

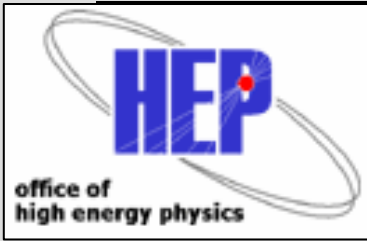
Prospects for ILC Detector R&D Funding

DOE Report (Paul Grannis
representing both agencies)

P5 Report

LCDRD funding (FY06-07 Supplement and FY07)

ILC Detector R&D Plan



ILC university grants

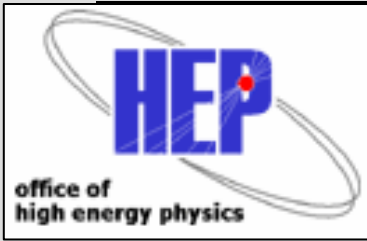


In 2002, University Consortium for Linear Collider (UCLC) aimed at NSF, and Linear Collider Research and Development (LCRD) aimed at DOE were established to promote LC research at universities - both accelerator and detectors.

First LCRD and UCLC awards were made in FY03.

| | Detector | | Accelerator | |
|------|----------|--------|-------------|--------|
| | DOE | NSF | DOE | NSF |
| FY03 | \$412K | \$0K | \$400K | \$0 |
| FY04 | \$700K | \$0K | \$400K | \$93 |
| FY05 | \$700K | \$117K | \$650K | \$119K |
| FY06 | \$1048K | \$300K | \$700K | \$235K |

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9/8/06



University grant process

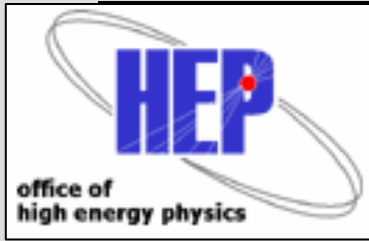


Relevant bodies (ALCPG, LCSGA, ART ... have screened university proposals and made recommendations to DOE and NSF.

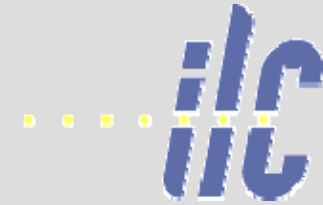
DOE and NSF have done a joint review and selected proposals for support without constraints on who funds, within the overall budget guidance.

Since FY2005, the detector grants have been administered through a single umbrella grant to Univ. Oregon. DOE accelerator grants are to specific universities. NSF uses Cornell for umbrella grant.

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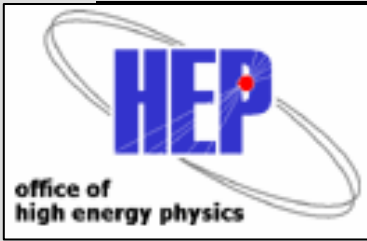
NSF/DOE position on ILC R&D activity



"Both DOE and NSF recognize the high priority placed by HEPAP and the recent NRC EPP2010 report on conducting a vigorous R&D program that could lead to the ILC project. Both agencies currently fund university grants for both detector and accelerator research with applicability to the ILC. These programs have been modest but have grown over the past several years.

"Both agencies respond to grants through the peer review process. They welcome proposals for which ILC detector or accelerator R&D is the whole or a component of the effort, as well as for generic research that may have some bearing on ILC issues. In addition, there is often some latitude within existing grant funds to consider new directions. The use of existing grant funds for ILC-related research depends upon the details of each proposal and grant holders are encouraged to speak with their program monitors on the appropriate extent of such activities."

