Sources Session Summary

LCWS 2008

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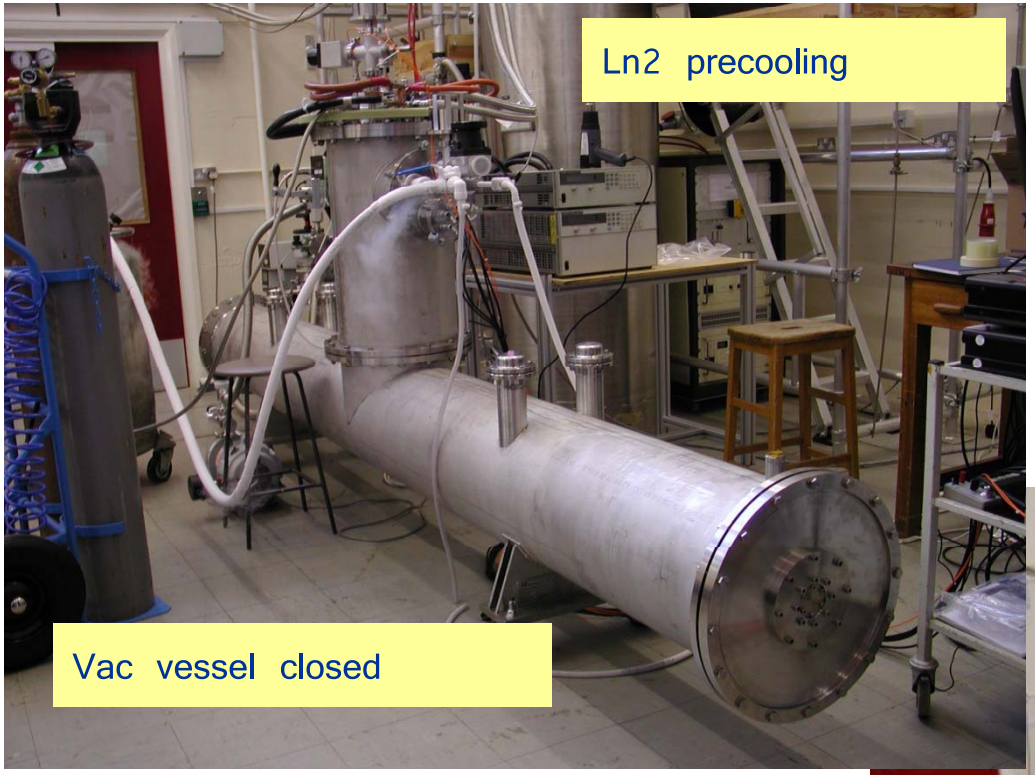
Overview

- One day session (Monday 11/17)
- Total of 16 talks
  - 75 % e+
  - 25 % e-
- Few slides illustrating the highlights …

First Ever Full Length Undulator Cryomodule



Constructed by Rutherford Appleton Lab.

First cooldown of complete system early Sept 08.

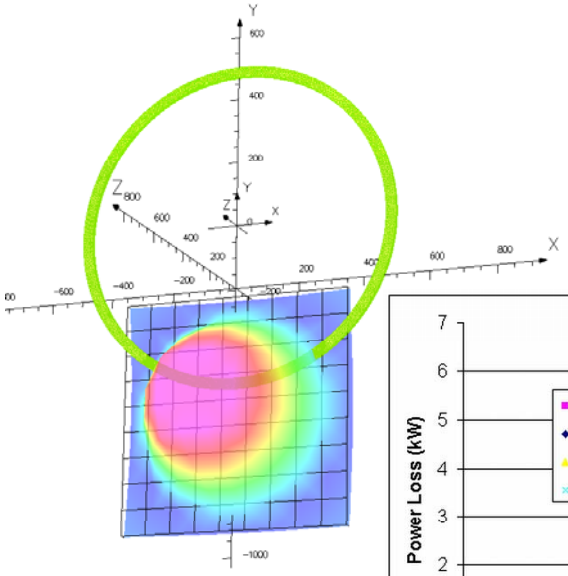
Vertical magnet tests successful – design field exceeded in both 1.75m undulators

