

**ILC BDS Kickoff Meeting
Magnet Power Supplies
Summary of SLAC PCD EDR EOI**

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Proposals

- Three proposals that address the following major tasks
 1. EDR design and engineering
 2. Development of a high availability (HA) bipolar power supply
 3. Development of a quench detection/protection system for SC magnets
- For each proposal we provide a
 1. Summary description of the task
 2. List of time-phase deliverables
 3. Description of needed resources and costs
 4. Implementation plan

EDR Design and Engineering

- Scope includes all DC and pulsed magnet systems and associated controls
- Develop and maintain a magnet / power system list
- Satisfy requirements for control, tuning, stability, reliability
- Design power systems and electrical raceways to accommodate the physical constraints of service tunnel
- Coordinate with CFS and magnet designers to minimize cable losses, heat loads and facility costs
- Personnel skills
 - a. Power Electronics Engineer – DC power system design and costs
 - b. Pulsed Power Engineer – Kicker and other pulsed system design and costs
 - c. Controls Engineer – Local power system control and interlocks
 - d. Electronic Designer – Interconnect diagrams and equipment details
 - e. Raceway Designer – Cable selection and layouts
- Three year plan culminates in System Descriptions, Facility and Raceway Layouts, Costs and an Acquisition Plan and Schedule

HA Bipolar Power System Development

- SC magnets require 132 bipolar power systems at 120A, normal temperature magnets require many more systems at lower current. Similar situations exist in other Areas
- PCD building 40 unipolar, 50A, 100A, 150A and 200A HA power systems for ATF2. This experience is applicable to bipolar systems
- Paralleled Bipolar power systems present additional challenges of setpoint control, more complex topology, no easy way to isolate paralleled systems in fault situation
- Build 120A prototype HA M out of N system. This will address needs of high and low current systems
- Three year plan involving M & S expenditures and the following skill sets
 - Power Electronics Engineer – concepts and topology selection / simulation and design, development test plans
 - Controls Engineer – concepts, design and test planning
 - Electronic Designer – document circuits, research and purchase parts
 - Electronic Technician – research and purchase parts, assemble systems and test

Quench Detection / Protection Circuit Development

- 98 superconducting systems in the BDS. Several hundreds more in other Areas
- In many cases power systems are small, but in all instances energy storage is large and the potential for magnet damage is omnipresent
- PCD proposes to design, build and test prototype system consisting of
 1. Magnet winding quench detection and protection
 2. Lead voltage-resistance detection and protection
 3. Magnet stored energy dump circuit
- System will feature monitoring and fast shutoff circuitry revolving around latest technology, FPGA-based Programmable Logic Controllers
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