ILC Positron Systems Keep Alive Source

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October 9, 2007

ILC Positron Systems KAS

ILC Positron System Keep Alive Source (KAS)

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Rev 1: April 10, 2006

The Keep Alive Source (KAS) is required to produce an unpolarized, 10% single bunch intensity, full bunch structure, and repetition rate positron beam. It is envisioned that this beam will be used when the primary positron production is down due issues in electron side of the machine. The KAS can also be used for initial commissioning and machine turn-on. Electrons from the KAS drive beam may be used directly for commissioning of positron systems with a low emittance beam. If polarized, these electrons can serve as the source for the e-e- and $\gamma\gamma$ options.

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The KAS is a conventional positron system utilizing a 500 MeV drive electron beam, incident onto a 4 r.l. thick W target. The systems downstream of the target are chosen to be the same that are used in the primary ILC positron source: OMD followed by a 125 MeV capture region, separation dogleg and 125-400 MeV pre-accelerator. 400 MeV positrons are then injected into the 400-5000 MeV positron booster linac. Basic requirements are design features are listed in table 1. Figure 1 shows to overall layout of the ILC KAS.

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Positron Beam

Positron Intensity	2×10^{9}	e+/bunch	N_b	
Number of Bunches	2625	Bunches/train	n_b	
Bunch spacing	369	ns	t_b	
Repetition rate	5	Hz	f_{rep}	
Energy	5000	MeV	E_{e+}	
Beam Power	21	kW	P_{e+}	
Overhead	1.5		F	

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Electron Drive Beam

Electron Intensity	2×10^{10}	e-/bunch	N_b	
Number of Bunches	2625	Bunches/train	n_b	
Bunch spacing	369	ns	t_b	
Repetition rate	5	Hz	f_{rep}	
Energy	500	MeV	E_{e-}	
Beam Power	21	kW	P_{e-}	

Target System

Target Material	W23%Re			
Target Thickness	4	r.l.	L_t	
Target Thickness	1.4	cm	L_t	
Peak Energy Deposition	?	J/g		Needs checking
Average Power Deposition	3.4	kW		
Average Energy Absorption	16	%		
Target Diameter	1	m		Needs checking
Target Rotation Speed	1000	rpm		Needs checking
Perimeter Velocity	52	m/s		Needs checking
FC/AMD Field	6	T		

