

Layer 00 Studies

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Motivation

- L00 Alignment is progressing -> Want to see how much it improves σ_{d0} ? How does it compare with expectations?
- Even if alignment is not perfect, improvement at low pT should already be clear (MS-dominated) -> Divide sample into regions with more and less material.

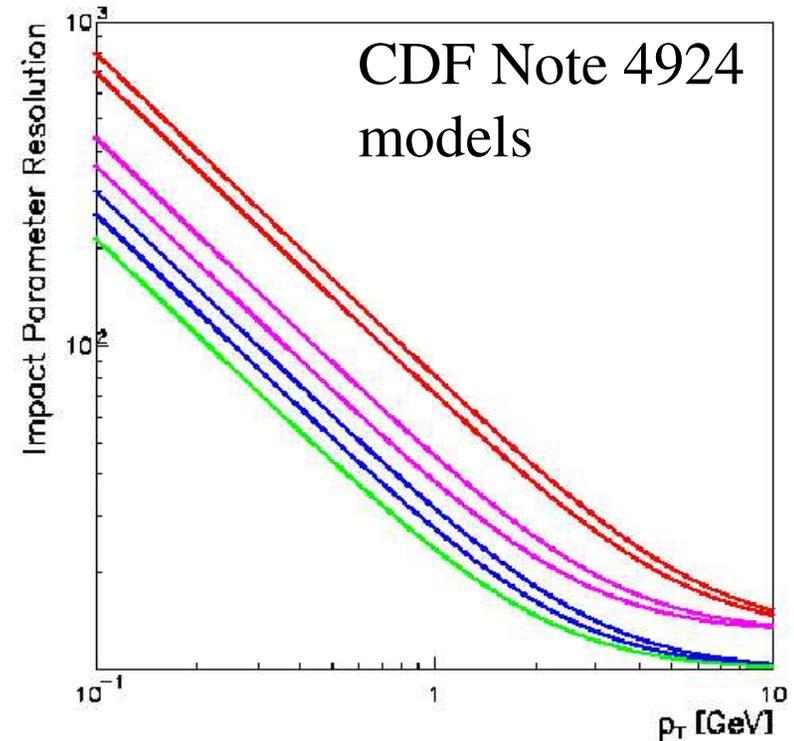
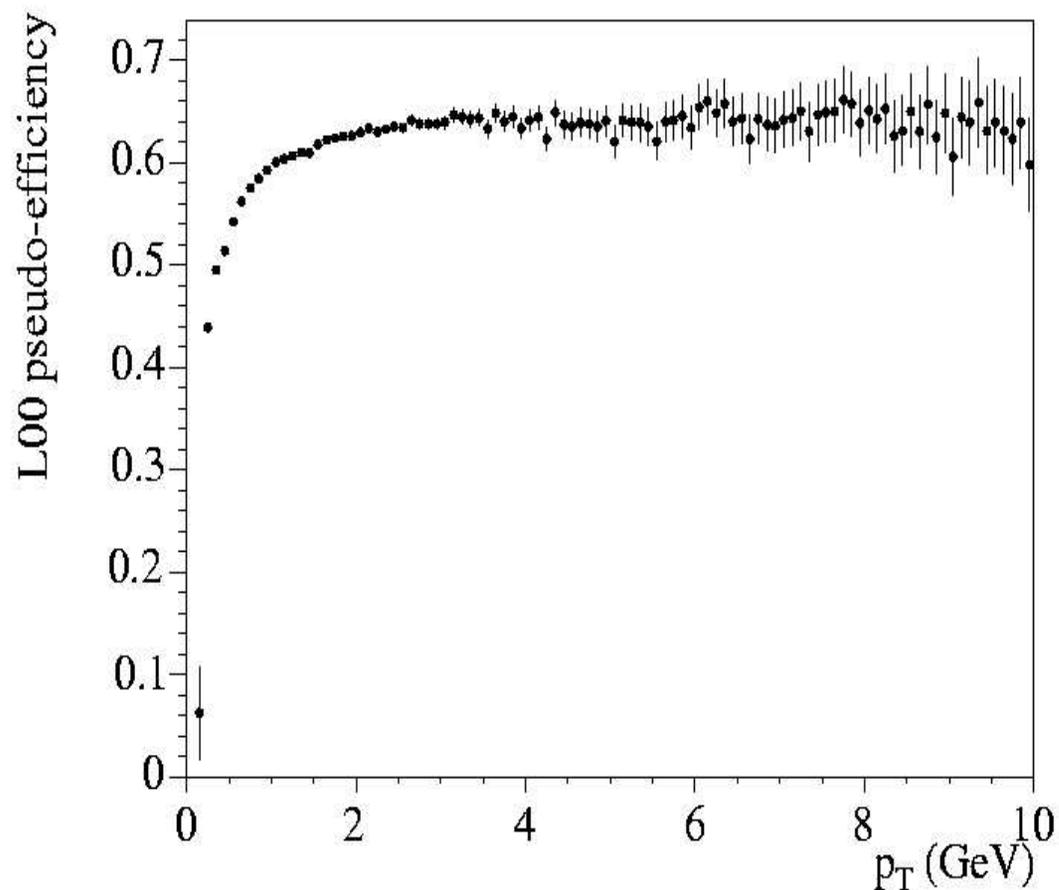


