Polarized Electron Source Future R&D

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on behalf of the ILC IDT WG2 – Sources

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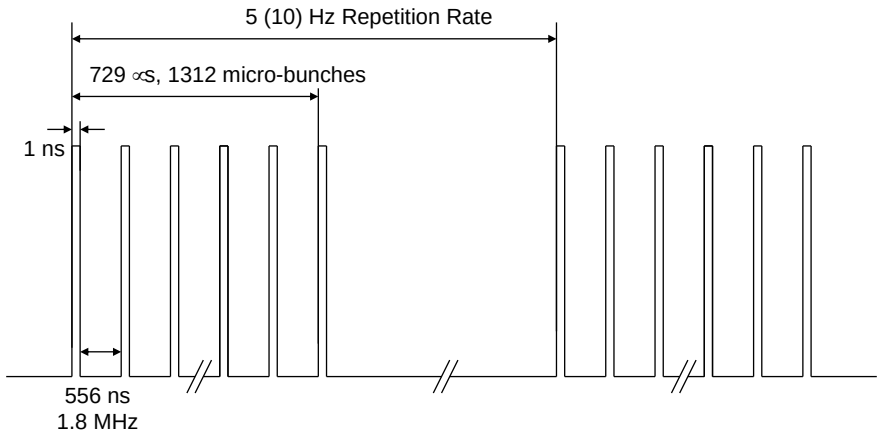
The baseline design of the ILC polarized electron source includes:

- 200 kV **DC high voltage photo-gun**, free of field emission
- **Drive laser** providing bunch pattern, sufficient power and laser polarization
- **High-P GaAs photocathodes** providing P>90% and QE>1%

Polarized electron source parameters from the TDR

Parameter	Symbol	TDR
Number Electrons per microbunch	N_e	3×10^{10}
Number of microbunches	n_b	1312
Width of microbunch	t_b	1 ns
Time between microbunches	Δt_b	556 ns
Microbunch rep rate	f_b	1.8 MHz
Width of macropulse	T_B	729 μs
Macropulse repetition rate	F_B	5 (10) Hz
Charge per micropulse	C_b	4.8 nC
Charge per macropulse	C_B	6300 nC
Average current from gun (C_B x F_B)	I_{ave}	31.5 (63) uA
Average current macropulse (C_B / T_B)	I_B	19.8 mA
Duty Factor in macropulse (1 ns / 556 ns)	DF	0.18 %
Peak current of micropulse (I_B / DF)	I_{peak}	11 A



← **Drive Laser (repetition rate)**

← **High-P Photocathode (quantum efficiency)**

← **Gun Vacuum (operating lifetime)**

← **Gun HV (peak current & surface charge limit)**

Round-table discussion on spin-polarized photocathode R&D

- What are the requirements/challenges from spin polarized photocathodes?
- What R&D is being pursued now?
- What issues are faced in R&D or obtaining spin polarized photocathodes?
- Are there opportunities which should be explored?
- What roles should Universities, National Labs, and Industry play?
- Are there sufficient funding sources and resources available to meet future needs?
- Could there be improvements in how progress is shared or collaborations formed?