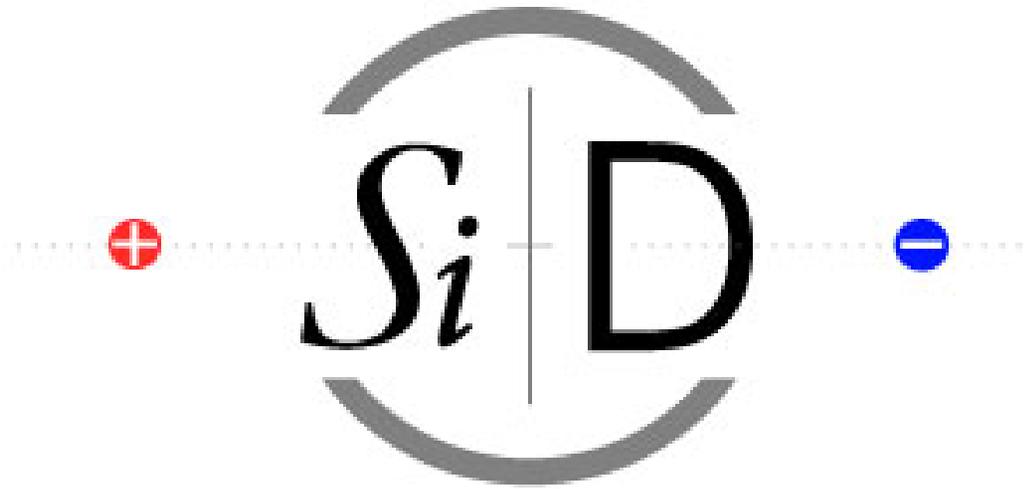


# Workshop Goals

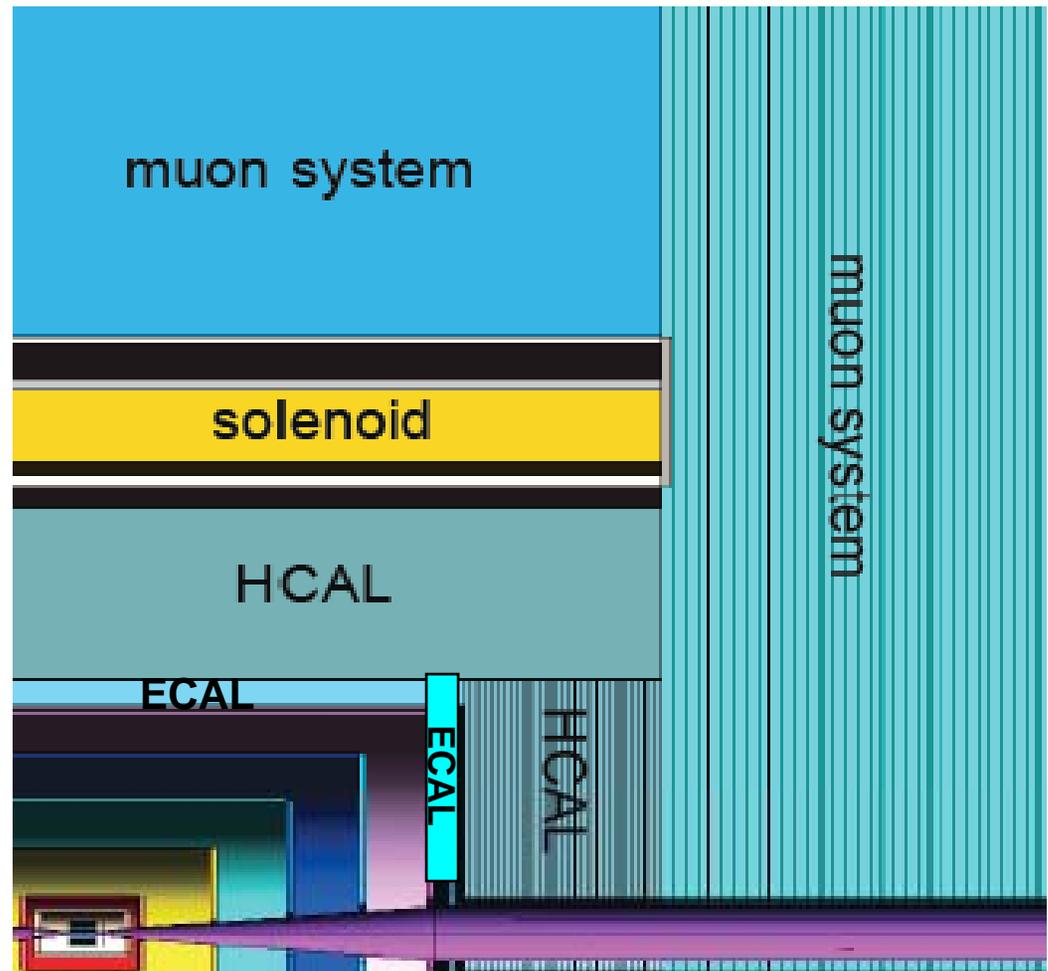


SiD RAL Workshop  
April 14, 2008  
John Jaros

# The Silicon Detector Concept

- 5 layer pixel VXT
- 5 layer Si tracker with endcaps
- Highly segmented Si/W Ecal and Hcal inside the coil
- 5T Solenoid
- Instrumented flux return for muons detection

Compact: 12m x 12m x 12 m



To Be Optimized and Re-Baselined for the Letter of Intent

# SiD's Selling Points

- **Solenoid 5T. Follows CMS design. Feasible.**
- **VXT**      **5T Field allows smallest beam pipe radius, best resolution. Endcap design maximizes  $\Omega$ , improves resolution for forward tracks.**
- **Tracker**      **Si is robust against unwanted beam backgrounds. Si is “live” for only one bunch crossing, which minimizes occupancy and physics backgrounds. Si precision + 5T magnet gives superb momentum resolution.**
- **ECAL**      **Si/W has good resolution ( $\Delta E/E \sim 17\%$ ), superb transverse and longitudinal segmentation. Compact enough to afford!**
- **HCAL**      **RPC? GEM? Scint? Moderate resolution ( $\Delta E/E \sim 60-80\%$ ) excellent segmentation for PFA. Other options (e.g. dual readout) can be considered as alternates.**
- **Cost**      **Constrained, balanced with physics performance.**

# Silicon Detector Design Study

<http://silicondetector.org/display/SiD/home>