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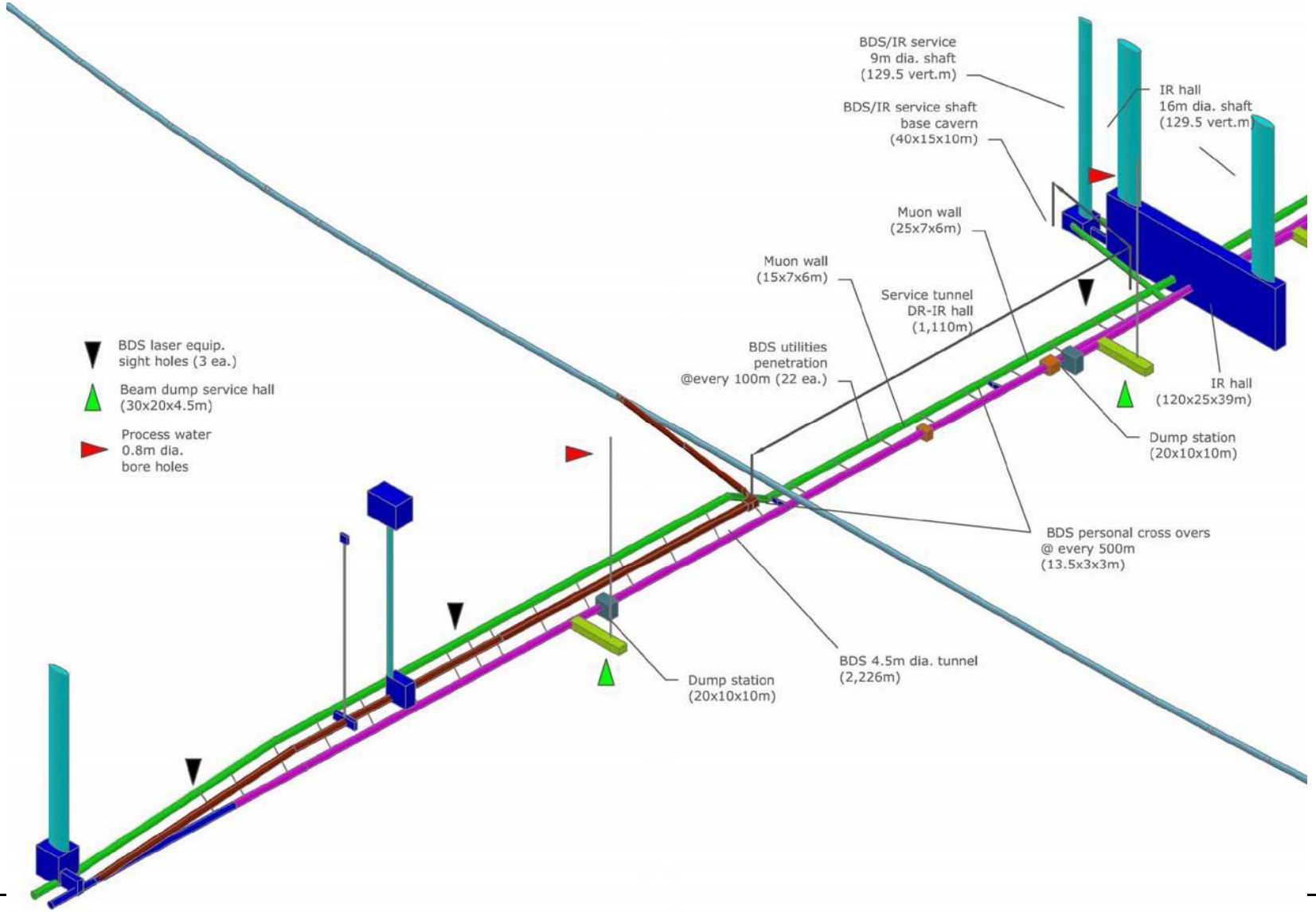

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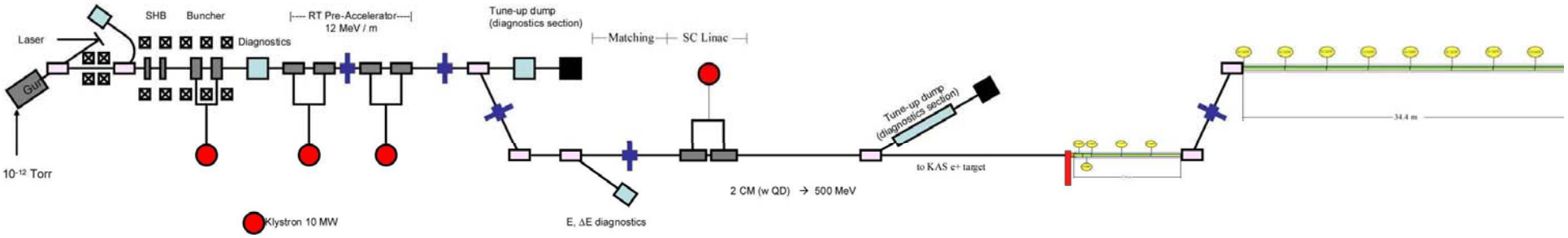
ILC Keep Alive Source, Rev 0.



