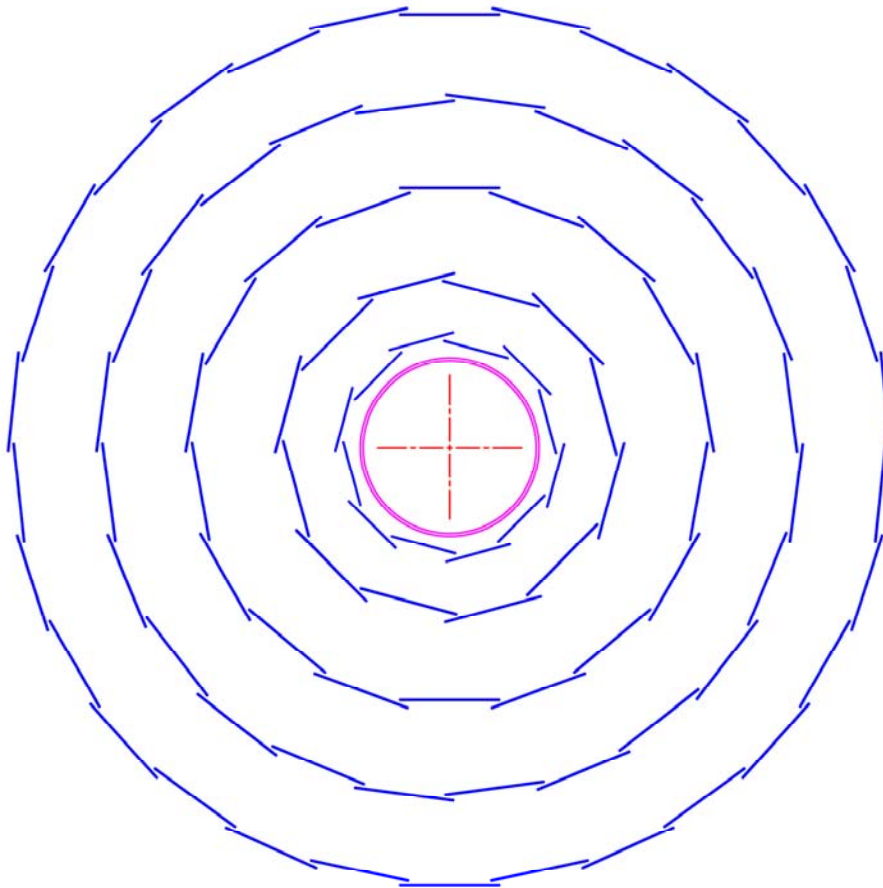# Present Barrel Layout

- 5-layers with A and B sub-layers
- Radii normal to inner sensor surface
  - 14, 15.006, 22, 23.132, 35, 35.890, 47, 48.409, 60, 60.770 mm

Sensor active widths:
L1: 9.1 mm
L2 - L5: 13.3 mm
Cut - active width: 0.08, 0.5 mm
Inner radii:
A-layer: 14, 22, 35, 47.6, 60 mm
B-layer: 15.0060, 23.1325, 35.8901,
          48.4088, 60.7702 mm
Sensors per layer:
12, 12, 18, 24, 30
Sensor-sensor gap: 0.646, 0.5 mm
Sensor thickness: 0.15 mm
30 August 2006

Split at approximately the equator

B- to A-layer overlaps left and right of the origin are different (L3, L5).

Consequence of # sensors per layer

Present Barrel Layout

- Assumed sensor thickness = 0.1 mm, but an effective thickness = 0.15 mm to include readout

- Sensor cut widths were originally assumed to be 9.8 mm (L1) and 13.8 mm (L2 – L5).

- Cut width – active width was assumed to be 0.5 mm.

- The gap from the corner of an A-layer sensor to the inner surface of a B-layer sensor was assumed to be 0.5 mm.

- As L1 was being detailed, we received a suggestion / request that the dead band at sensor edges be made more consistent with the "3-D" technology under development at MIT/LL/Fermilab.

- L1 sensor positions were left unchanged, but cut and active widths were reduced to 9.18 mm and 9.1 mm, respectively.
  - That led to a larger sensor-sensor gap in L1.

