Radiation Safety at SLAC

• Shielding
• Beam Containment System (BCS)
  – Active (Ave I, LIONS)/ Passive (collimators)
• Personnel Protection System (PPS)
  – Entry Module/Stopers
# Shielding Design Criteria

<table>
<thead>
<tr>
<th>Beam loss scenarios</th>
<th>Dose Rate (mrem/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>• Outside ESA</td>
<td>0.5</td>
</tr>
<tr>
<td>• SSRL</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Mis-steering</td>
<td>400</td>
</tr>
<tr>
<td>Accident</td>
<td>25000</td>
</tr>
<tr>
<td></td>
<td>&lt;3000 mrem integrated</td>
</tr>
</tbody>
</table>
Radiation Safety Analysis

• Responsibility of the beam-line (experiment) physicist and the radiation physicist assigned to the experiment.

• includes:
  – beam parameters
  – losses along the path of the beam
  – location and dimension of the mechanical containment devices
  – list of active BCS devices
  – estimate of the maximum credible beam power
  – mis-steering scenarios
  – accident scenarios
  – ray-traces
  – shielding requirements
  – ....
Real Photon Experiments

• **Assumptions:**
  – primary e⁻ beam in the ESA (occasionally)
  – approximately 1 kW of average beam power
  – dump the beam in a quantameter in 3PC3
  – maximum credible beam = 1300 kW
Real Photon Experiments

- permanent magnets not required
- collimators/BTMs may be required
- number/location/size depend on the optics
- Deposition of 1 kW in 3PC3 region requires large amount of shield
  ~ 4 ft of iron, 5 ft concrete
Radiation Safety Road Map

- Assign a Beam Line/Experiment Physicist
- Work with Responsible Radiation Physicist (S. Mao)
  - study the impact of different designs of the experiment
  - freeze the design of the experiment
  - perform the safety analysis
  - other safety issues (e.g. earthquake, hydrogen target)
  - prepare a report for the RSC review/RSO approval
- Study radiation safety issues for the electron dump in the A-line
- Activation, training, etc.
- Beam Authorization Sheet
  - Beam tests/radiation surveys