The 8-Pack Project at NLCTA

An overview of the status and schedule for the project.
Modulator and klystrons turn on 6/11
High power operations Jan., 2003
# 8-Pack Project People

<table>
<thead>
<tr>
<th>Role</th>
<th>Members</th>
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</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>David Schultz</td>
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<tr>
<td>Assistant Project Managers</td>
<td>Joe Frisch, Ray Larsen, John Cornuelle, Clay Corvin</td>
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<tr>
<td>Project Physicist</td>
<td>Chris Adolphsen</td>
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<tr>
<td>Project Engineer</td>
<td>Leif Eriksson</td>
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<tr>
<td>Project System Engineering</td>
<td>Scott Anderson, Dennis Atkinson, Bobby McKee,</td>
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<tr>
<td>NLCTA Interface</td>
<td>Marc Ross, Keith Jobe</td>
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<tr>
<td>Conventional Facilities</td>
<td>Javier Sevilla, Fred Asiri, Juanito Buhain</td>
</tr>
<tr>
<td>Klystrons</td>
<td>John Cornuelle, Erik Jongewaard, Chris Pearson, Saul Gold</td>
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<tr>
<td>Modulators</td>
<td>Richard Cassel – SLAC, Ed Cook – LLNL, Craig Brooksby – Bechtel</td>
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<tr>
<td>High Power RF</td>
<td>Stephen Marnock, Carl Rago, Sami Tantawi, Chris Nantista</td>
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<tr>
<td>LLRF</td>
<td>Steve Smith, Elias Andrikopoulos, Andrew Young</td>
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<tr>
<td>Controls &amp; DAQ</td>
<td>Ron Chestnut, Kristi Luchini</td>
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<tr>
<td>Vacuum Controls</td>
<td>Tom Porter, Earl Hamner</td>
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<tr>
<td>Racks</td>
<td>Mario Ortega</td>
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<tr>
<td>Cable Plant</td>
<td>Ponciano Rodriguez</td>
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<tr>
<td>PPS Systems</td>
<td>Patrick Bong</td>
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<tr>
<td>Special Instrumentation</td>
<td>Doug McCormick</td>
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<tr>
<td>High Gradient Girders</td>
<td>Harry Carter – FNAL</td>
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The 8-Pack Project

Demonstrate full NLC RF power & stored energy,

1st with SLED,
Test DLDS components at full power prior to DLDS assembly
Then with DLDS
Deliver full NLC RF power to NLCTA accelerating structures

• Phase-1: 4-Pack
  – Assemble system with:
    • 2 XP3 klystrons to power the SLED, additional XP3 klystron(s) as available
    • A solid state modulator (from the ‘4-dog’)
    • SLED system
  – Produce NLC spec. power: 600 MW 400 ns
    • Benchmark as a power source (albeit inefficient) for the NLC
  – Test station for running DLDS components at full power

• Phase-2: 8-pack
  – Assemble 8 (total) XP3 klystrons with a (new) solid state modulator
  – Attach DLDS system with two half arms reaching to two girders of high gradient accelerating structures (from FNAL).
The 8-pack Phase-1 layout

Sited next to the NLCTA beam housing.
Goals – Phase 1

• Use multimoded SLED II pulse compression on 2 tubes to attain >600 MW, 400 ns (@ cross potent) – meeting the NLC spec.

• Set up a station for high power tests of DLDS components & begin testing components

• Gain experience with 75 MW klystron operation

• Not to interfere with the High Gradient Structure Tests
Goals – Phase 2

- Demonstrate DLDS pulse compression to attain NLC power specs.  
  - 500 MW, 396 ns  
    (@ girder)  
  - Power NLCTA girders

- Test DLDS system and high gradient structures to full energy (200J – 400J)

- Investigate operational, stability, maintenance issues associated with DLDS
8-Pack Location - ESB
Modulator

Solid State Modulator in the 4-dog Test Stand

Move to ESB 4/16

Stand being designed at LLNL
Klystrons

Unit #1 under test by the SLAC klystron group.

Schedule:

Ready:
#1 3/15
#2 5/17
#3 8/15

Installed:
6/3-14

Begin commissioning:
6/19 (no RF)
7/23 (RF)

XP3 PPM #1
75MW
Infrastructure schedule

Finalize designs 1/31

Civil
- Install secondary containment 2/5
- Install raised floor 5/6

Electrical
- Cable plant design final 2/7
- Install to HVPS 4/30
- Install cable trays and power 3/25

Water
- Begin installation 3/13

Racks
- Racks installed 4/29
- Power to racks 5/8
Schedule overview

Finalize designs 1/31

★ System design review 2/22

Infrastructure complete 5/31

Commission modulator, klystrons 6/19

Klystrons’ power to loads 7/23

SLEDII installation begins 10/1

pump down SLEDII 1/24/03

High power testing during 2003

DLDS system installed April 2004

DLDS Testing July 2004

See details at:
http://www-project.slac.stanford.edu/lc/local/Projects/8Pack/8pack.html

System Review, Feb. 22
# FY02 8-pack project budget

*(subject to mid-year review)*

<table>
<thead>
<tr>
<th>Phase 1: 4-pack and SLED</th>
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<tbody>
<tr>
<td><strong>System Eng. &amp; Admin.</strong></td>
<td>$510k</td>
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<tr>
<td><strong>Infrastructure</strong></td>
<td>$710k</td>
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<td><strong>Modulators – R&amp;D</strong></td>
<td>$0*</td>
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<td>– Installation</td>
<td>$120K</td>
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<td><strong>Klystrons</strong></td>
<td>$340k</td>
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<td><strong>RF distribution</strong></td>
<td>$1180k</td>
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<tr>
<td><strong>Controls &amp; DAQ</strong></td>
<td>$825k</td>
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<tr>
<td><strong>ES&amp;H</strong></td>
<td>$10k</td>
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<td>**Total ***</td>
<td>$3,695k</td>
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*Modulator development & fabrication is not a part of the 8-pack project funding*
NLC DLDS Layout

8-Pack Project

Next Linear Collider

System Review, Feb. 22
**RF system**

High power components

~60% of drawings are complete
Nothing out of shops yet
Install components for klystron testing 6/3
Fabrication scheduled into August

**LLRF**

Design complete
Long-lead items on order
Commissioning begins 7/11
75XP-3 Klystron Specification

- Output Power: 75 MW
- Beam Voltage: 500 kV
- Beam Current: 265 A
- Pervance: .75 µK
- Pulse Length: 3.1 µsec
- Rep. Rate: 120 Hz
- Average RF Power: 27 kW
- Gain: 55 dB min
- Efficiency: 57% (Goal = 60%)