Dashboard > Silicon Detector for ILC > [home](#)

SILICON DETECTOR DESIGN STUDY

Log In

- SiD Home
- Sign Up for SiD Emails
- Org Chart
- Meetings
  - Monthly Collaboration Meeting
  - Weekly Meetings
  - Workshops and Conferences
  - Previous Events
- Documents
- Simulation
  - Detector versions
- Working Groups
- Web Site
  - Recent Updates
  - Index
  - Search
  - Links

## Silicon Detector (SiD) Design Study.

The Silicon Detector Design Study is developing the SiD Detector Concept for the ILC into a detailed, optimized, and fully integrated detector design. The SiD concept incorporates Si/W electromagnetic calorimetry and all-Si tracking in a detector design which attempts to optimize physics performance, constrain costs, and be robust against physics and machine backgrounds.

**Optimizing design, benchmarking, doing R&D**

### Announcements

- [SiD Collaboration Phone Meeting on Thursday Dec 6](#)
- [Call for Letters of Intent \(LOIs\)](#)

### Upcoming Workshops

- [SiD Outreach Meeting Paris Feb 11, 2008](#)
- [SiD Meeting, April 14-15, 2008 at RAL](#)

### ILC Newsline

- [ILC NewsLine - 21 February 2008](#)
- [ILC NewsLine - 14 February 2008](#)
- [ILC NewsLine - 7 February 2008](#)
- [ILC NewsLine - 31 January 2008](#)
- [ILC NewsLine - 24 January 2008](#)

[Page Operations](#)

[Browse Space](#)