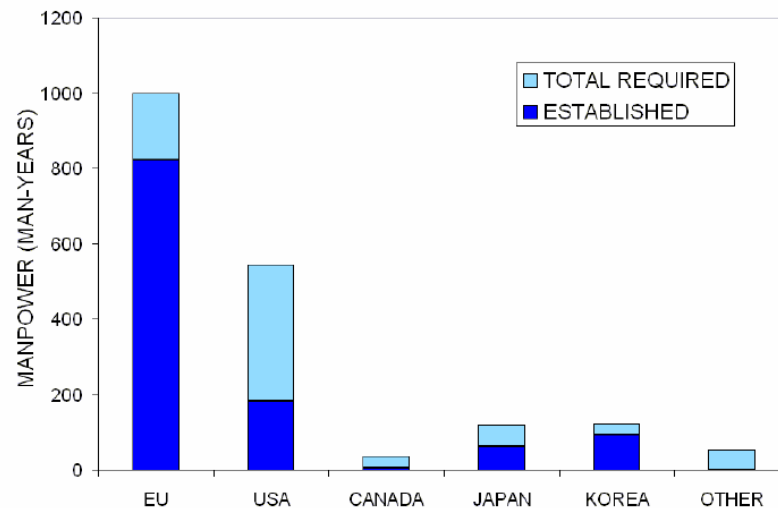
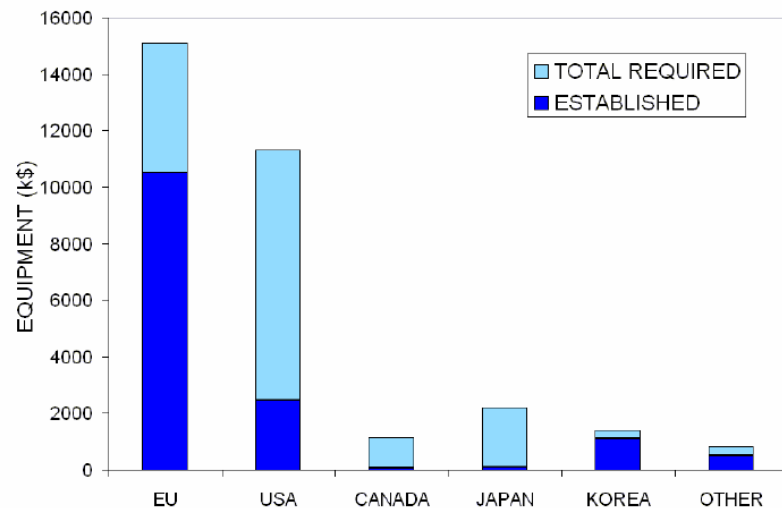
Grannis
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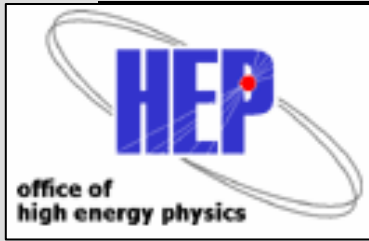
Comments on university detector grants



A 2005 WWS panel chaired by C. Damerell compared funded and self-estimated needs for detector R&D in the three regions. The US and Japan lagged behind Europe significantly. The US effort was about 4 times less than Europe, and was funded at about 35% of the estimated need. (Japan received ~\$1M new funding recently.)



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Detector R&D outlook

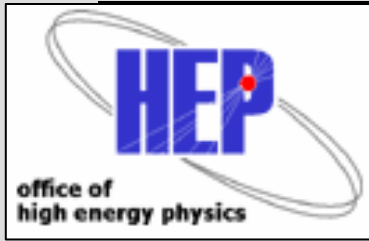


ALCPG proposes to increase ILC detector R&D at universities to ~\$3M in FY2007, with ~\$1M early in year for specific deliverables related to tests and ~\$2M for the base program later in the year.

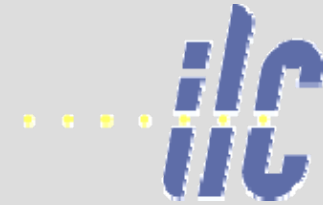
If the FY2007 ILC appropriation is at the President's request (and House markup), DOE will try to meet this goal and continue detector R&D effort and infrastructure at Labs.

DOE/NSF require a plan for multi-year detector R&D with goals, milestones and resource needs. Will peer review proposals, and expect a detector R&D review.