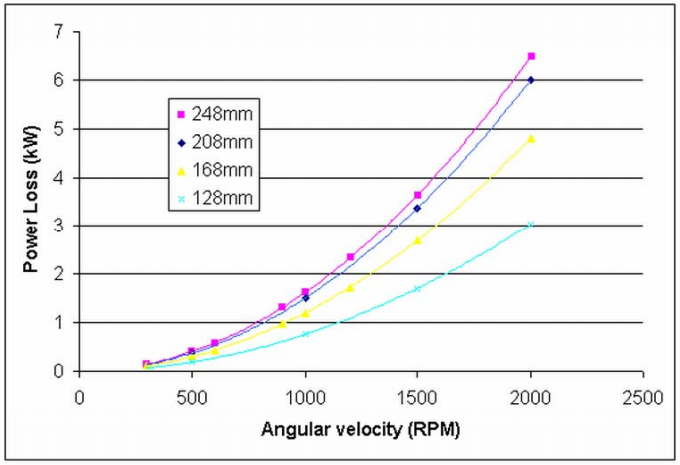
But, vacuum leak when cold – now being repaired – should be complete by Jan 09

Positron Target Tests

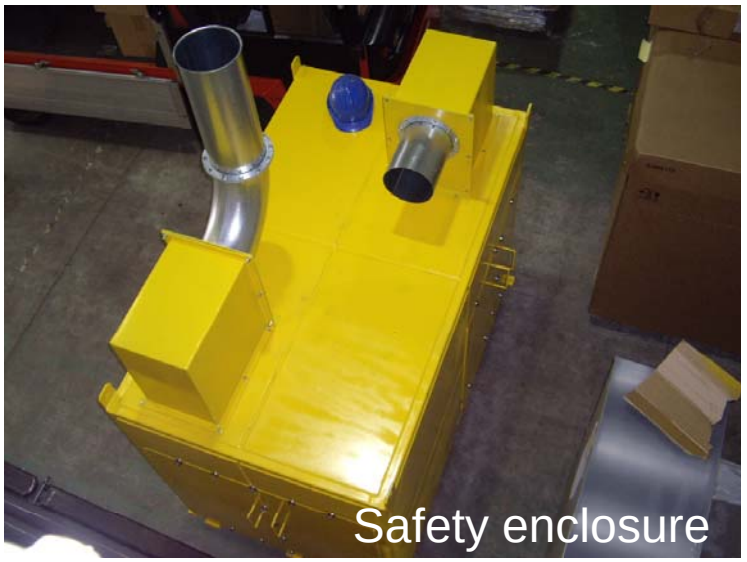
Experiment at Daresbury Lab/Cockcroft Institute to check Eddy current simulations, mechanical stability, etc.

Wheel speed to be increased in stages, full speed of 2000 rpm before end 2008.