Layout under Development

- Sensor counts were increased in L3, L4, L5 to obtain multiples of 4.
- Radii normal to inner sensor surface were adjusted.
  - 14, 15.006, 21, 22.068, 34, 34.967, 47, 47.885, 60, 60.831 mm
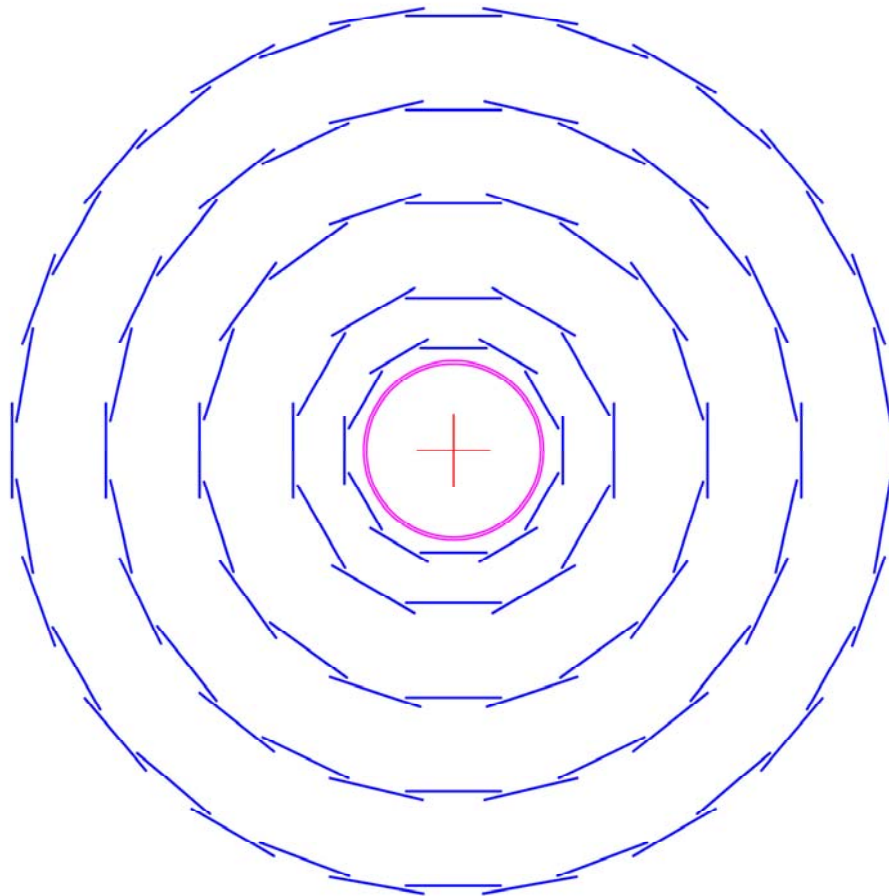
Sensor active widths:
L1: 9.1 mm
L2 - L5: 13.1 mm
Cut - active width: 0.08 mm
Inner radii:
A-layer: 14, 21, 34, 47, 60 mm
B-layer: 15.0060, 22.0681, 34.9674,
　　　　　 47.8855, 60.8313 mm
Sensors per layer:
12, 12, 20, 28, 36
Sensor-sensor gap: 0.5 mm
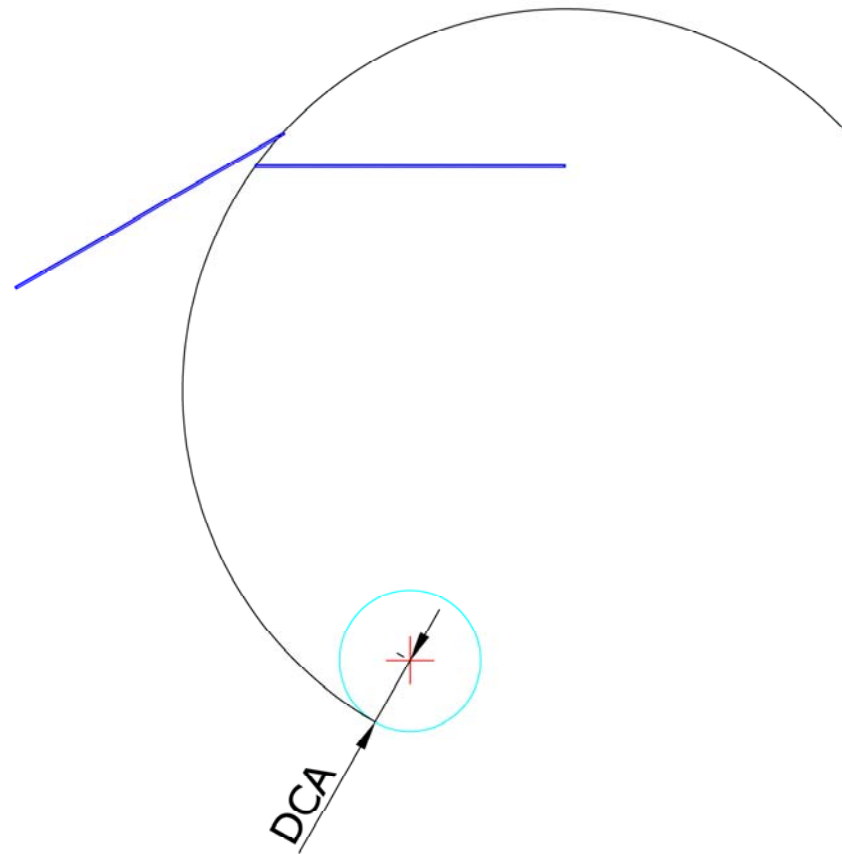Sensor thickness: 0.1 mm
24 April 2007

