Cosmogenic Background Rejection at ICARUS

**Motivation**
- ICARUS is on the surface and exposed to huge cosmic activity
- Primary background for several physics analysis

**Impact of overburden on reducing cosmic backgrounds**
- ~ 3 m concrete overburden (OB)
- 4π coverage of the detector with Cosmic Ray Tagger (CRT)

**Primary Cosmic Rays**

<table>
<thead>
<tr>
<th>Primary cosmic particle</th>
<th>n</th>
<th>p</th>
<th>μ</th>
</tr>
</thead>
<tbody>
<tr>
<td>w/o OB</td>
<td>43.5%</td>
<td>41.3%</td>
<td>13.5%</td>
</tr>
<tr>
<td>w/ OB</td>
<td>(2.5%)</td>
<td>(2.5%)</td>
<td>(95%)</td>
</tr>
</tbody>
</table>

**Total in 211 s active LAr**
- 12290 γ (989 γ)
- 3630 brems γ
- 2231 primary γ (negligible)

**Summary**
- The overburden is very effective in reducing the hadrons while fully eliminating the electromagnetic cosmic ray components

**Cosmogenic Background Rejection**
- Primary cosmic particle impact of overburden on reducing cosmic backgrounds
- ICARUS is on the surface and exposed to huge cosmic activity
- Counts in 211 s active LAr
- Total in 211 s active LAr
- Work in progress

**CRT - PMT (Photo Multiplier Tube) Matching**
- Primary background for several physics analysis
- ICARUS is on the surface and exposed to huge cosmic activity
- Counts

**CRT - TPC (Time Projection Chamber) Matching**
- Exploiting the information from three sub detector and benchmarking the method with data is in progress
- The reconstructed TPC track once we drift it according to the time at CRT, we will see a pointing track matching to a CRT hit.

**References**
2. C. Hilgenberg, SBN-Docdb : 19166v1