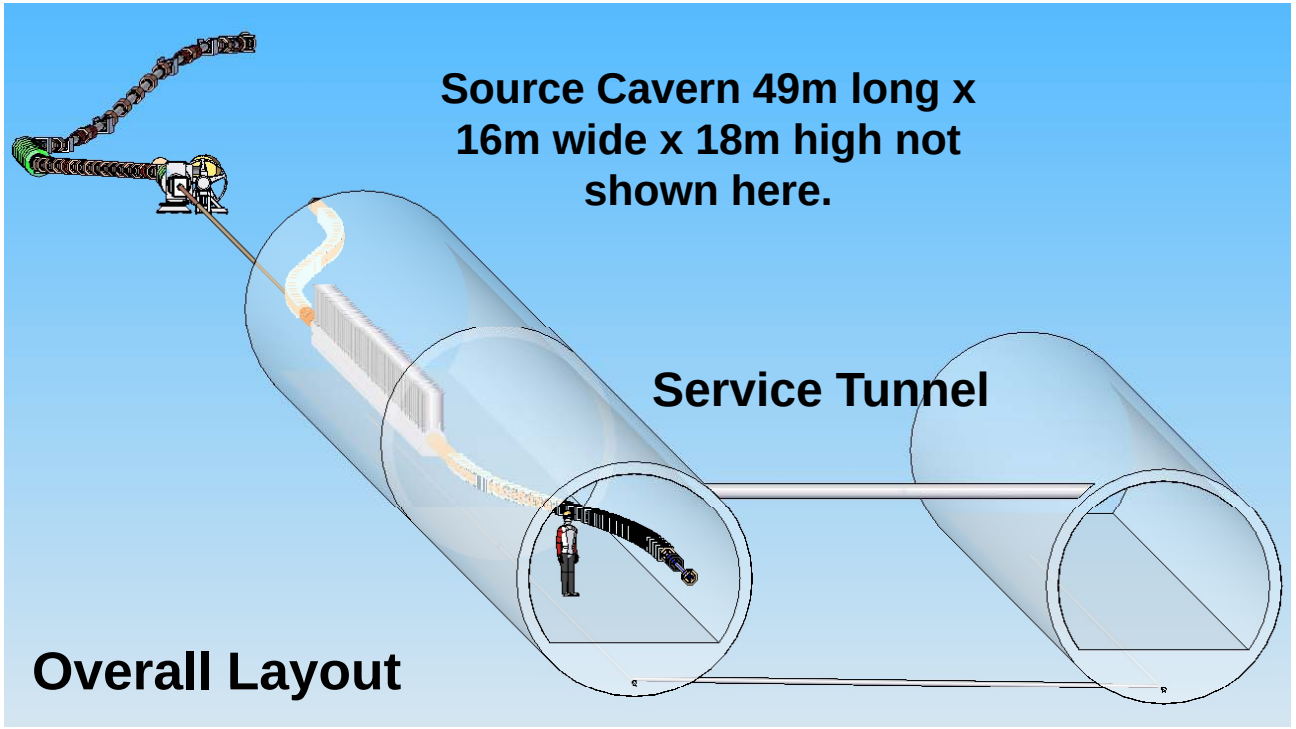



Target wheel & magnet


Safety enclosure

System Integration

- CAD models of RDR layout generated
- Many issues already highlighted
  - Clashes, installation problems, etc
- Minimum machine layouts will start soon with CF&S – trial of EDMS system !

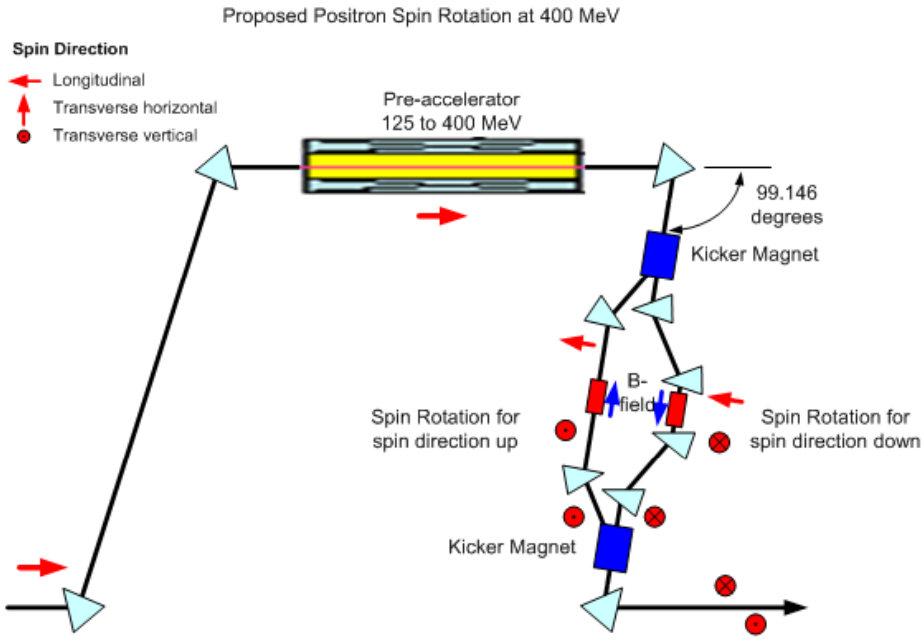


Spin Rotators Before DR

- Proposal to move from 5 GeV to 0.4 GeV
- Considerably easier magnets and less real estate needed (value engineering!), 5Hz flipping much simpler and looks tolerant

