel undulator e+ source, 6% energy overhead
magnets - water cooled	20	20
power supply controllers	10	50
flow switches	10	10
water instrumentation near pump	10	10
power supplies	5	5
kicker pulser	5	5
coupler interlock sensors	5	5
collimators and beam stoppers	5	5
all electronics modules	3	10
AC breakers < 500 kW		10
vacuum valve controllers		5
regional MPS system		5
power supply - corrector		3
vacuum valves		3
water pumps		3
modulator		
klystron - linac		
coupler interlock electronics		
linac energy overhead		3%

Improvement factor C for	
1 tunnel undulator e+	
source, 3% energy Nominal MTBF	
overhead (hours)	
20	1.000.000
50	100.000
10	250.000
30	30.000
5	200.000
5	100.000
5	1.000.000
5	100.000
10	100.000
10	360.000
5	190.000
5	5.000
3	400.000
3	1.000.000
3	120.000
3	50.000
5	40.000
5	1.000.000
	3%

Run Number	LC description	Simulated % time down incl forced MD	Simulated % time fully up integrating lum or sched MD	% time scheduled maintenance	Simulated % time integrating lum
ILC5	Pre-RDR, undulator e+, KAS Updated towards RDR and SB2009 repair fraction of cryo and all other devices each long down, 5 month run, fix extra things during unsched downs, no sched downs, table D MTBFs, 20% energy overhead, low P	17,7	82,3	0,0	76,7
ILC105		13,2	86,8	0,0	80,9
ILC106	ILC 105 but linac in 1 tunnel	15,6	84,4	0,0	78,9
ILC107	ILC 105 but no extra repairs during unsched down	13,9	86,1	0,0	80,6
ILC108	ILC 107 but add sched downs with no repairs made	13,0	81,0	6,1	75,3
ILC109	ILC 107 but add sched downs with repairs made (incl klys) (2 tunnel 10 MW)	13,4	79,7	6,8	74,1
ILC113	ILC109 but 1 tunnel and KlyClus	14,3	78,7	6,8	73,7
ILC114	ILC109 but 1 tunnel and DRFS	14,3	78,6	6,8	73,6
ILC115	ILC109 but 1 tunnel 20% energy overhead	14,3	78,7	6,7	73,7
ILC109	ILC 107 but add sched downs with repairs made (incl klys) (2 tunnel 10 MW)	13,4	79,7	6,8	74,1
ILC113	ILC109 but 1 tunnel and KlyClus	14,3	78,7	6,8	73,7
ILC114	ILC109 but 1 tunnel and DRFS	14,3	78,6	6,8	73,6
ILC115	ILC109 but 1 tunnel 3% energy overhead	14,3	78,7	6,7	73,7
ILC109	ILC 107 but add sched downs with repairs made (incl klys) (2 tunnel 10 MW)	18,3	74,6	6,9	70,3
ILC113	ILC109 but 1 tunnel and KlyClus	16,7	76,3	6,7	72,0
ILC114	ILC109 but 1 tunnel and DRFS	21,1	71,8	6,7	68,3
ILC115	ILC109 (10MW) but 1 tunnel 4% energy overhead	32,2	60,8	6,4	57,5
ILC109	ILC 107 but add sched downs with repairs made (incl klys) (2 tunnel 10 MW)	14,6	78,4	6,8	73,2
ILC113	ILC109 but 1 tunnel and KlyClus	14,5	78,5	6,7	73,7
ILC114	ILC109 but 1 tunnel and DRFS	17,0	76,0	6,7	71,8
ILC115	ILC109 (10MW) but 1 tunnel 6% energy overhead	26,7	66,2	6,6	62,8

ILC109	ILC 107 but add sched downs with repairs made (incl klys)	13,2	79,8	6,8	74,2
ILC113	ILC109 but 1 tunnel and KlyClus	14,3	78,7	6,8	73,7
ILC114	ILC109 but 1 tunnel and DRFS	14,4	78,6	6,8	73,6
ILC115	ILC109 (10MW) but 1 tunnel	20,1	72,6	6,9	68,5

Simulated % time scheduled MD	Simulated % time actual opportunistic MD	Simulated % time useless down
5,6	1,9	15,8

5,9	1,6	11,6
5,5	2,0	13,6

5,5	2,0	11,9
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5,7	1,8	11,2
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5,6	1,9	11,5
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5,0	2,5	11,8
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5,0	2,5	11,8
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5,0	2,5	11,8
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5,6	1,9	11,5
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5,0	2,5	11,8
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5,0	2,5	11,8
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5,0	2,5	11,8
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4,3	3,2	15,1
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4,2	3,3	13,5
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3,6	3,9	17,2
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3,3	4,2	28,0
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same but not
low p

16,4

76,6

6,8

71,8

Need to investigate why lost 3% when only 1%

5,3	2,3	12,3
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4,8	2,7	11,8
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4,2	3,4	13,7
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3,4	4,1	22,6
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5,6	1,9	11,3
5,0	2,5	11,8
5,0	2,5	11,8
4,1	3,4	16,7

4,8 2,7 13,7

% is due to RF power sources. (LLRF?)