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Detector R&D outlook



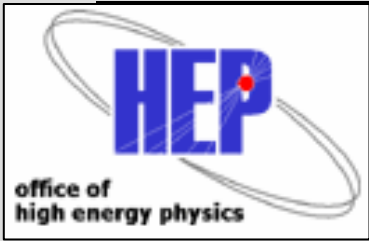
We aim to strengthen the interaction of lab and university detector R&D efforts, and treat program as a coordinated whole.

University detector R&D program will continue and should grow.

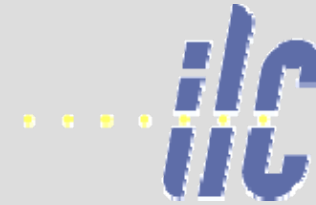
Much of the current funding is for generic R&D. Need to plan the transition to detector collaborations & proposals.

There is at present no body that is ideally suited to advise on the relative priority between machine-related R&D and detector R&D. For FY2007, we are using LCSGA for this advice.

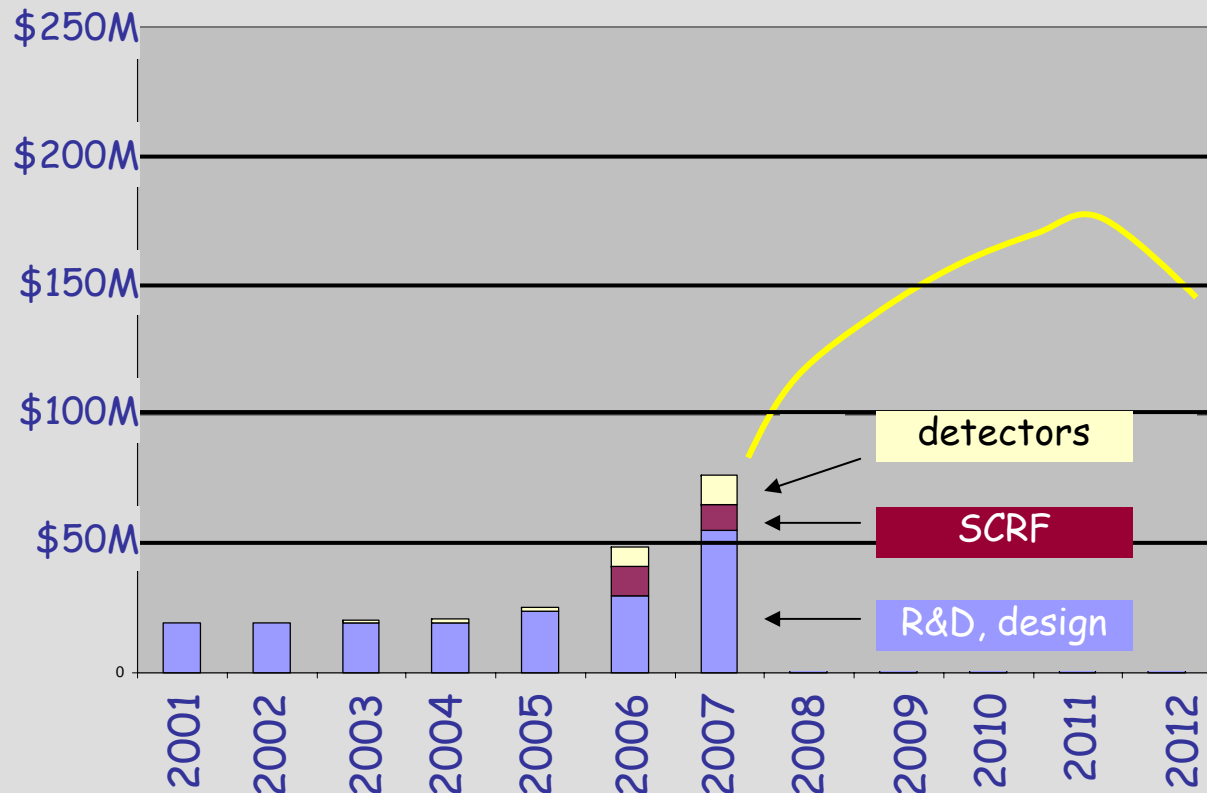
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9/8/06



Rough estimate of R&D phase funding



Out year integral taken from the EPP2010 estimate (\$500M over 5 years) plus detector and laboratory SCrf infrastructure., with a canonical 'project' profile. Assumes construction funding starts in 2012.



