8-Pack Project Update

Phase 2: In fabrication

KEK produced 3dB power splitter

MAC, December 8, 2003
8-Pack Phase 2a & 2b

By March ’04; power to 4 structures, and hardware (not installed) for the rest.

From SLED

March ’04

6 dB

later ’04

4.8 dB

Overmoded

3 dB

WR90

3 dB

3 dB

March ’04

phase 2b

phase 2a

MAC, December 8, 2003
Phase 1 straight-up assy. in place
Phase 2 location above the NLCTA

← beam
Phase 2 beam line layout
# The 8-Pack Project

## Phase 1&2 baseline goals

<table>
<thead>
<tr>
<th></th>
<th>NLC Baseline</th>
<th>Phase 1</th>
<th>Phase 2b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klystrons @ power</td>
<td>2 @ 75 MW</td>
<td>4 @ 50 MW</td>
<td>4 @ 50 MW</td>
</tr>
<tr>
<td>Pulse length</td>
<td>1.6 µs</td>
<td>1.6 µs</td>
<td>1.6 µs</td>
</tr>
<tr>
<td>Klys. - SLED power transfer efficiency</td>
<td>95%</td>
<td>90% (1)</td>
<td>90% (1)</td>
</tr>
<tr>
<td>SLED power multiplier</td>
<td>3.2</td>
<td>3.0 - 3.2 (2)</td>
<td>3.0 - 3.2 (2)</td>
</tr>
<tr>
<td>Power at SLED output</td>
<td>475 MW</td>
<td>540 - 576 MW</td>
<td>540 - 576 MW</td>
</tr>
<tr>
<td>Pulse length</td>
<td>400 ns</td>
<td>400 ns</td>
<td>400 ns</td>
</tr>
<tr>
<td>SLED - structure power transfer efficiency</td>
<td>95%</td>
<td>n/a</td>
<td>90% (1)</td>
</tr>
<tr>
<td>Power at structures - total</td>
<td>450 MW</td>
<td>486 - 518 MW</td>
<td></td>
</tr>
<tr>
<td>Structure gradient</td>
<td>65 MV/m</td>
<td></td>
<td>66 - 68 MV/m</td>
</tr>
</tbody>
</table>

**Notes:**

1) Phase 1 power handling inefficiency is due to liberal use of WR90
2) Measured m-SLED power multiplier
3) Eight 60 cm. ‘H60VG4S17’ structures
4) Rounded cells

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8-Pack Phase 2a Status

Vacuum:
  Cable plant defined, ready to be pulled
  Power supplies installed
  Ion pumps, beamline parts, on order

Modulator:
  Operational at 30 pps.
  Chiller (for 60 pps) expected 2/04

Instrumentation:
  Acoustic sensor array defined
  Cables ready to be pulled
8-Pack Phase 2a Status

LLRF:
Drive from Phase 1 existing
I&Q readback will need to be expanded
(underway, and not a show stopper)

Software:
Database & EPICS control to be expanded
Significant effort, not just cut-and-paste
8-Pack Phase 2a Status

High Gradient Structures for Phase 2a:
- H60vg3S18 - at ESB sealed in N₂
- H60vg3R17-1 - at ESB sealed in N₂
- H60vg4S17-1 - being tested in Station 2
- H60vg3-6C – vented, in the klystron lab
- FXB-6,7 - ready for test in Station 1
- FXC-1,2,3,4 - available in January

For Phase 2b:
- H60vg4R17-1,2 - available end of February
- FXD-1,2,3,4 - available March - June
8-Pack Phase 2a Status

Structure Strongbacks:
- Shorter than existing NLCTA strongbacks
- Built at FNAL, 2 with FXC 3 & 4
- 3rd & 4th Strongbacks expected 2/04
- Strongbacks compatible with all structures

High Power Components:
- WR90 components expected 1/04, for 2a&b
- 3 of 4 H-bends finished and in cold test
- Pump T’s finished, in bakeout
- Tapers expected 12/03
- 2.97” spools expected 2/04
- Supports expected 2/04
Phase 2a Schedule Drivers

Schedule benchmark:

Phase 1 Combiner:

Body out of 1st QC - 3/10/03
1st braze – 5/1
2nd braze – 5/23
Final braze – 6/16
Complete, to cold test - 6/20/03
15 weeks total duration, 8 weeks after 1st braze

KEK 3dB power splitter, out of QC 11/21
1st braze 12/9 → to cold test 2/23/04

Mode stripper, out of QC 12/5
1st braze 12/15/04 → to cold test 3/2/04

4th H-bend needs circ-rect converters, due 3/04
8-Pack Phase 2a timeline

Jan ‘04 – Begin to install infrastructure & high power components in tunnel and on roof. Bore penetrations in roof.

Feb ‘04 – High power components, supports available
   Install pre-processed structures on system.
   Obtain (Phase 2b) 6 dB, 4.8 dB power splitters from KEK
   (to be completed at SLAC 4/04)

Mar ‘04 – Connect to SLED system
   Bake system (2-3 weeks)
   Begin high power ops.
   Life test – 2000 hours → July ’04
8-Pack Status: Phase 2b

KEK designed high power splitters

6.0dB splitter design, 4.8dB splitter is similar

6dB, 4.8 dB splitters electrical, mechanical design in hand at KEK. Due 2/04
SLAC contributes Circ – Rect converters, and does brazing. Complete mid-April /04

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