# What SiD's Doing Now...

- **Fixing Global Parameters**  
Physics Performance and cost  $\Rightarrow R_{\text{ecal}}, Z_{\text{ecal}}, B, \lambda_{\text{hcal}}$
- **Completing the Sim/ReconTool Kit**  
Finish up PFA and Full Track Reconstruction for performance studies and physics benchmarking.
- **Developing a Full Conceptual Engineering Design**  
Realistic conceptual engineering, accounting for supports, assembly, repair/replacement, services, realistic material budget.
- **Updating/Optimizing Sub-Detector Parameters**  
Fully Define SiD subsystems in Geant4. Prerequisite to performance and physics studies.
- **Benchmarking SiD's Performance**
- **Advancing sub-detector R&D and Identifying Next Steps**  
KPiX, Si Pixel Sensors, Si  $\mu$ strip Sensors, Si/W Ecal, RPCs, GEMs,  $\mu$ Megas, Tracker mechanics, VTX Sensors, VTX mechanics,...
- **Designing the interface with ILC**

...will lead to SiD LOI

# SiD's EOI

March 31, 2007

Dear Yamada-san:

We are writing on behalf of the Silicon Detector Design Study to inform you of SiD's intention to submit a Letter of Intent, to pursue a full technical design of the Silicon Detector for ILC, by late March, 2009.

SiD has initiated study of the benchmark reactions selected by the WWS software group to document the physics capability of its design. SiD is also developing a full conceptual engineering design, optimizing detector parameters, evaluating costs, defining a list of needed R&D, and pursuing R&D for many subdetectors.

The SiD contact persons for your Physics and Detector Board will be John Jaros and Harry Weerts.

Members of SiD are already participating in several of the common task teams you have proposed. SiD's representatives to the common task teams will be as follows:

Machine Detector Interface	Phil Burrows
Engineering Tools	Kurt Krempetz
Detector R&D Panel	Andy White
Software Panel	Norman Graf
Physics Panel	Andrei Nomerotski

The following institutions are currently participating in developing the Silicon Detector Concept...

On behalf of the Silicon Detector Design Study,  
Harry Weerts and John Jaros

# SiD EOI Institutions

## **Laboratories and Institutes:**

Argonne National Laboratory  
Brookhaven National Laboratory  
Fermi National Accelerator Laboratory  
Institute of Physics, Prague  
Ifu, CEA/Saclay  
LAPP, CNRS/IN2P3 Université de Savoie

LPNHE, CNRS/IN2P3 Universites Paris VI et Paris VII  
Lawrence Livermore National Laboratory  
Max Planck Institute, Munich  
Physical Sciences Laboratory, Wisconsin  
Rutherford Appleton Laboratory  
Stanford Linear Accelerator Center

## **Universities:**

U. of Bonn  
U. of Bristol  
Brown U.  
U. of California, Davis  
U. of California, Santa Cruz  
Charles U., Prague  
U. of Chicago  
Chonbuk National U.  
U. of Colorado, Boulder  
Colorado State U.  
Imperial College, London  
Indiana U.  
U. of Iowa  
Kansas State U.  
Kyungpook National U.  
U. of Melbourne  
U. of Michigan  
Massachusetts Institute of Technology

U. of Mississippi  
U. of New Mexico  
Northern Illinois U.  
U. of Notre Dame  
U. of Oregon  
Oxford U.  
U. of Pierre and Marie Curie LPNHE  
Princeton U.  
Purdue U.  
U. of Rochester  
Seoul National U.  
State U. of New York, Stony Brook  
Sungkyunkwan U.  
U. of Texas, Arlington  
U. of Tokyo  
U. of Washington  
Wayne State U.  
U. of Wisconsin  
Yale U.  
Yonsai U.