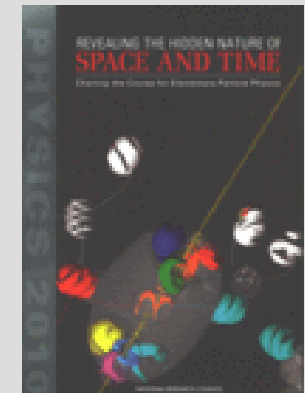
FY2007 is President's request and House markup; Senate is lower.

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9/8/06

EPP 2010: Elementary Particle Physics in the 21st Century

REVEALING THE HIDDEN NATURE OF SPACE AND TIME

Charting the Course for Elementary Particle Physics



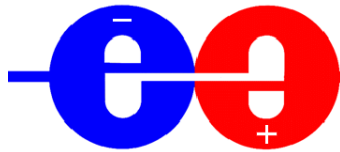
Action Item 2: Achieving Readiness for the ILC. The United States should launch a major program of R&D, design, industrialization, and management and financing studies of the ILC accelerator and detectors.

U.S. expenditures on R&D for the ILC should be very significantly expanded. The key objective of this R&D program is to reduce both the technical and cost risks of the ILC and to initiate a program that will allow for industrialization of significant portions of ILC components. This effort should continue in the tradition of the broad international collaboration that has been the hallmark of the ILC project to date. The United States should prepare for long-term involvement in the physics program of the ILC as well.

For the accelerator, this commitment should be at a level as high as \$100 million in the peak year and could represent a cumulative amount on the order of \$300 million to \$500 million over the time period prior to the decision to proceed with construction.² For detector R&D, the commitment would be near \$80 million over the same period,³ financed in part by the redirection of some university and national laboratory efforts.

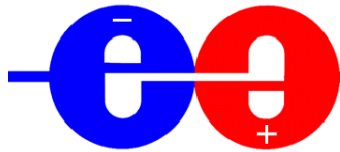
Realizing the ILC

The physics questions that the ILC will address require detector capabilities that are beyond the performance of current detectors. To achieve these advances a well-orchestrated detector R&D program is needed. Such a program has been realized in Europe where it is addressing some of the R&D areas that need attention. In the U.S. such a coherent program, including universities and laboratories and centrally managed, is only partially in place. The U.S. efforts on ILC detector R&D are lagging both in terms of funding and manpower. Given that the U.S. wants to play a leading role in the ILC, this problem needs to be addressed and a well-defined U.S. ILC detector program with sufficient funding should be realized.



Detector R&D - WWS

- WWS created the Detector R&D Panel
 - collect information on projects world-wide
 - strengthen coordination and prioritization
 - J-C. Brient (IN2P3), [CJS Damerell](#) (RAL), R. Frey(Oregon), HankJoo Kim (Kyungpook Natl), W. Lohmann (DESY), D. Peterson (Cornell), Y. Sugimoto (KEK), T. Takeshita (Shinshu U), H. Weerts (ANL)
- R&D Panel prepared the R&D report to accompany the GDE machine Baseline Configuration Document early this year
 - supported by concepts and R&D teams



Detector R&D - WWS

- R&D Panel Report
 - Draft circulated beginning in January
 - Report updated in April & posted on WWS web page
 - <http://physics.uoregon.edu/~lc/wwstudy/R&D Report-final.pdf>
 - Urgent needs require \$32M and 1870 man-years over next 3-5 years - globally
 - Established support over 3-5 years \$15M and 1160 man-years - globally
 - Translating man-years to dollars (\$100k/man-year)
 - \$33M/yr established over 4 years, \$22M/yr more required
 - Support notably behind in North America and Japan
- Planning review of R&D
 - Begin in Beijing - Tracking



University Detector R&D in US

This year was the fourth year of support for detector R&D from the agencies since it was first organized by the LCSGA (formerly USLCSG) and the ALCPG

