



ILC Positron and Electron Sources

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SLAC



ILC Electron and Positron Beams

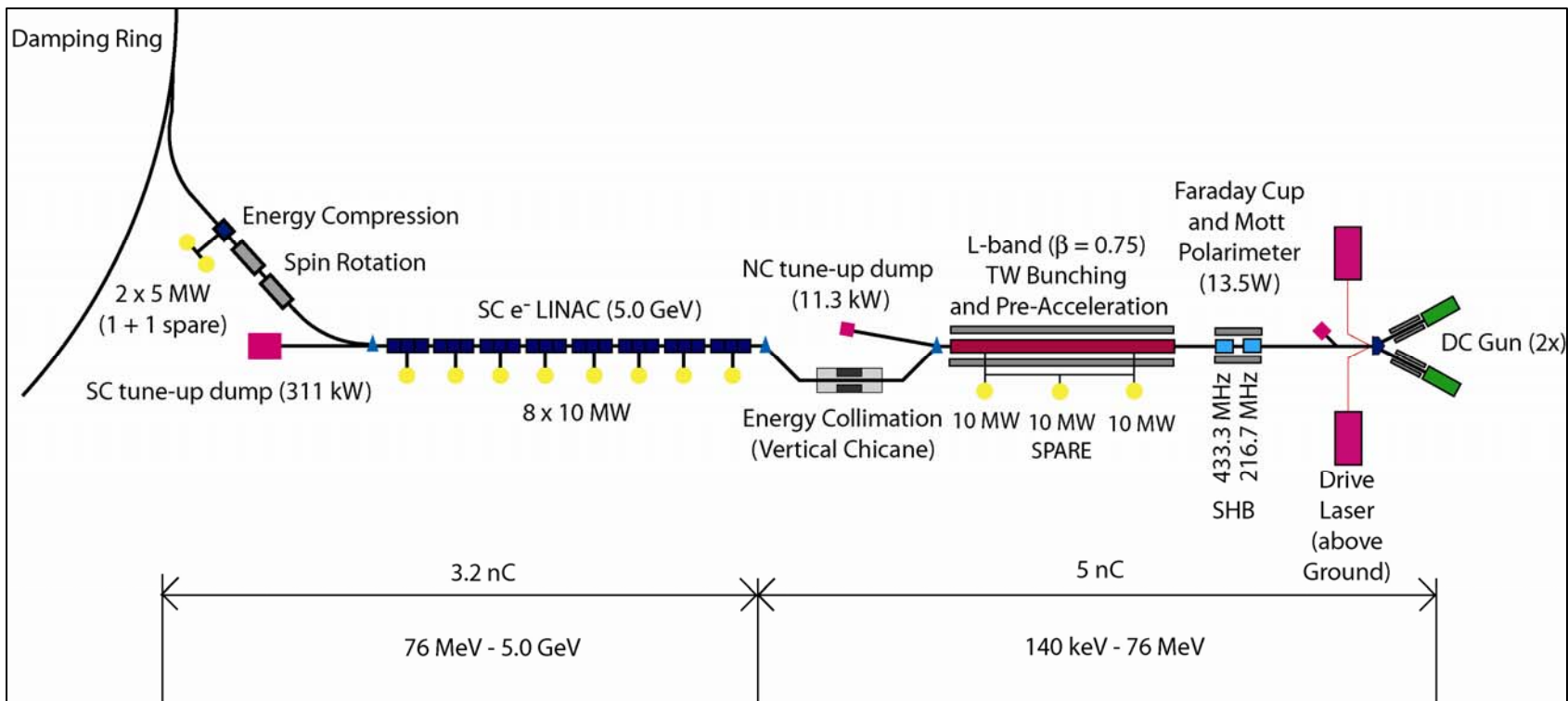
TABLE 1). Major parameters of the ILC and CLIC high-current high-polarization electron sources.