Figure 4. Estimated IP resolutions at low momentum for SVXII bulkhead and hybrid regions (top two red curves), silicon-only regions (next two magenta curves). These become the two blue and the green (bottom) curves, respectively, after adding Layer 00.

How efficient are we at adding L00 hits as a function of p_T ?

- Use J/ψ data (thanks Matt!)
- Denominator:
TRK_algo !=16,
 $d_0 < 200 \mu\text{m}$
- Numerator: Track must also have a L00 hit (I make no isolation requirement): Optimistic “pseudo-efficiency”.
- Consistent with others' observations

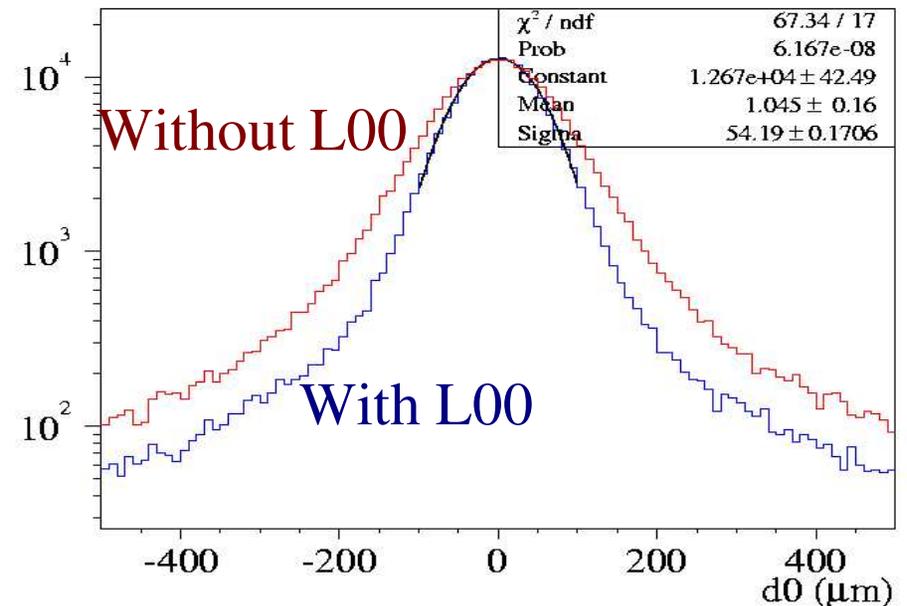
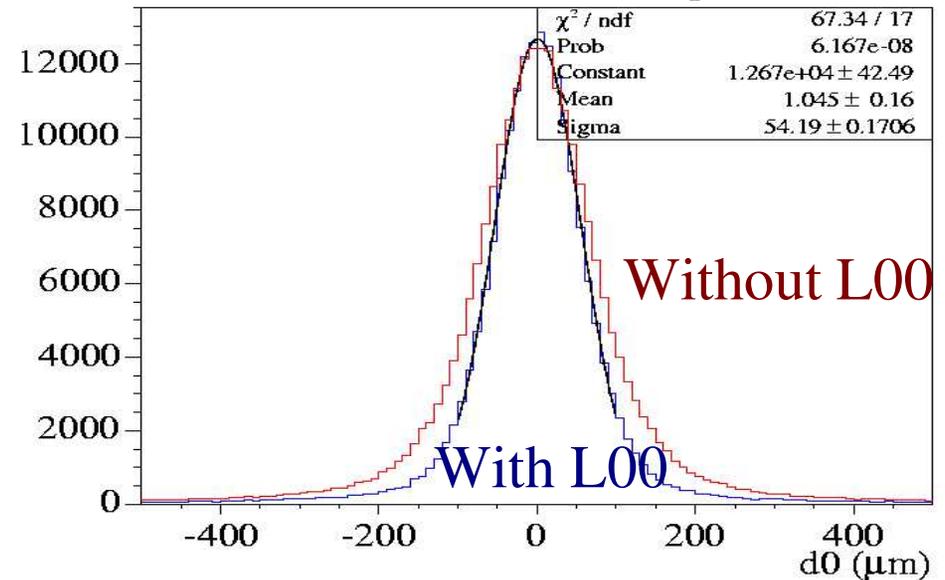