FY05 LCDRD funds

\$700,000 – DOE

\$117,000 – NSF

24 projects

25 universities

FY06 LCDRD funds

\$1,048,000 - DOE

\$ 300,000 - NSF

34 projects

26 universities/labs

<http://physics.uoregon.edu/~lc/lcdrd/fy05-awards.html>

<http://physics.uoregon.edu/~lc/lcdrd/fy06-awards.html>



FY07 University Detector R&D in US

We are organizing ourselves in anticipation for increased funding in FY07 – discussed \$3M
(5 year R&D plan being developed by ALCPG)

Encouragement led to developing a proposal early for a few (9) high priority, urgent efforts (~\$1M)
followed by annual round for another \$2M

Supplemental proposal

- 1 – call for abstracts (received 22)
- 2 – selection of highest priorities/urgent needs (9)

<http://physics.uoregon.edu/~lc/lcdrd/supplement-06a.html>



Supplemental LCDRD Proposal

- High Performance Digital Hadron Calorimetry for the International Linear Collider
PI - J. Repond
- Development of a Silicon-tungsten Test Module fo an Electromagnetic Calorimeter
PI - R. Frey
- TPC Development
PI - D. Peterson
- Pixel Vertex Detector R&D for Future High Energy Linear e+e- Colliders
PI - C. Baltay
- Energy Spectrometers for the International Linear Collider
PI - E. Torrence/M. Hildreth
- Pixel-level Sampling CMOS Vertex Detector for the ILC
PI - G. Varner
- Detector to Measure the Beam-strahlung Gammas
PI - W. Morse
- Long Shaping-Time Silicon Microstrip Readout
PI - B. Schumm
- Scintillator Based Muon System R&D
PI - P. Karchin

2 VXD

2 TRK

3 CAL

1 Muon

1 LEP

This resulting
distribution was
not by design

<http://physics.uoregon.edu/~lc/lcdrd/supplement-06a.html>



FY07 University-based LCDRD Proposal

FY07 proposals will be accepted for continuing and new projects from DOE/NSF funding

One year proposals (third year of 3 year cycle),
and future 1-2 year plan (anticipating continuation)

Anticipated timeline

December 15, 2006 – status reports
and new project descriptions due

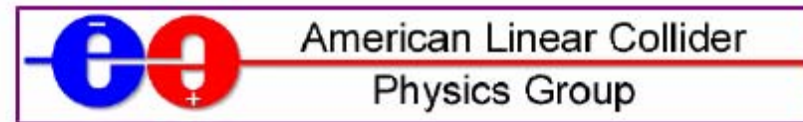
May – awards announced - revised budgets/descriptions

September, 2007 – funded year begins

details posted on ALCPG web page <http://physics.uoregon.edu/~lc/lcdrd/>
comments are welcomed by all members of the ALCPG exec comm

<http://physics.uoregon.edu/~lc/lcdrv/>

LCSGA (formerly USLCSG)



26 OCT 2006

**International Linear Collider
University-based Linear Collider Detector R&D
DOE/NSF funded program
FY 2007**

(Grant dates: DOE - Sep 1, 2007-Aug 31, 2008
NSF - Aug 15, 2007 - Aug 14, 2008)

Guidelines for the FY2007 Proposal Process

FOR CONTINUING DOE or NSF PROJECTS:

Important dates:

December 15, 2006: *Status Report* due. Please submit to [Jim Brau](#) both the original file and a pdf file for your Status Report. LaTeX is preferred for the original, but Word is also acceptable. A LaTeX Template and its pdf file are given below. If Word is used for the original, the format and structure should be the same as shown in the template below. Please also send your status report to [George Gollin](#) in pdf and postscript format.

- In addition, if new senior personnel are included on the project, please provide the following:

January 15, 2007: *Biographical Sketch* due for new senior personnel. Send to [Jim Brau](#) in pdf format, together with the original LaTeX or Word file.

January 15, 2007: "*Current and Pending Support*" Form due for new senior personnel. Send to [Jim Brau](#) as a Word file.