Parameters	ILC	CLIC
Particles Per Microbunch	3×10^{10}	6×10^9
Number Of Microbunch	2625	312
Width Of Microbunch	1 ns (~ps)	100 ps (~ps)
Time Between Microbunches	360 ns	500.2 ps
Bunching Frequency	3 MHz	2 GHz
Width Of Macropulse	1 ms	156 ns
Macropulse Repetition Rate	5 Hz	50 Hz
Charge Per Macropulse	12600 nC	300 nC
Normalized Emittance, source	0.1 m-rad	0.1 m-rad
Normalized Emittance, damped	$1 \times 10^{-5} / 4 \times 10^{-8}$ m-rad	$6 \times 10^{-7} / 2 \times 10^{-8}$ m-rad
Polarization, electrons	>80%	>80%



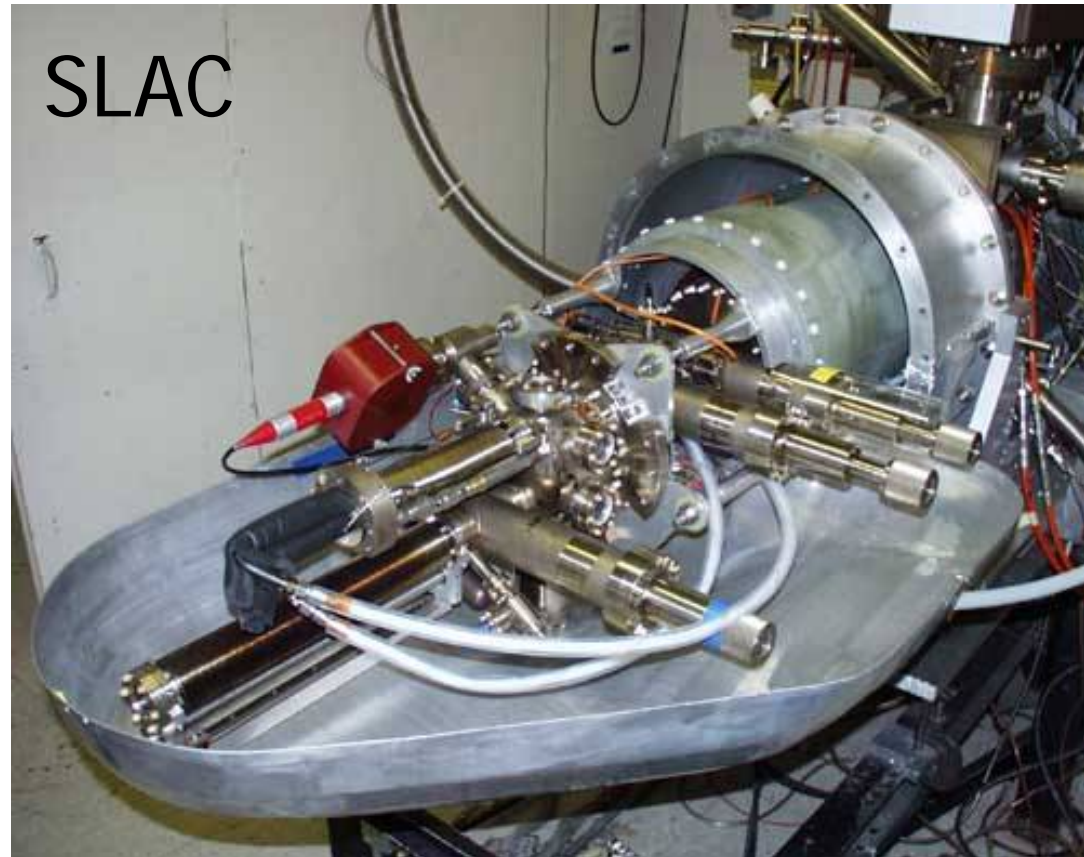
The Baseline Electron Source (Brachmann)

Electron source provides polarized electron beam and consists of all systems from source laser to 5 GeV injection to damping rings.



