

Polarized Source Program
(03/14/05)

Basic specifications of the laser system for the un-polarized and polarized source

Parameter	TESLA 500	TESLA 800	Polarized Source
Wavelength	< 270 nm	< 270 nm	~ 800 nm
Train Rep Rate	5 Hz	3 Hz	5 Hz
Pulse Train Length	950 μ s	860 μ s	950 μ s
No of pulses per train	2820	4886	2820
Pulse spacing	337 ns	176 ns	337 ns
Pulse energy	3 μ J	2 μ J	5 μ J
Pulse length (FWHM)	10 ps	10 ps	700 ps -2 ns ^[1]
Spot radius on Cathode	3 mm (flat top)	3 mm (flat top)	12 mm
Gun bunch charge			4.5 nC ^[2]
Peak current			2.25 A
Cathode bias voltage			-120 kV
Accelerating field			1.8 MV/m

[1] TESLA TDR II-111, 4.2

“With a bunch charge of 3.2 nC (2.2 nC for TESLA 800), a bunch length of at least 320 ps is required to keep the peak current below the 10 A limit. A bunch length of 2 ns has been chosen to ease the design of the laser system”

[2] We assume 6.4 nC, which is twice the charge required at the IP.

Polarized Source R&D identified in TESLA TDR assuming the use of a DC gun:

- Simplify load-lock system (inverted gun)
- Ion bombardment reduction by reduction of field at cathode (SLC gun 7 MV/m, TESLA gun 1.8 MV/m)
- Space charge
- Cathode charge limit
- TESLA TDR assumes cathode recovery time is not an issue, however the extraction of a 1 ms long bunch train needs to be demonstrated
- Laser System (Ti:Sapphire, Cr:LiCAF, OPA)

Pre-accelerator LINAC (TESLA 500 design)

- Focussing solenoids
- Subharmonic buncher
 - TESLA TDR refers to PARMELA simulations ← pickup here
- NC pre-acceleration to 76 MeV

Milestones 2005

1. B006 roof repair

Burl Skaggs:

“Building 006 is planned for this spring, we are waiting for funding to be approved as part of the FY05 GPP project list.”

2. Preparation of laser room (B006/105)

- Laser safety
- Electricity
- Air conditioning

3. Hire physicist

- Photocathode R&D
- Injector simulations (PARMELA)

4. Laser system modeling

Standing meetings

- PES group meeting
Bi-weekly, Wednesdays 9:15 am
- PPRC meeting, ~ monthly – bi-monthly