



NEWS FROM CORNELL

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LAST YEARS ACTIVITY ASSOCIATED WITH

Undulator design; tested few 40 cm-undulators, tested few taperings

Simulation code KONN for parameters optimization (Monte-Carlo)

Lithium lens (FlexPDE)

Collimators (Conver-analog EGS4)

Liquid metal target (Pb/Bi, Hg) with thermal stress calculations (FlexPDE)

Eddy currents calculation in rim/disc (FlexPDE)

Tasks	Description	Time frame	Cost (pre-preliminary)
Monte-Carlo code for simulation of conversion	<ul style="list-style-type: none"> •Choice of undulator parameters (period, K, aperture) •Choice of target dimensions (thickness, \emptyset) •Choice of collection optics parameters (type, efficiency—Li lens or dual layer solenoid) 	2007-2008	30k\$
Undulator design	<ul style="list-style-type: none"> •Design and fabrication of modular cryostat •System for magnetic measurements (4 m) •Alignment, pumping, pickups •String setup of 4 m long undulator 	2008-2009	200k\$+150k\$
Target design	<ul style="list-style-type: none"> •Rotating W-Ti (sandwich) •Liquid metal target design (Pb-Bi and Hg, model) •Shock waves in target (enhancement of pressure) 	2007-2009 2007-2008 2007-2008	– 70k\$+100k\$ 30k\$
Collection optics design	<ul style="list-style-type: none"> •Lithium lens (dynamics, windows: Be, BN, model) •Dual layer solenoid with compensated input (heat, mechanical stability, test) 	2007-2008 2007-2008	70k\$+70k\$ 50k\$
Collimators	<ul style="list-style-type: none"> •Collimators for gammas •Collimators for full power beam •Structure of power deposition in undulator 	2009 2009 2008	– – 20k\$
Undulator chicane	<ul style="list-style-type: none"> •Minimal possible parallel shift ~450mm (optics, no hall option) •power density deposition 	2008 2008	– 20k\$
Perturbation of emittance	<ul style="list-style-type: none"> •Dynamical perturbations of emittance (regular part, fringe fields and tapering, chicane) •Radiative perturbations 	2008 2007-2008	30k\$ –
Handling of polarization	<ul style="list-style-type: none"> •Compensation of spin tilt in undulator (scheme) •Fast spin flip schemes with helical field (scheme) 	2008 2008-2009	20k\$ 40k\$
Combining scheme	•Two targets combining scheme calculations	2009	30k\$ 3

UNDULATOR DESIGN

Diameter of cryostat ~10 cm (4")

Completed design;

System for magnetic measurement designed;

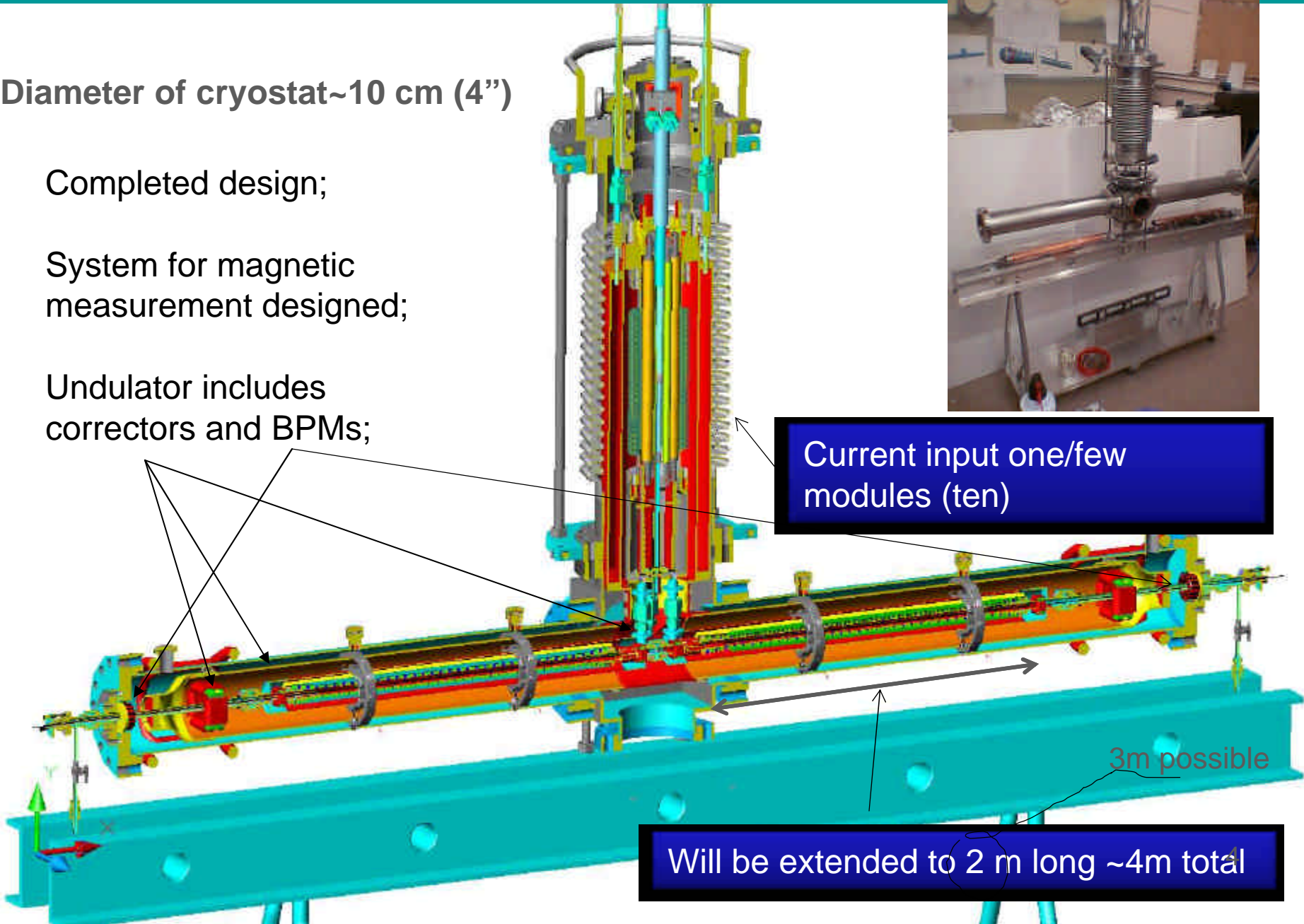
Undulator includes correctors and BPMs;