## A new draft time line for the SiD LOI

from Harry

<u>Date</u>	<u>Milestone</u>	<u>Activities</u>
4/09	Submit LOI	
3/09	Begin Final Edit of LOI; complete authorlist	
2/09	Complete LOI Draft Collaboration Review and Comment	Additional goals ??
9/08	GEANT4 Description Ready Performance Studies Ready Benchmarking Studies Ready	
6/08	Freeze Detector Design SubSystems Fully Specified Subsystem Technologies/Alternates Selected Conceptual Designs Ready	
4/08	Freeze Global Parameters First Pass Detector Design	At UK meeting ?
3/08	First Pass Global Parameters  Optimization studies	Optimization studies
01/08	Subgroup Plans Defined Milestones and Deliverables Manpower Resources Needed	

# Fixing SiD Global Parameters

- Not ready to fix SiD's global parameters yet, but close.
- New PFA results and optimization to be discussed Tuesday
- At this meeting, we need to digest the new results, and plan for completing the process. By Warsaw? How?

## 14:00->15:30 PFA (Convener: Andy White (University of Texas at Arlington) , Harry Weerts (Argonne National Laboratory) )

14:00 SiD performance using PandoraPFA (30') Marcel Stanitzki (Rutherford Appleton Laboratory)

14:30 SiD studies using Iowa PFA (30') lawrence bronk (MIT)

15:00 PFA - What's next (discussion) (30') Andy White (University of Texas at Arlington)

A general discussion about the open issues in PFA

15:30

Coffee Break

## 16:00->18:00 Detector Optimization and Benchmarking (Convener: John Jaros (SLAC) )

16:00 Benchmarking SiD (15')

16:15 ttbar Analysis (15')

16:30 ZHH analysis (15')

16:45 Sbottom Analysis (15')

17:00 Optimizing & Costing (20')

Martin Breidenbach (SLAC)

17:20 Detector Optimization Discussion (40')

Harry Weerts (Argonne National Laboratory) , John Jaros (SLAC)

# Tools Readiness

- (A) We'll hear present status of PFA and track reconstruction this afternoon and tomorrow morning.
- (B) When do we need these tools for detector performance studies and physics benchmarking?

We need to discuss and plan  
How do we get from (A) to (B)

---

**16:05->18:10 Vertexing and Tracking** (Convener: Marcel Demarteau (*Fermi National Accelerator Laboratory (FNAL)*), Ronald Lipton (*Fermilab*), Richard Partridge (*SLAC*))

16:05	Digitization and planar tracking geometries (20')	Timothy Nelson ( <i>SLAC</i> )
16:25	Seed-based Track reconstruction (20')	Richard Partridge ( <i>SLAC</i> )
16:45	News from the LCFI Vertex Package (20')	Ben Jeffery ( <i>Oxford University</i> )
17:05	Forward Tracking Studies (20')	Marcel Vos ( <i>IFIC Valencia</i> )
17:25	DEPFET-based VTX for SID (15')	Alexei Raspereza ( <i>MPI Munich</i> )
17:40	Serial Powering (15')	Marc Weber ( <i>Rutherford Appleton Laboratory-STFC - Science &amp; Technology Facil</i> )
17:55	Tracking, what's next (15')	Marcel Demarteau ( <i>Fermi National Accelerator Laboratory (FNAL)</i> )

# Re-Baselining SiD

We need to think carefully about what is really needed for the LOI.  
We've had grand plans. It's time to get real.

We need to understand *what must* be done for detector optimization/re-baselining.

What engineering constraints must be included?

What level of detail should go into the Monte Carlo?

Exactly what do we need to specify?

We need to understand *what we are capable* of doing in terms of detector optimization/re-baselining.

What can we do with available resources?

Where can we get help from new collaborators?

We need to agree on when this process must converge, how we keep these changes straight, and how SiD approves and implements the new design.

# Help Needed

- **SiD needs help to complete work needed for the LOI**  
Detector optimization and performance studies are undermanned.  
More help on physics benchmarking needed.  
Help and collaboration welcome on detector R&D.
- **SiD needs help internationalizing.**  
SiD has Asian and European collaborators, but needs a broader international base. New collaborators are needed and welcome.
- **Opportunity exists to impact the SiD Design for the LOI**  
Technology choices, specific designs, and global optimization are all being discussed. There is time to make a difference.

Let us know if you're interested in SiD