$D_S^{*+} \rightarrow D_S^+ e^+ e^-$

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Contents

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• Cuts for each of the 9 modes have been optimized for the pion-fitted and electron-fitted samples.

• Still evaluating the usefulness of vertex constraining the daughters. Had previously shown Anders that with vertex constraints, the width of the Ds mass cut could be reduced by 27% while retaining the same signal yield. Am investigating how this reduces the background.

• Once cuts are settled, we will unblind the sideband region of the $\Delta \Phi$ cut to make sure we see the number of conversion events we expect.
## Prediction for Data for Sample Set of Cuts

<table>
<thead>
<tr>
<th>Decay Mode of the $D_s^+$</th>
<th>Expected Signal Events in 586 pb$^{-1}$ in the Pion-Fitted Samples</th>
<th>Expected Background Events in 586 pb$^{-1}$ in the Pion-Fitted Samples</th>
<th>Expected Signal Events in 586 pb$^{-1}$ in the Electron-Fitted Samples</th>
<th>Expected Background Events in 586 pb$^{-1}$ in the Electron-Fitted Samples</th>
<th>Details in Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>$K^+K\pi^+$</td>
<td>12.3</td>
<td>2.0</td>
<td>16.6</td>
<td>3.3</td>
<td>KKpi</td>
</tr>
<tr>
<td>$K_sK^+$</td>
<td>3.3</td>
<td>0.8</td>
<td>3.2</td>
<td>0.5</td>
<td>KsK</td>
</tr>
<tr>
<td>$\pi^+\eta; \eta\rightarrow\gamma\gamma$</td>
<td>4.2</td>
<td>0.4</td>
<td>4.8</td>
<td>0.5</td>
<td>pieta</td>
</tr>
<tr>
<td>$\pi^+\eta'; \eta'\rightarrow\pi^+\eta; \eta\rightarrow\gamma\gamma$</td>
<td>1.1</td>
<td>0.5</td>
<td>1.2</td>
<td>0.0</td>
<td>pietaprime</td>
</tr>
<tr>
<td>$K^+K\pi^+\pi^0$</td>
<td>4.9</td>
<td>3.8</td>
<td>5.1</td>
<td>2.2</td>
<td>KKpipi0</td>
</tr>
<tr>
<td>$\pi^+\pi^+\pi^+\pi^0$</td>
<td>3.2</td>
<td>1.3</td>
<td>3.9</td>
<td>2.1</td>
<td>pipipi</td>
</tr>
<tr>
<td>$K^*+K^<em>0; K^</em>+\rightarrow K^0\pi^+; K^*0\rightarrow K\pi^+$</td>
<td>1.9</td>
<td>1.3</td>
<td>2.1</td>
<td>1.0</td>
<td>KsKmpipi</td>
</tr>
<tr>
<td>$\eta\rho^+; \eta\rightarrow\gamma\gamma; \rho^+\rightarrow\pi^+\pi^0$</td>
<td>5.8</td>
<td>5.9</td>
<td>6.0</td>
<td>2.5</td>
<td>pipi0eta</td>
</tr>
<tr>
<td>$\eta\pi^+; \eta\rightarrow\rho^0\gamma$</td>
<td>2.3</td>
<td>2.4</td>
<td>2.5</td>
<td>2.3</td>
<td>pietaprimerho</td>
</tr>
<tr>
<td>Total</td>
<td><strong>39.0</strong></td>
<td><strong>18.4</strong></td>
<td><strong>45.4</strong></td>
<td><strong>14.4</strong></td>
<td></td>
</tr>
</tbody>
</table>

$9.1\sigma \rightarrow 12.0\sigma$
## Reprocessing Campaign Frontline

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Pass2</th>
<th>DTag</th>
<th>N-Tuplize</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>20060117_P2</td>
<td>Done 20060224_FULL_1</td>
<td>Done</td>
</tr>
</tbody>
</table>
|         | PASS2-C_5      | Analysis-C_5        | Missed DsTags ~ 0.18%
|         |                |                     | New DsTags ~ 0.1%  |
| 40      | 20060802_P2    | Done 20060224_FULL_1| Done               |
|         | PASS2-C_6      | Analysis-C_6        | Missed DsTags ~ 0.15%
|         |                |                     | New DsTags ~ 0.09%  |
| 41      | 20060802_P2    | Done 20060224_FULL_1| Done               |
|         | PASS2-C_6      | Analysis-C_6        | Missed DsTags ~ 0.14%
|         |                |                     | New DsTags ~ 0.08%  |
| 47      | 20071023_P2    | Done 20060224_FULL_A_3| Done               |
|         | PASS2-C_6      | Analysis-C_6        | Missed DsTags ~ 0.18%
|         |                |                     | New DsTags ~ 0.11%  |
| 48      | 20071023_P2    | Done 20060224_FULL_A_3| Done               |
|         | PASS2-C_6      | Analysis-C_6        | Missed DsTags ~ 0.15%
|         |                |                     | New DsTags ~ 0.08%  |
| **Total** | **Done**      | **Done**            | **Done**           |
|         |                |                     | Missed DsTags ~ 0.15%
|         |                |                     | New DsTags ~ 0.09%  |

Details of re-pass2-ing, DsTagging, n-tuplizing and validating documented here: [Reprocessing](#)