Current input one/few modules (ten)

3m possible

Will be extended to 2 m long ~4m total



Technology developed for fabrication of continuous yoke of necessary length (2-3m)

Wire having diameter 0.33mm chosen as a baseline one for now

For 10mm period the coil has 8(z)x11(r) wires; bonded in 4strands

For 12mm period the coil has 12(z)x12(r) wires bonded in 6 strands

Fabricated undulator with 6.35 mm Inner diameter (1/4") available for the beam; $K=1.48$ measured (13.5 mm period)



Two meter long yoke under visual inspection by William Trusk

TESTED UNDULATORS

For aperture available for the beam **8 mm in Ø clear**
OFC vacuum chamber, RF smoothness

SC wire	54 filaments	56 filaments	56 filaments	56 filaments
# layers	5	6	11	9 (12) +sectioning
?=10 mm @300 °K	K=0.36 tested	K=0.42 tested	K=0.467 tested	K~ 0.5 (calculated)
?=12 mm @300 °K	K=0.72 tested	K=0.83 tested		K~ 1 (calculated)

For aperture available for the beam **6.35 mm (1/4") in Ø clear**
OFC vacuum chamber, RF smoothness

# layers	11			12+sectioning
?=13.5 mm @300 °K	K=1.48 tested			K~ 1.6 calculated
?=10.0 mm @300 °K	K~ 0.7calculated			K~ 0.72 calculated

CONCLUSIONS

Start to end code for Monte-Carlo simulation of conversion was developed;

For 500 GeV, a conversion system requires more efforts; one solution is to move the system as a whole to a new 150 GeV point, other solution -longer period of undulator

Helical iron yokes of ~3 m long obtained from industry;

Reached $K=0.467$ for 10 mm period; aperture 8 mm;

Reached $K=0.83$ for 12 mm period; aperture 8 mm (old wire);

Reached $K=1.48$ for 13.5 mm period; aperture 6.35mm ($\frac{1}{4}$ ")

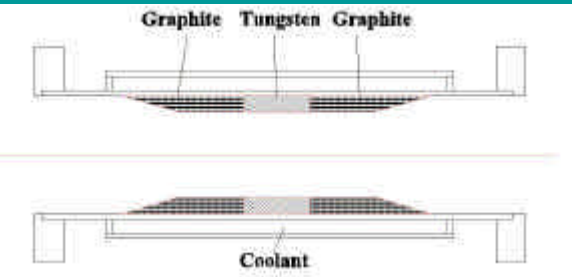
Pumping of Helium was tested, gain $>10\%$;

Few tapers for the undulator ends are tested

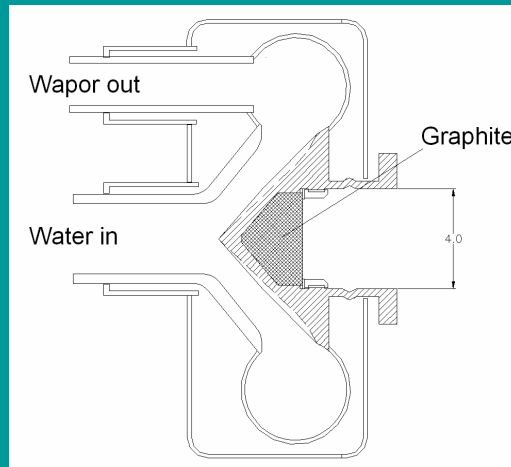
4-m long Undulator module fabrication and its test was a priority job for 2008;

ALL ILC ACTIVITIES ARE TERMINATED

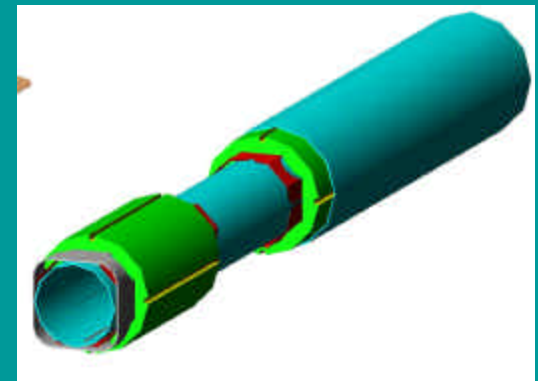
Right now I switched to activities associated with ERL developed by Laboratory;
This activity has funding so far.



Collimator



Beam Dump for
1.5MW DC



SC lens installed in
Cryomodule

Hoping that these activities will be requested by ILC some day also

Back up slides