Layer 00 and Impact Parameter

Resolution

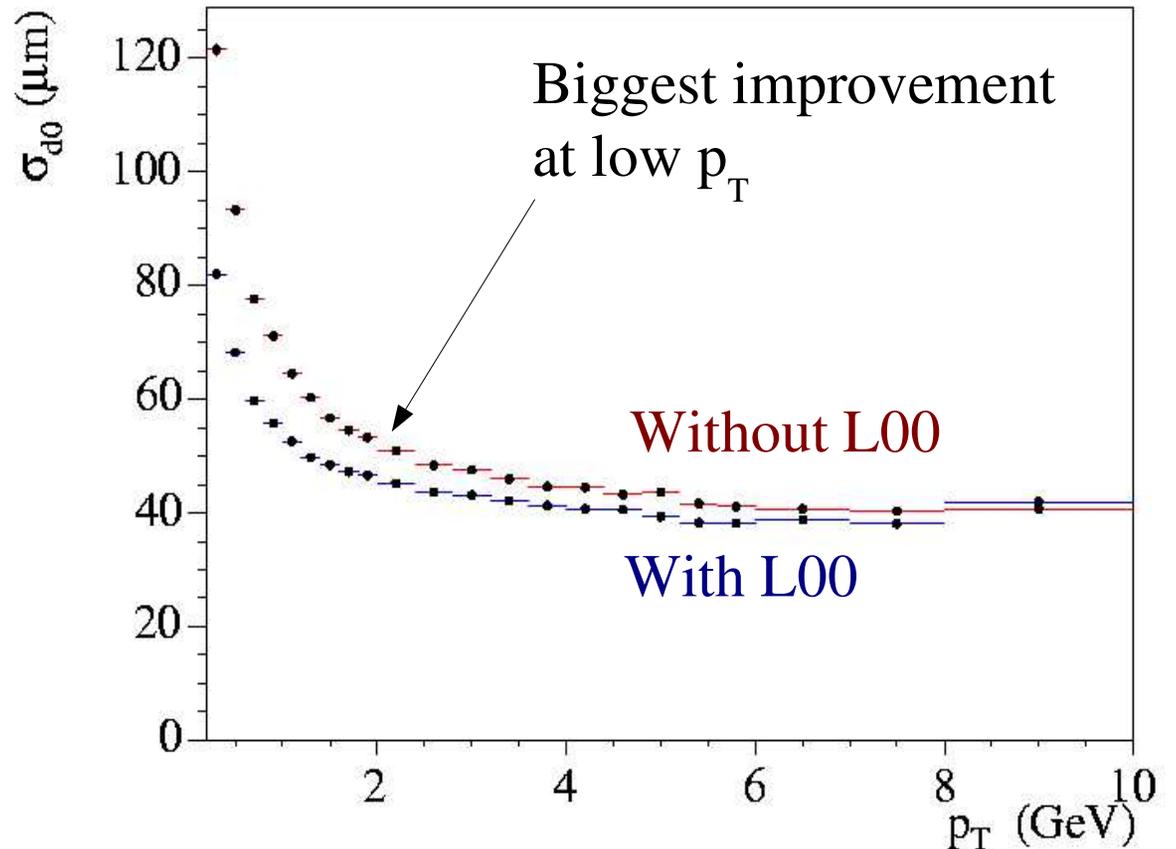
$0.9 \text{ GeV} < p_T < 1.0 \text{ GeV}$