Split at approximately the equator

Sensor overlaps at the split now have a uniform character.
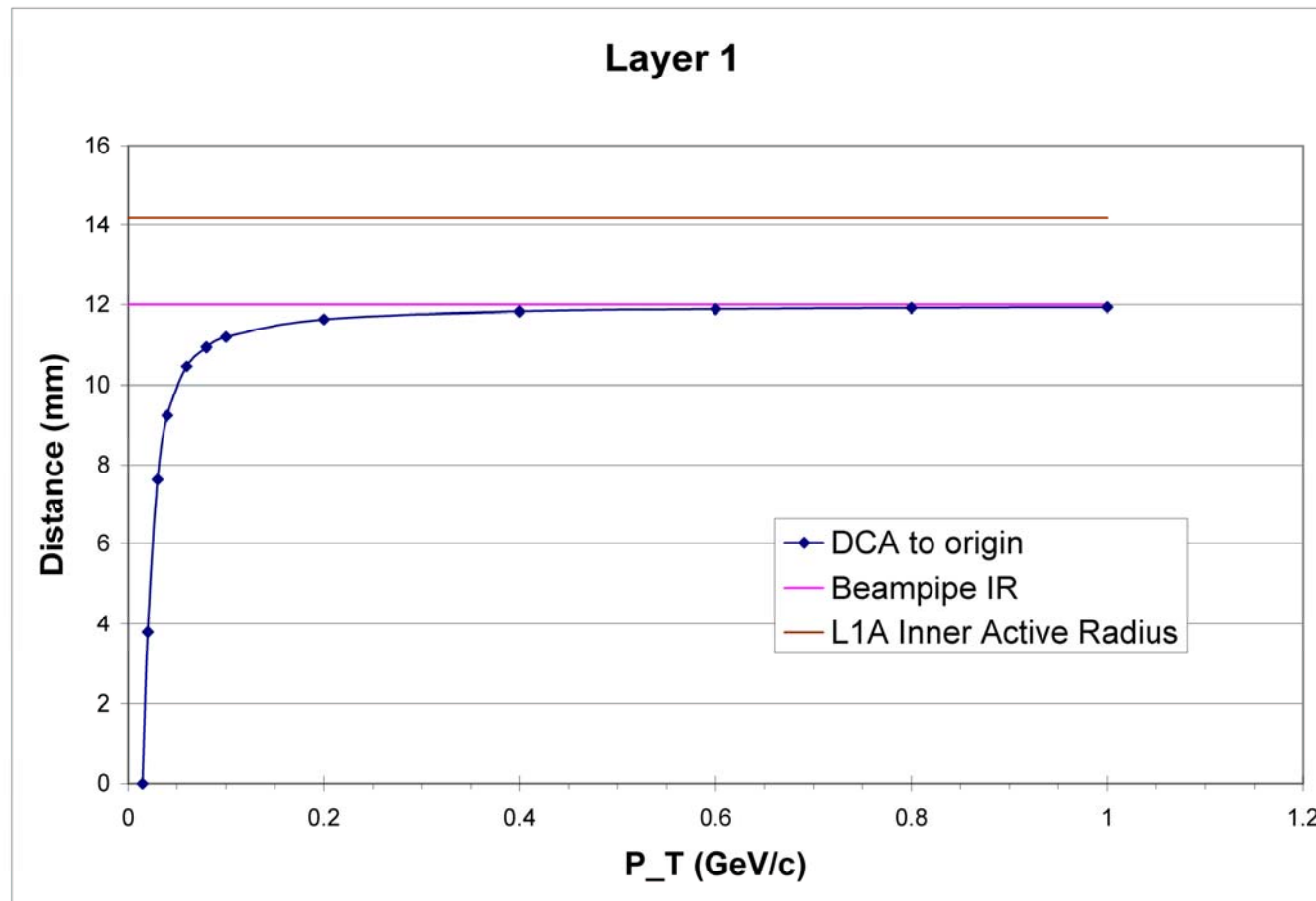
B-layer to A-layer Gaps