With **train by train helicity reversal:**

substantially smaller systematic uncertainties 'in phase' with electrons → increase of lumi (>25%)
smaller polarization error
→ High precision and best flexibility for new physics



Minimum Machine Auxiliary e+ source

By considering the sharing, three options are possible

A)Sharing target, capture, and PPA (Cheapest option)

B)Dedicated target, capture, but shared PPA (Moderate option)

C)Dedicated target, capture, PPA (Most expensive option)

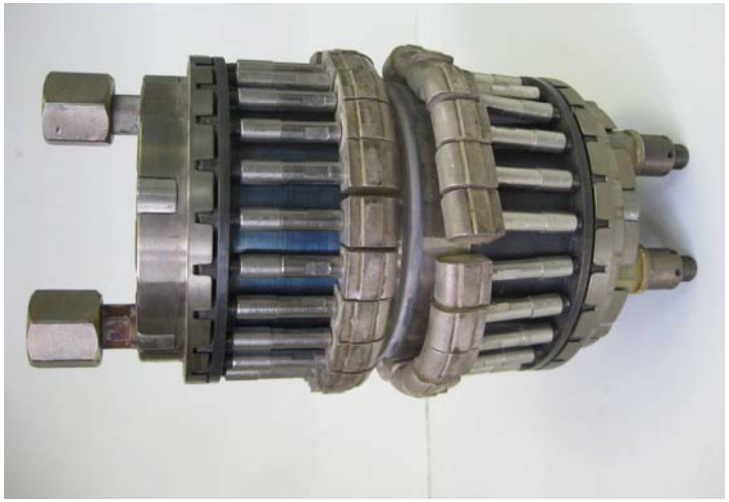
	Option A	Option B	Option C
RF photo-injector	Yes	Yes	Yes
SC e- booster	Yes	Yes	Yes
Target	No	Yes	Yes
Capture RF	No	Yes	Yes
PPA	No	No	Yes

	Relative Cost	Ye+	V=Ye+/Cost
Option A	0.25	0.04	0.16
Option B	0.58	0.32	0.55
Option C	1	0.32	0.32