- Compare tracks before and after adding a L00 hit
- Look in bins of p_T
- Fit to Gaussian in range $\pm 100 \mu\text{m}$
- Resolution improved, tails reduced



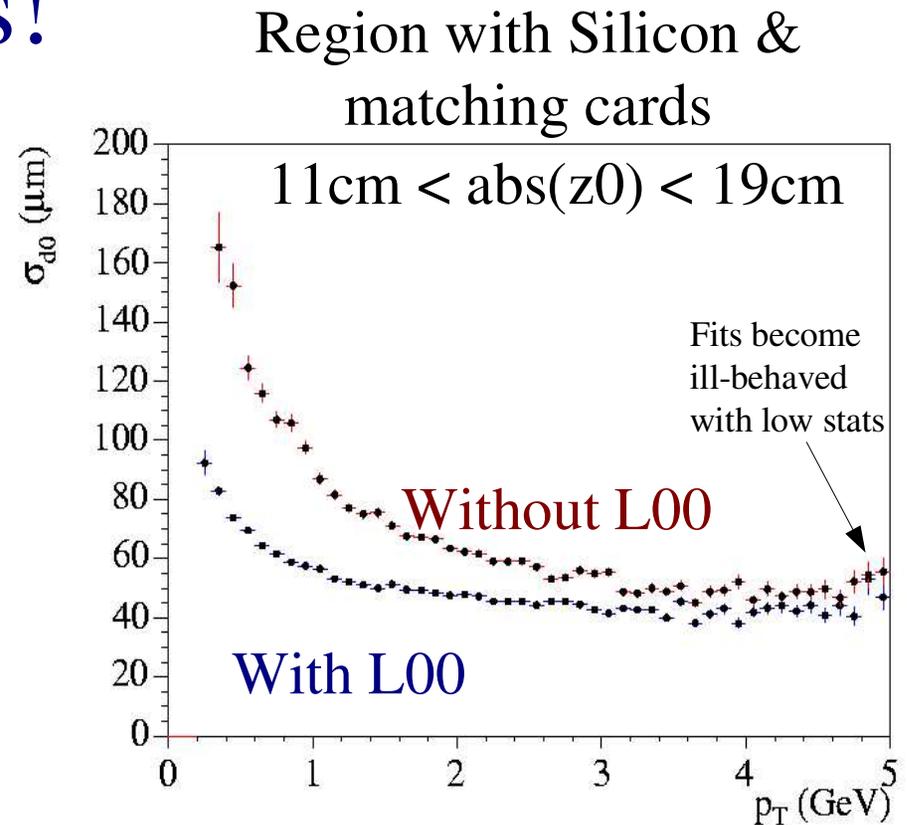
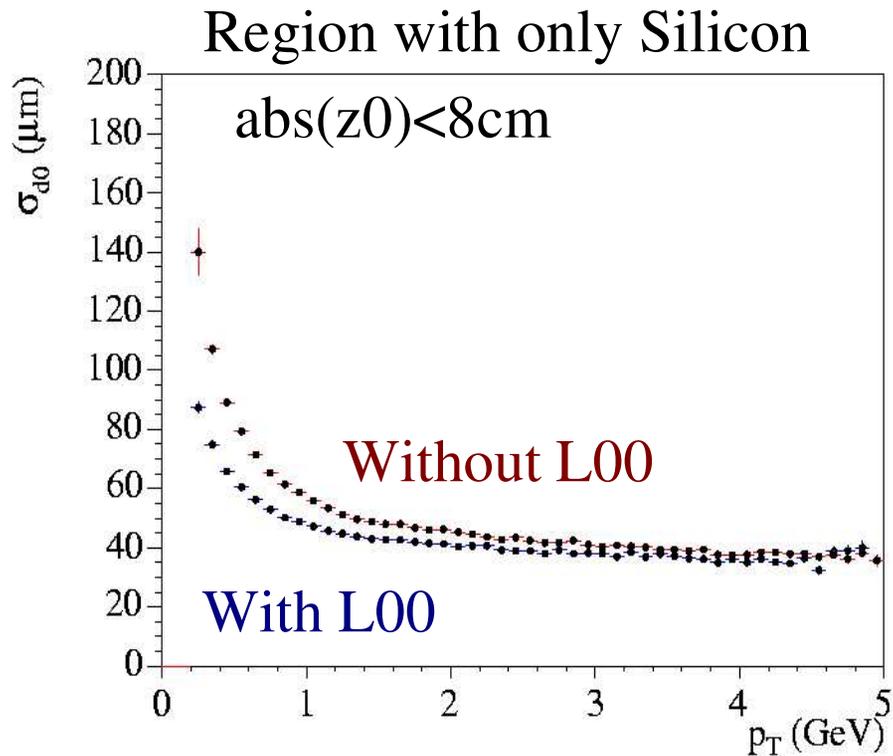
Impact Parameter Resolution with L00