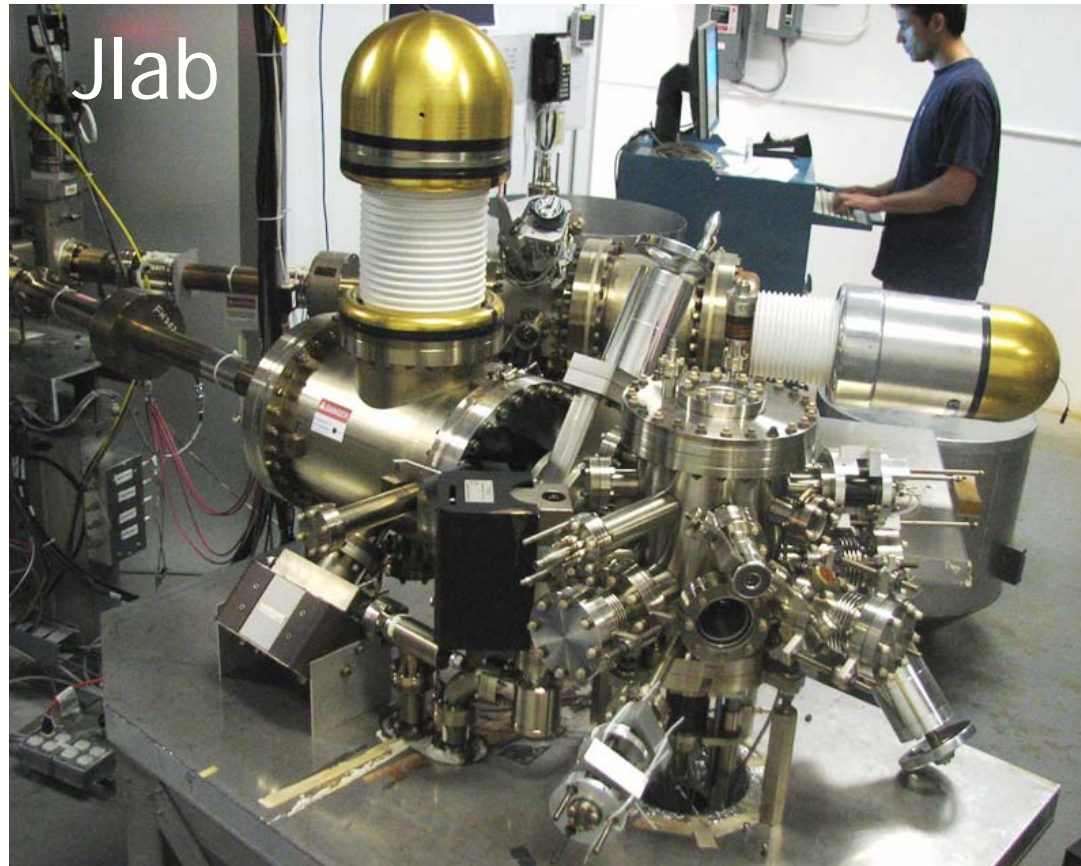


SLAC Polarized Electron Gun, GTL





Jefferson Lab Polarized Electron Gun





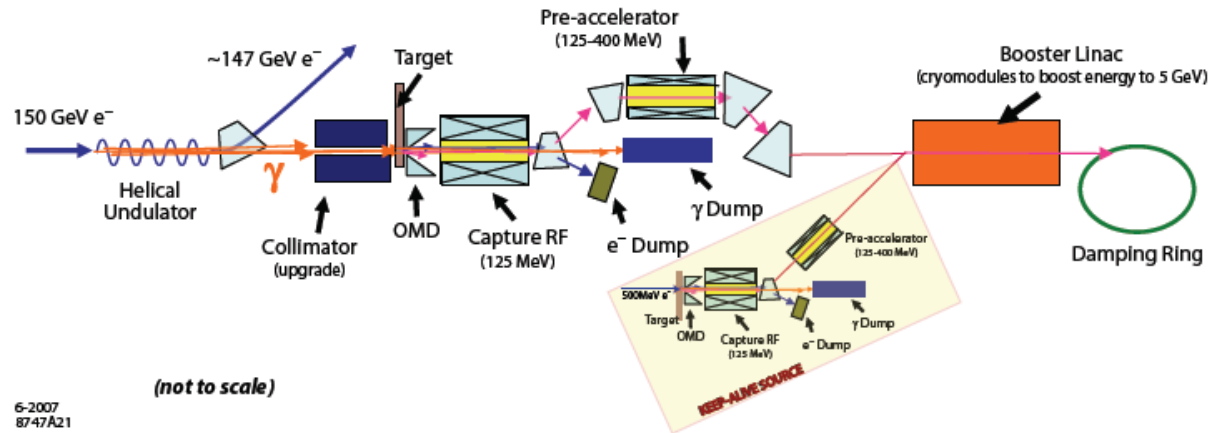
ILC Electron Beams, Critical Issues