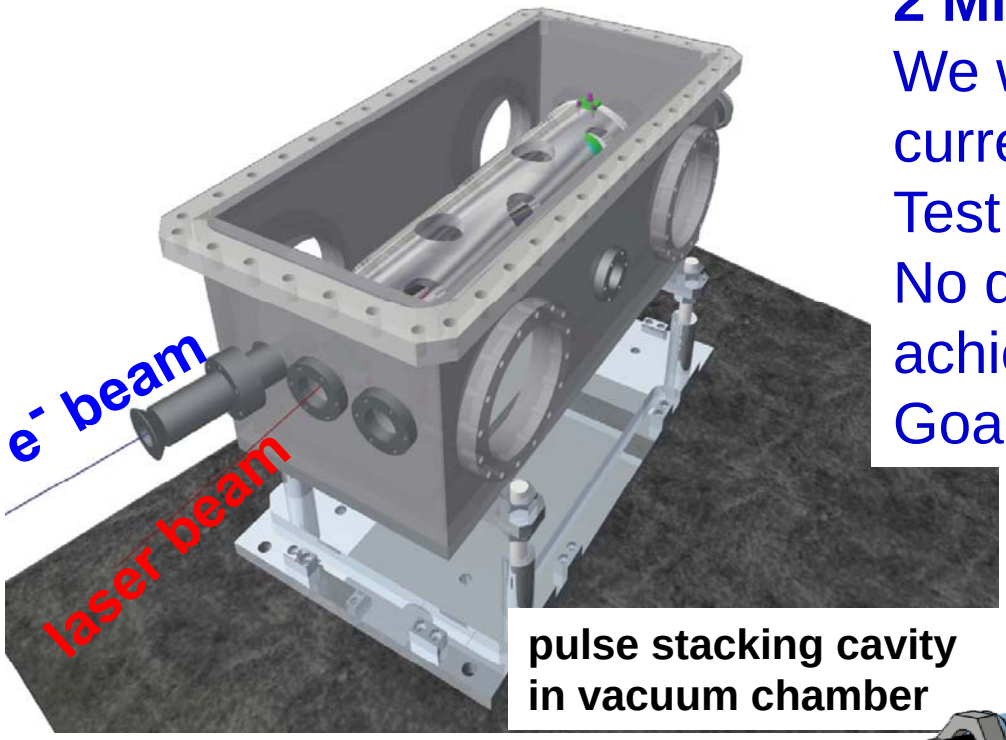
Recommended →

Liquid Lithium Lens

- Provides x 2 yield increase
- BINP have just built one for antiproton capture – first tests ok.
- Windows are main issue for ILC, BN looks good candidate
- BINP tests of the liquid *lead* target with BN windows are in progress
- For ILC BN window tests proposal to use KEKB Ampere beam



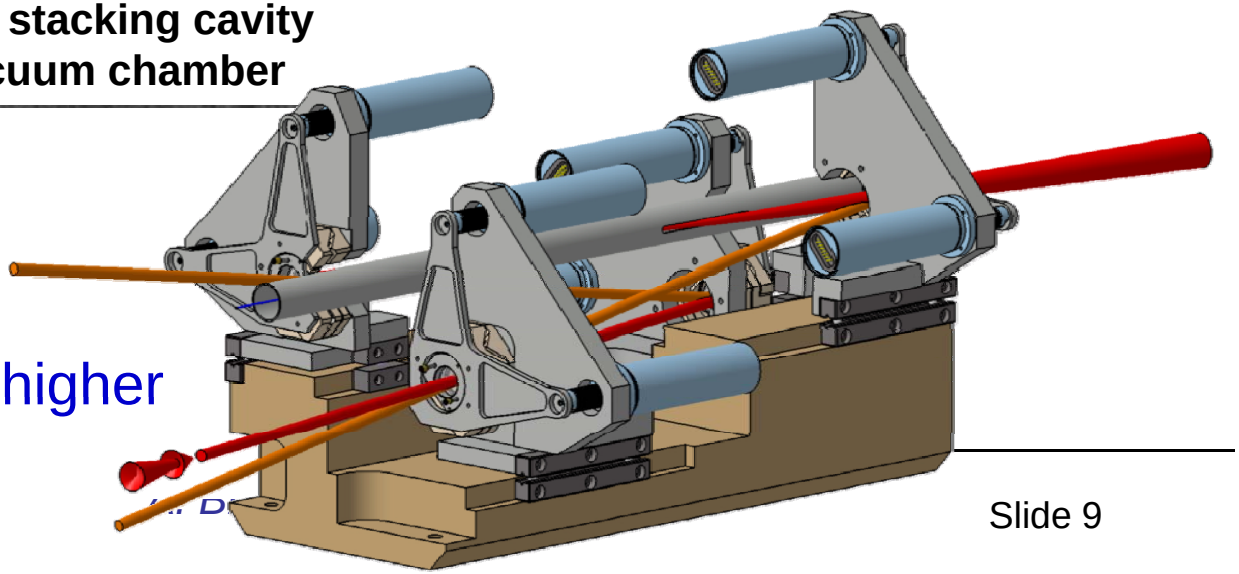
Compton Stacking Cavity Tests at ATF



pulse stacking cavity
in vacuum chamber

2 Mirror Cavity

We will detect 20 γ's/collision in current configuration.
Test is on going.
No deterioration of e-beam (so far achieved 3 γ's/collision)
Goal: detect 400 γ's/collision