[Instructions for preparing your Status Report and supporting material for continuing projects](#)

Latex and Word Template and "Current and pending support" form

Latex Status Report template (in preparation)

[Word Status Report template](#)

[pdf version of the Status Report template](#)

"Current and pending support" form ([Word file-NSF](#); [Word file-DOE](#))

FOR NEW PROJECTS:

Important dates:

December 15, 2006: *Project Description* due. Please submit to [Jim Brau](#) both the original file and a pdf file for your Project Description. LaTeX is preferred for the original, but Word is also acceptable. A LaTeX Template and its pdf file are given below. If Word is used for the original, the format and structure should be the same as shown in the template below. Please also send your project description to [George Gollin](#) in pdf and postscript format.

January 6, 2007: *Letter of Commitment* from your institution's Office of Sponsored Programs due. The letter should be addressed to and sent to [Jim Brau](#), University of Oregon, the Principal Investigator of the umbrella grant, with a copy to [Kent Hardin](#) at the University of Oregon. It should specify the name of the contracting officer assigned to this project.

January 15, 2007: *Biographical Sketch* due. Send to [Jim Brau](#) in pdf format, together with the original LaTeX or Word file.

January 15, 2007: "*Current and Pending Support*" Form due. Send to [Jim Brau](#) as a Word file.

[Instructions for preparing your Project Description and supporting material for new projects](#)

Latex and Word Template and "Current and pending support" form

Latex Project Description template (in preparation)

[Word Project Description template](#)

[pdf version of the Project Description template](#)

"Current and pending support" form ([Word file](#); [Word file-DOE](#))

US ILC Detector R&D Plan

US program

"Bottoms up" ILC US detector R&D program

Version B 0.6

| TOTAL | | FY07 | FY08 | FY09 | FY10 | FY11 | Total |
|---------------|-------|-----------|-----------|-----------|-----------|-----------|------------|
| | | Cost(K\$) | Cost(K\$) | Cost(K\$) | Cost(K\$) | Cost(K\$) | Cost |
| LEP | TOTAL | \$ 2,835 | \$ 2,835 | \$ 2,835 | \$ 4,673 | \$ 4,673 | \$ 17,850 |
| VXD | TOTAL | \$ 4,477 | \$ 4,384 | \$ 5,130 | \$ 3,974 | \$ 3,176 | \$ 21,141 |
| Si-tr_tot | TOTAL | \$ 872 | \$ 1,732 | \$ 1,977 | \$ 1,407 | \$ 1,087 | \$ 7,075 |
| TPC | TOTAL | \$ 1,119 | \$ 1,583 | \$ 2,064 | \$ 1,337 | \$ 1,307 | \$ 7,410 |
| ECALall | TOTAL | \$ 1,445 | \$ 1,835 | \$ 2,880 | \$ 2,630 | \$ 2,810 | \$ 11,700 |
| | | | | | | | |
| HCALall | TOTAL | \$ 5,031 | \$ 3,800 | \$ 3,189 | \$ 2,840 | \$ 2,160 | \$ 17,020 |
| | | | | | | | |
| Forward | TOTAL | \$ 430 | \$ 685 | \$ 890 | \$ 985 | \$ 815 | \$ 3,785 |
| Solenoid | TOTAL | \$ 442 | \$ 644 | \$ 704 | \$ 824 | \$ 632 | \$ 3,248 |
| MUON | TOTAL | \$ 888 | \$ 1,230 | \$ 1,268 | \$ 1,399 | \$ 1,531 | \$ 6,292 |
| | | | | | | | \$ - |
| Algo & Reco | TOTAL | \$ 4,200 | \$ 4,200 | \$ 3,400 | \$ 4,650 | \$ 5,550 | \$ 22,000 |
| | | | | | | | \$ - |
| | | | | | | | \$ - |
| Back End Elec | TOTAL | \$ 205 | \$ 375 | \$ 660 | \$ 920 | \$ 1,020 | \$ 3,180 |
| INFRA_EE | TOTAL | \$ 182 | \$ 188 | \$ 193 | \$ 199 | \$ 205 | \$ 968 |
| Test_FNAL | TOTAL | \$ 1,590 | \$ 1,480 | \$ 885 | \$ 995 | \$ 1,490 | \$ 6,440 |
| Test-SLAC | TOTAL | \$ 500 | \$ 500 | \$ 500 | \$ 870 | \$ 870 | \$ 3,240 |
| US program | TOTAL | \$ 23,694 | \$ 24,970 | \$ 26,173 | \$ 26,813 | \$ 26,456 | \$ 128,106 |