- The gaps determine hermeticity in the R-Phi plane.
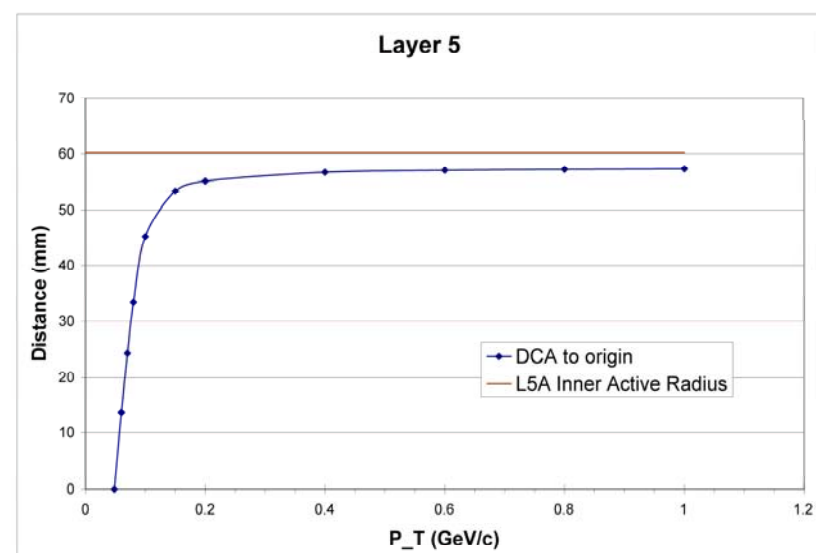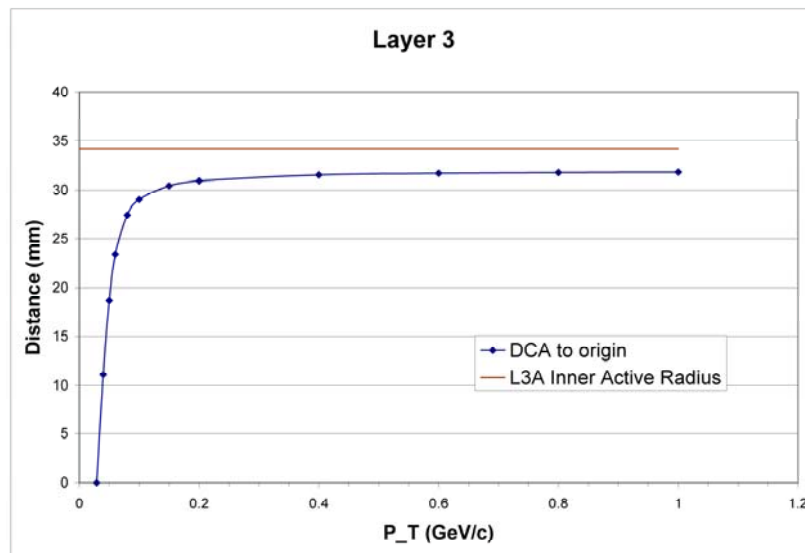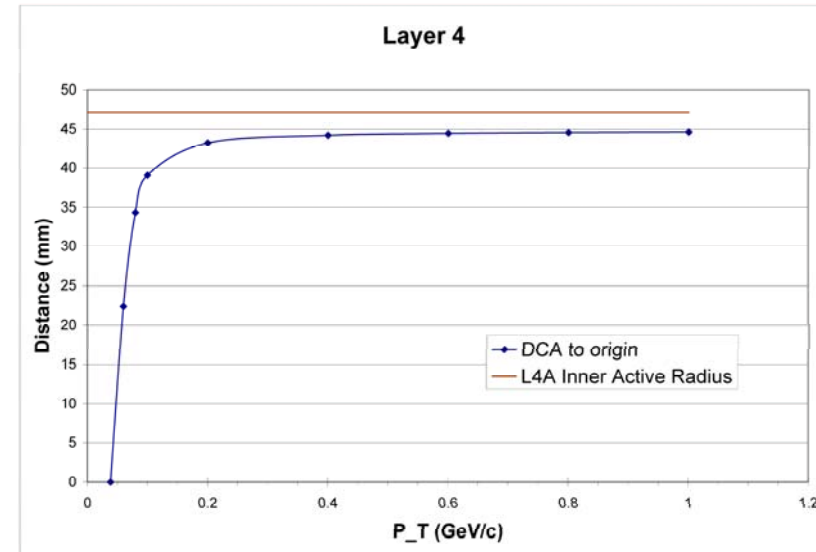- For the same DCA and higher PT than drawn, full geometric efficiency is obtained.
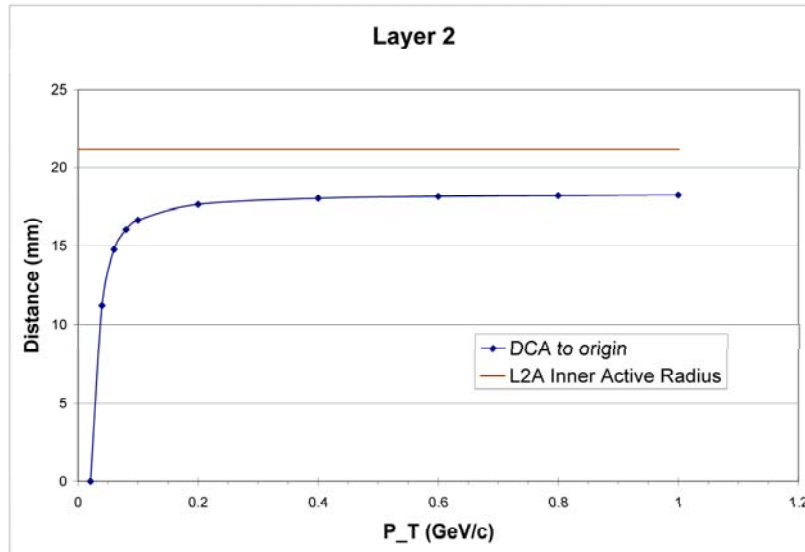
B-layer to A-layer Gaps

- Full geometric efficiency is obtained below and to the right of the curve. I'm working on the average efficiency versus P_T and DCA.
- Question: Do we care to be fully efficient for tracks that do not reach L2?

B-layer to A-layer Gaps

Issues

- What is the net efficiency in the R-Phi plane?
- Should the fifth layer be moved to larger radius to reduce the gap to the outer tracker?
- Should there be a sixth layer at larger radius?
- Is the radius of L2 OK?

- Work in progress
- Suggestions are welcome.
- Although this effort is in conjunction with SiD, the results may be applicable to any ILC vertex detector.