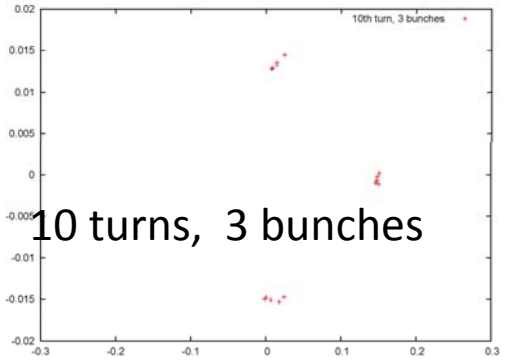
4 Mirror Cavity

Now being developed for higher enhancement

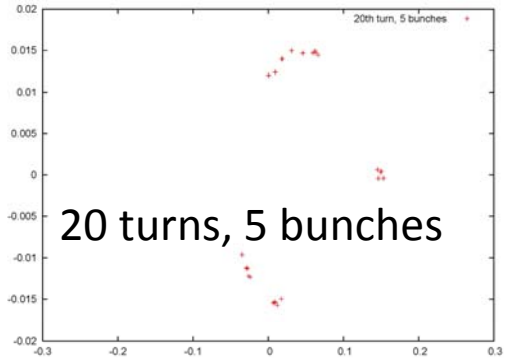
Compton Source – Stacking in DR

- Stacking efficiencies now improved, typically ~95% using off-momentum off-phase injection
- DR off-momentum dynamic aperture must be adequate!