3 MHz Laser System (responds to money)

Cathode Demonstration (probably a non-issue)



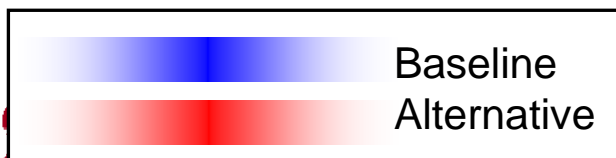
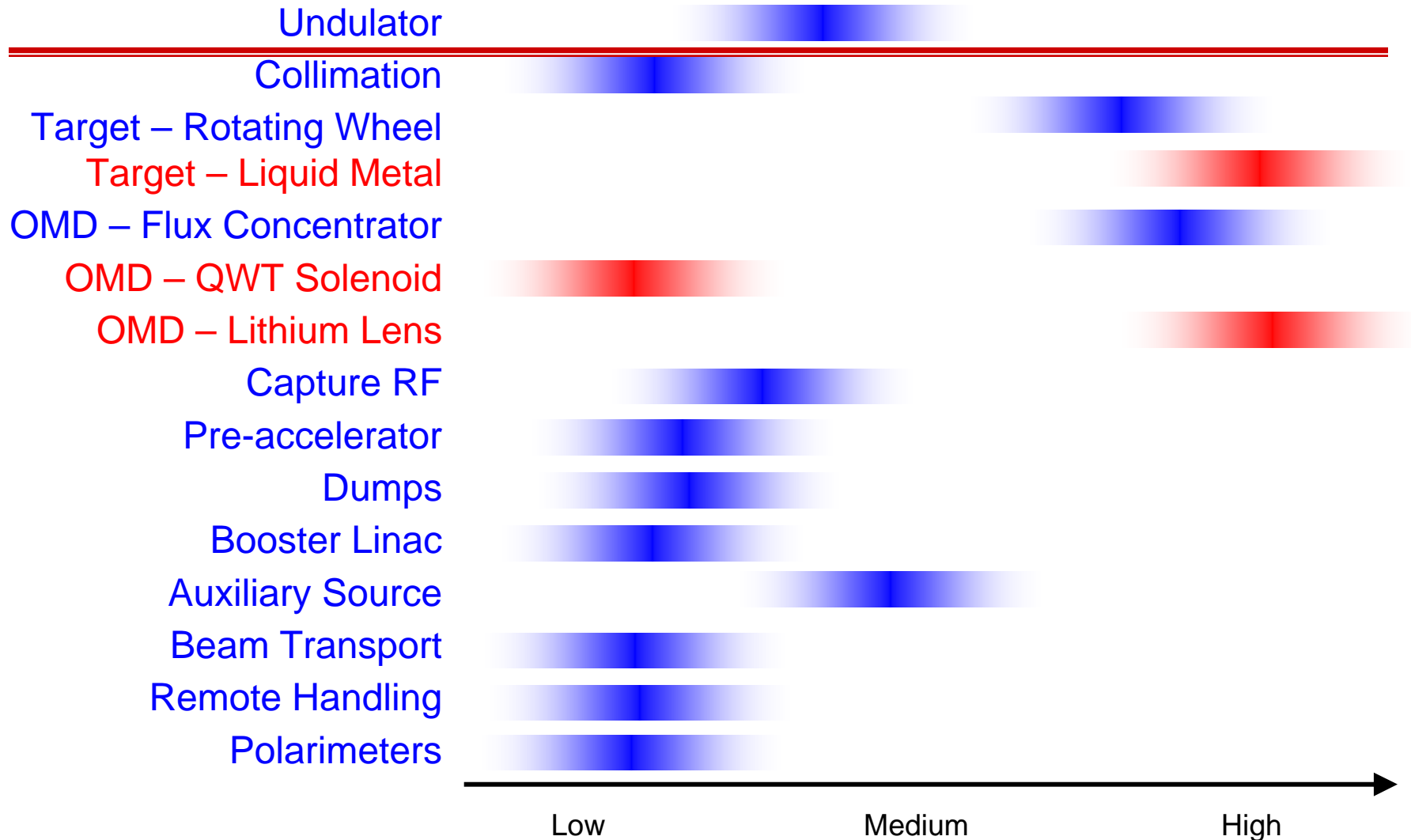
The Baseline Positron Source (Clarke)



