NLC Magnets
2001 Configuration

By Area:
- Injector Systems are Permanent/Electro Based on Schluter Criteria
  - DR’s PM’s are Ferrite Due to Radiation Considerations
- Main Linac are “All” Permanent
- Beam Delivery “All” Electro to Provide Energy Flexibility

By Type:
Permanent – Electromagnet Split: Feb ‘01
Summary (counts will change as feasibilities scrutinized)

<table>
<thead>
<tr>
<th>Magnet Type</th>
<th>Permanent</th>
<th>Electromagnet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dipoles</td>
<td>336</td>
<td>522</td>
<td>858</td>
</tr>
<tr>
<td>Quadrupoles</td>
<td>2610</td>
<td>799</td>
<td>3409</td>
</tr>
<tr>
<td>Sextupoles</td>
<td>270</td>
<td>82</td>
<td>352</td>
</tr>
<tr>
<td>Total</td>
<td>3216</td>
<td>1403</td>
<td>4619</td>
</tr>
</tbody>
</table>

These magnets are not candidates for permanent magnets:

<table>
<thead>
<tr>
<th>Magnet type</th>
<th>Quantity</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correctors</td>
<td>838</td>
<td>All air-cooled/solid wire</td>
</tr>
<tr>
<td>Pulsed magnets</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Solenoids</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>61</td>
<td>Wigglers, Septa, Spin Rotators</td>
</tr>
</tbody>
</table>
Changes from May, 1999

- Adjustable permanent magnets are replacing electromagnets in ~57% of the machine. (This percentage is currently fluid as lattices change; designs are judged for feasibility.)
- Electromagnets have been strung wherever feasible (no stringing in May, 1999)
- Power supply volt-amps have been reduced to the minimum required (small number of standard sizes, often oversized, used for CD-1)
- Controlling electronics are in TEE's.
- 2001 lattice changes, especially in Beam Delivery, will be included by Snowmass.

Notes:

- Most permanent magnet candidates are based on the simple Schlueter criteria at this point in time, engineering feasibility studies are on-going, will be mostly concluded by Snowmass.
- Trims are not included in these figures.
- Trims will disappear if an electromagnet with a trim is changed to a permanent magnet.
- Total magnet count: 5,653 of 123 styles (excluding new lattices/lines)
- Total power supply count: TBD by Snowmass
- Total cable lengths: TBD by Snowmass
Magnet Design Features:

Electromagnets will be an enhanced SLAC typical design:
- Solid low-carbon steel cores
- Hollow copper conductors, vacuum-potted coils
- Quadrupole magnetic center stability satisfies beam-based alignment requirement
- Design for low cost and for high reliability (decision on redundant power supplies or other approach by Snowmass)
- Power supplies on strings wherever feasible

Permanent magnets will be a similar to FNAL recycler design with steel poles and integrated field strength adjustability obtained by rotating or sliding segments:
- Solid low-carbon steel cores
- NdFeB, SmCo5/Sm2Co17, or SrFe12O19 permanent magnet material in block form
- Rotating NdFeB elements for buck/boost adjustability.
- BBA requirement not yet satisfied.