Update on LUXE GEANT4 Simulation

Oleksandr Borysov
## Fast background simulation

<table>
<thead>
<tr>
<th>Simulation</th>
<th># particles</th>
<th>Processed (BX)</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electron background for electron-laser setup, fast simulation, updated ECal geometry</td>
<td>2.3983e11</td>
<td>159.89</td>
<td>/nfs/dust/luxe/user/oborysov/hics_list/list_root_hics_background_fast_c99bba6d_0_18_luxe.txt</td>
<td>Setup corresponds to commit c99bba6d of hics_fast branch, ECal has stainless casing. Particle tracking is stopped when it crosses any of beam dump or shielding volumes.</td>
</tr>
<tr>
<td>Electron background for electron-laser setup, fast simulation, updated ECal geometry</td>
<td>20.0774e11</td>
<td>138.5</td>
<td>/nfs/dust/luxe/user/oborysov/hics_list/list_root_hics_background_fast_9f6b6590_0_16_luxe.txt</td>
<td>Setup corresponds to commit 9f6b6590 of hics_fast branch, ECal has stainless casing and additional lead shielding between the beam pipe and detectors (tracker, ECal). Particle tracking is stopped when it crosses any of beam dump or shielding volumes.</td>
</tr>
<tr>
<td>Background for gamma-laser setup, fast simulation, updated ECal geometry</td>
<td>6.051e10</td>
<td>40.34</td>
<td>/nfs/dust/luxe/user/oborysov/hics_list/list_root_bppp_background_fast_0508546b_0_5_luxe.txt</td>
<td>ECal has stainless casing. Particle tracking is stopped when it crosses Shielding, BeamDumpAssembly, GammaBeamDumpAssembly</td>
</tr>
<tr>
<td>Background for gamma-laser setup, fast simulation, updated geometry to reduce background</td>
<td>1.9381e11</td>
<td>129.2</td>
<td>/nfs/dust/luxe/user/oborysov/bppp_list/list_root_bppp_background_fast_850fd10d_0_11_luxe.txt</td>
<td>ECal has stainless casing. The beam pipe section which joins interaction chamber with vacuum chamber changed to rectangular with bigger cross section. Particle tracking is stopped when it crosses Shielding, BeamDumpAssembly, GammaBeamDumpAssembly</td>
</tr>
</tbody>
</table>

716G /nfs/dust/luxe/group/MCProduction/Background/elaser/07012021_9f6b6590_fast_sim

2.3T /nfs/dust/luxe/group/MCProduction/Background/gammalaser/10012021_850fd10d_fast_sim
## BPPP Spectra

### BPPP Spectra Table

<table>
<thead>
<tr>
<th></th>
<th>8 um e+</th>
<th>8 um e-</th>
<th>5 um e+</th>
<th>3 um e+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entries</td>
<td>377</td>
<td>377</td>
<td>5095</td>
<td>7533</td>
</tr>
<tr>
<td>Mean</td>
<td>7.278</td>
<td>7.346</td>
<td>6.892</td>
<td>6.076</td>
</tr>
<tr>
<td>Std Dev</td>
<td>1.808</td>
<td>1.969</td>
<td>2.052</td>
<td>2.121</td>
</tr>
</tbody>
</table>

### Energy Distribution

- **8 um e+**
  - Entries: 377
  - Mean: 7.278
  - Std Dev: 1.808

- **8 um e-**
  - Entries: 377
  - Mean: 7.346
  - Std Dev: 1.969

- **5 um e+**
  - Entries: 5095
  - Mean: 6.892
  - Std Dev: 2.052

- **5 um e-**
  - Entries: 5095
  - Mean: 6.894
  - Std Dev: 2.075

- **3 um e+**
  - Entries: 7533
  - Mean: 6.076
  - Std Dev: 2.121

- **3 um e-**
  - Entries: 7533
  - Mean: 6.083
  - Std Dev: 2.165
BPPP ECAL signal, \( w_0 = 3\mu m \)

Geant4 simulation:
- No weight scaling;
- Modified beam pipe IPC-VC.
BPPP ECal signal, \( w_0=5\mu m \) and \( w_0=8\mu m \)
Compton photons

IPStrong, 8um $\xi=1.93$

Ptarmigan, $\xi=1.93$