	SLC	ILC
Positrons per Bunch	3.5×10^{10}	2×10^{10}
Bunches per Macropulse	1	2625
Macropulse Rep Rate (Hz)	120	5
Positrons per second	4.2×10^{12}	2.6×10^{14}



ILC Positron Critical Issue Summary (Clarke)





Excel Parameter Sheet (Raubenheimer)

Developed an Excel-based parameter sheet that can help think about the impact

Have asked all acceleration conveners to consider parameters for a 1 TeV cms LC with a luminosity of $2 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$

Meant as a starting point

Versions	100pm v1	100pm v2	100pm v3
more details	SC	S-band	X-band or two beam
Case ID	101	102	103
Ecms [GeV]	1000	1000	1000
gamma	9.78E+05	9.78E+05	9.78E+05
Mode	e+ e-	e+ e-	e+ e-
Polarization	no,yes	no,yes	no,yes
Energy reach, S, GeV	1000	1000	1000
N	1.0E+09	1.0E+09	1.0E+08
nb	1200	120	120
DR kicker time [ns]	3	3	3
Min DR perimeter [km]	1.1	0.1	0.1
DR perimeter [km]	3	3	3
Number of Damping Rings	2	2	2
Length of both BDS [km]	4.5	4.5	4.5
Geographic gradient [Mev/m]	22	50	90
Length of both linacs [km]	45.5	20.0	11.1
Site length estimate [km]	50.0	24.5	15.6
Tsep in Linac [ns]	480.0	1.0	1.0
lave in train [A]	0.0003	0.1600	0.0160
f rep [Hz]	5	50	500
Pb [MW]	0.5	0.5	0.5
Electron polarization, %	80	80	80
Positron polarization, %	N/A	N/A	N/A
Electron E-spread, %	0.14	0.14	0.14
Positron E-spread, %	0.07	0.07	0.07
IP Parameters:			
gamepsX [m]	1.0E-06	1.0E-06	1.0E-07
gamepsY [m]	1.0E-10	1.0E-10	1.0E-10
bx [m]	1.0E-02	1.0E-02	1.0E-03
by [m]	1.0E-04	1.0E-04	1.0E-04
Travelling focus	yes	yes	yes
Z-distribution	Gauss	Gauss	Gauss