- Fit d_0 vs p_T in slices in p_T in range $\pm 100\mu\text{m}$
- Plot σ_{d_0} vs. p_T
- Expect contributions from:
 - Beamspot size (~ 30)
 - Alignment
 - Pitch
 - Multiple Scattering
 - Etc.



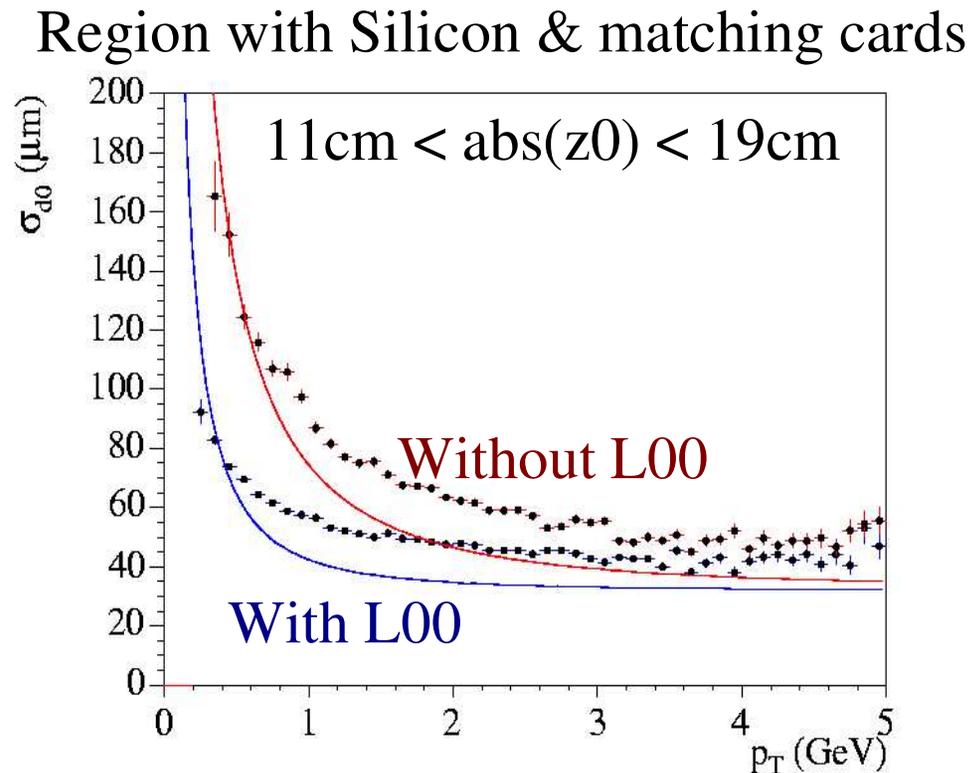
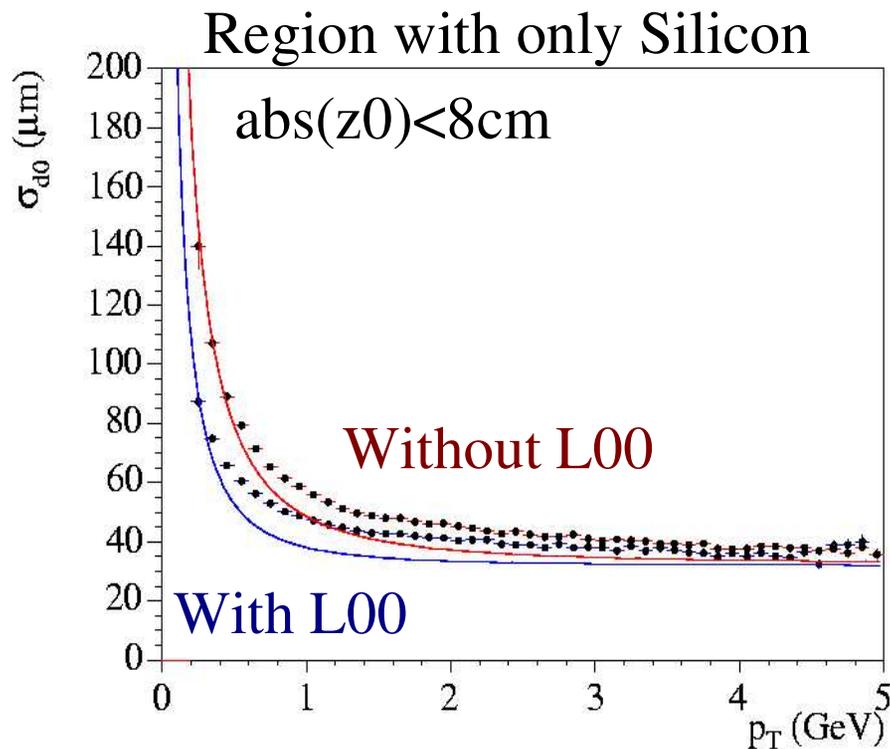
Can we see SVXII material effects?

Yes!



- Significant improvement at low p_T , especially for tracks in regions with more material!

How does this compare with note 4924 expectations?



Models shown are from Layer00 proposal, cdf note 4924, and are computed including a $31 \mu\text{m}$ contribution from beamspot size.

- Getting there, but still some room for improvement

Conclusions

- L00 improvement in σ_{d0} is already clearly visible, especially at low p_T in regions of SVXII with more material.
- Note 4924 expectations indicate there is still room for improvement: will come with better alignment.
- First look is encouraging!