US program

"Top Down" ILC US detector R&D program

Version T 0.61

"Bottom Up"

| TOTAL | | FY07 | FY08 | FY09 | FY10 | FY11 | Total | Total |
|---------------|-------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| | | Cost(K\$) | Cost(K\$) | Cost(K\$) | Cost(K\$) | Cost(K\$) | Cost | Cost |
| LEP | TOTAL | \$ 2,835 | \$ 2,835 | \$ 2,835 | \$ 4,673 | \$ 4,673 | \$ 17,850 | \$ 17,850 |
| VXD | TOTAL | \$ 4,477 | \$ 4,384 | \$ 5,130 | \$ 3,974 | \$ 3,176 | \$ 21,141 | \$ 21,141 |
| SI-tr_tot | TOTAL | \$ 872 | \$ 1,732 | \$ 1,977 | \$ 1,407 | \$ 1,087 | \$ 7,075 | \$ 7,075 |
| TPC | TOTAL | \$ 1,119 | \$ 1,583 | \$ 2,064 | \$ 1,337 | \$ 1,307 | \$ 7,410 | \$ 7,410 |
| ECALall | TOTAL | \$ 905 | \$ 1,240 | \$ 2,025 | \$ 1,630 | \$ 1,485 | \$ 7,285 | \$ 11,700 |
| | | | | | | | | |
| HCALall | TOTAL | \$ 2,496 | \$ 2,540 | \$ 2,169 | \$ 2,270 | \$ 1,080 | \$ 10,555 | \$ 17,020 |
| | | | | | | | | |
| Forward | TOTAL | \$ 430 | \$ 685 | \$ 890 | \$ 965 | \$ 815 | \$ 3,785 | \$ 3,785 |
| Solenoid | TOTAL | \$ 442 | \$ 644 | \$ 704 | \$ 824 | \$ 632 | \$ 3,246 | \$ 3,246 |
| MUON | TOTAL | \$ 856 | \$ 1,230 | \$ 1,266 | \$ 1,399 | \$ 1,531 | \$ 6,292 | \$ 6,292 |
| | | | | | | | \$ - | \$ - |
| Algo & Reco | TOTAL | \$ 1,570 | \$ 1,630 | \$ 1,630 | \$ 1,630 | \$ 1,630 | \$ 8,090 | \$ 22,000 |
| | | | | | | | \$ - | \$ - |
| | | | | | | | \$ - | \$ - |
| Back End Elec | TOTAL | \$ 205 | \$ 375 | \$ 660 | \$ 920 | \$ 1,020 | \$ 3,180 | \$ 3,180 |
| INFRA_EE | TOTAL | \$ 182 | \$ 188 | \$ 193 | \$ 199 | \$ 205 | \$ 968 | \$ 968 |
| Test_FNAL | TOTAL | \$ 1,590 | \$ 1,480 | \$ 885 | \$ 995 | \$ 1,490 | \$ 6,440 | \$ 6,440 |
| Test-SLAC | TOTAL | \$ 500 | \$ 500 | \$ 500 | \$ 870 | \$ 870 | \$ 3,240 | \$ 3,240 |
| US program | TOTAL | \$ 17,989 | \$ 20,545 | \$ 22,428 | \$ 22,223 | \$ 20,131 | \$ 103,316 | \$ 128,106 |

US ILC Detector R&D Plan

- Add milestones
 - ~ 4 per system over 5 years
- Needs further scrubbing
- then submit to DOE

Prospects for ILC Detector R&D Funding

DOE Report (and NSF)

P5 Report

LCDRD funding (2006/07 Supplement and FY07)

\$3M this year

ILC Detector R&D Plan