17 Klystrons

2 Cryomodules

18 NC RF Sections + 0.5T Solenoids

(needs modest update)

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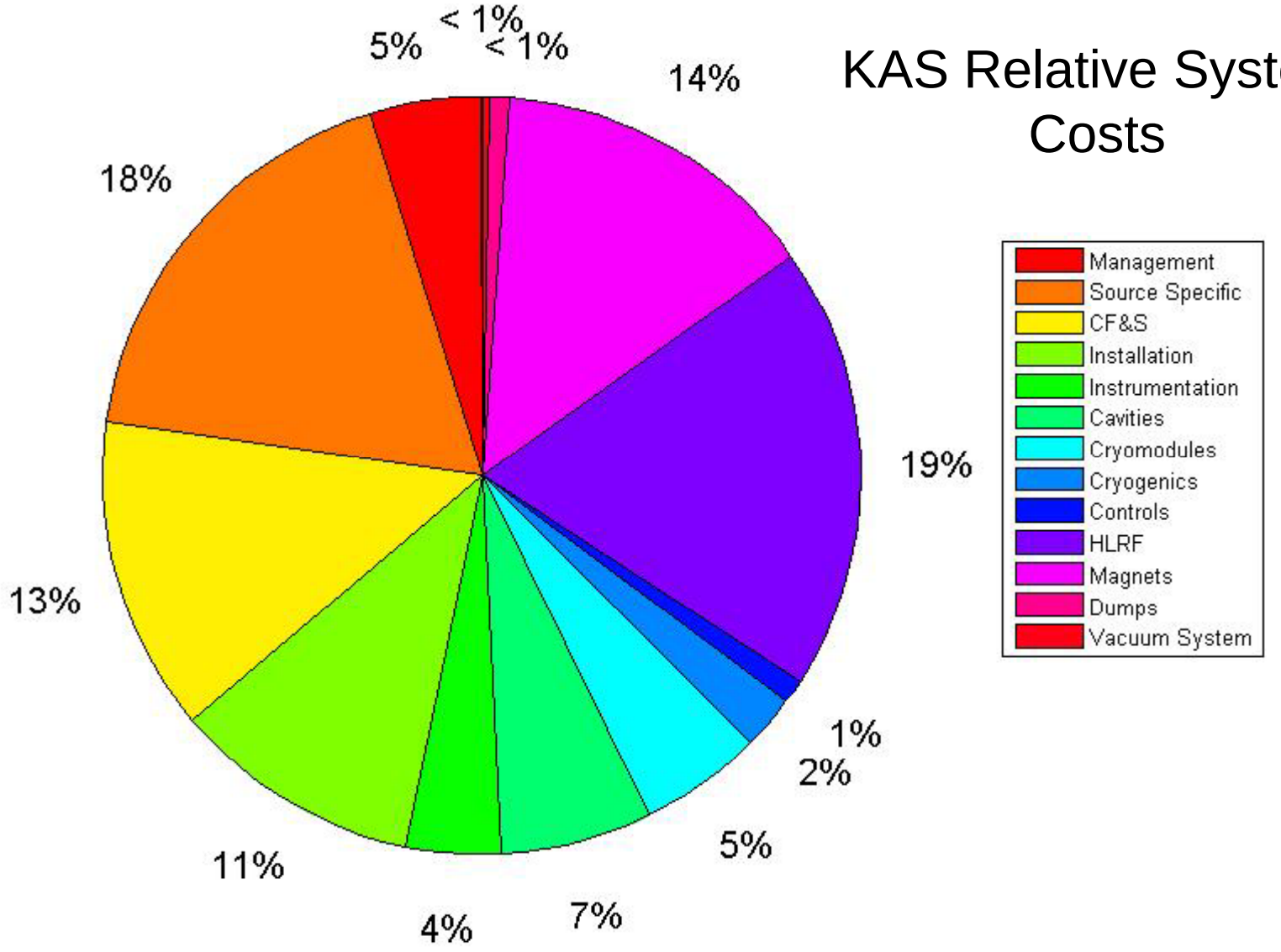
KAS Relative System Costs



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Utility of KAS to assure ILC availability should be reaffirmed by EDR management

Performance specifications should be restated (note the bunch format is not a cost driver, bunch intensity is a cost driver due to drive beam energy considerations)

The cost of the KAS is ~15% of the total ILC positron system cost (due in large to the rf systems: 900 MeV of linacs, 400 MeV of which is normal conducting)

Specification of commissioning requirements, electron-electron, and gamma-gamma options are need and may justify KAS Driver (aka KAS 500 MeV electron driver)