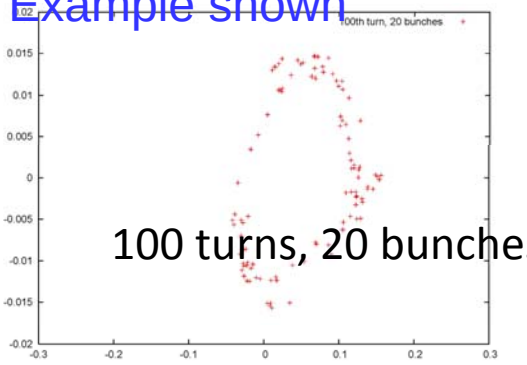
CERL Example shown



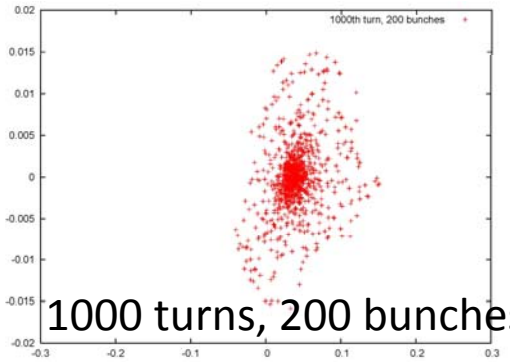
10 turns, 3 bunches



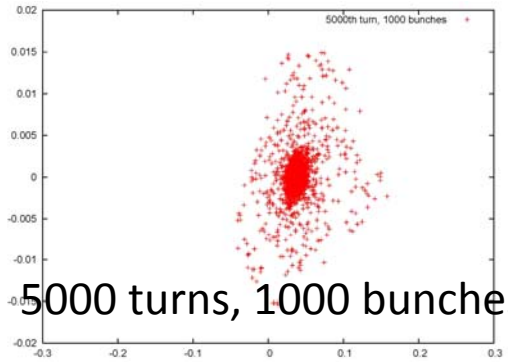
20 turns, 5 bunches



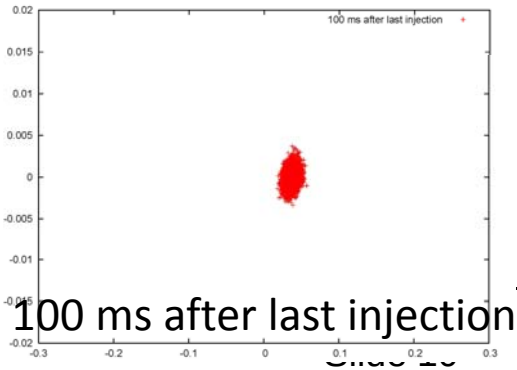
100 turns, 20 bunches



1000 turns, 200 bunches



5000 turns, 1000 bunches



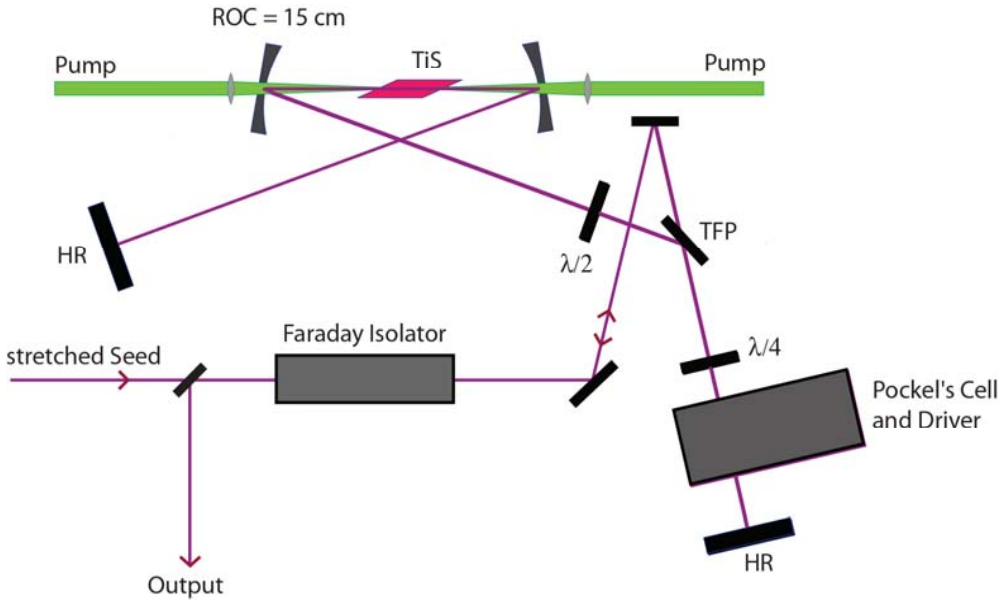
100 ms after last injection

Electron Source

- Source drive laser system
- Polarized Photocathode R&D
- DC Gun development

Source drive laser progress

- Source drive laser is being developed at SLAC
- Will be available to generate the e-beam with ILC specs for the e- source (in a test facility) within a year.



Photocathode R&D

- Investigation of alternative cathode structures:
  - InAlGaAs/AlGaAs
- Surface charge limit is still an open question
- Need to test cathodes with specific ILC conditions

DC Gun R&D

- 2 groups are working on a 200 kV DC Gun project:
  - Jlab, KEK
- Work is focussed on HV design
  - Reduction of field emission
    - Inverted gun design
    - New electrode materials
- Plans to develop > 350 kV guns

Draft mandate

The ILC study considers the Undulator option as the base line while the Compton ring is an alternative option. The CLIC study considers the Compton ring as the base line while the Undulator is an alternative option.

The working group should:

- Develop the synergy between the ILC and CLIC e^+ studies.
- Evaluate the common technical issues related to both options for the production of polarized positrons.
- Prioritize R&D.
- Consider other alternatives such as ERL, Linac-Compton and conventional sources.
- Review the existing technical and tests facilities where further tests could be performed.
- Evaluate where cost savings could be obtained.
- Promote common meetings and workshops.

Communication

- ILC e^+ workshop in October 2008 at Daresbury
- LCWS08 and ILC 08 workshop in November 2008 at Chicago
- GDE meeting in April 2009 at KEK
- POSIPOL workshop in June 2009 in Lyon
- CLIC workshop in October 2009 at CERN
- Regular Webex meetings (once a month)
- Joint ILC/CLIC workshop on sources from 2010
- Establish a mailing list