



PLUME material budget

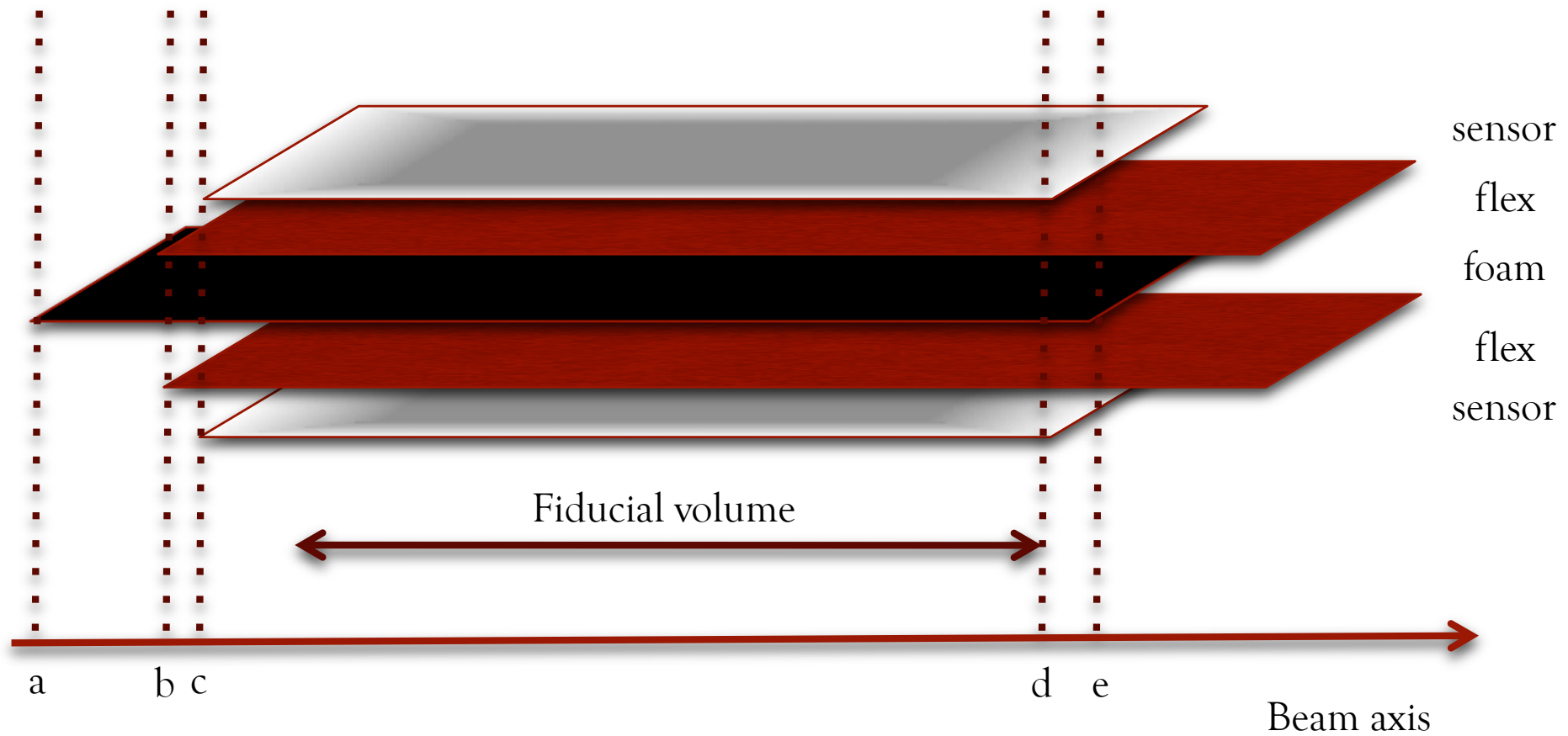
Estimate and predictions

28 October 2010

Hypothesis of calculation

- The fiducial area
 - Length = from the first sensor end to the last one end
 - Width = one sensor width
 - Consider the full sensor as active area = $21.5 \times 13.7 \text{ mm}^2$
 - Inter-space between sensor $\approx 110 \text{ }\mu\text{m} \times 5$
 - Fiducial area is $(6 \times 21.50 + 5 \times 0.10) \times 13.7 = 129.55 \times 13.7 = 1774.8 \text{ mm}^2$
- Fiducial weight of any other layer
 - The layer area limited in the fiducial length / fiducial area = layer width / fiducial width
 - Outside the fiducial length, weight = 1
- Flex dimensions
 - For each metal layer, we consider an equivalent continuous width of 3 mm
- Foam stiffener dimensions
 - As wide as the flex (we ignore that without a flex mirror design it is wider because we know it is not a real technical difficulty)

Geometrical definitions



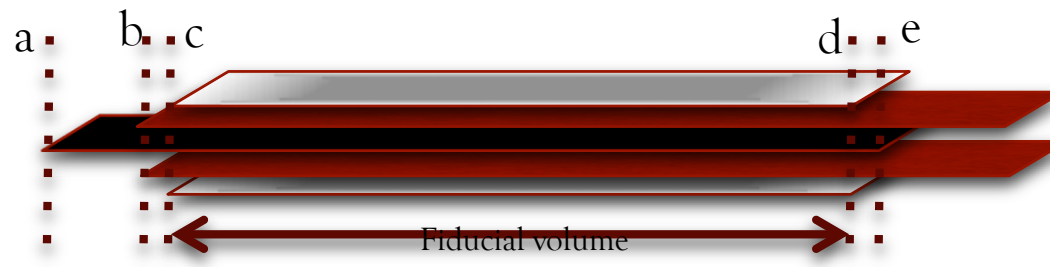
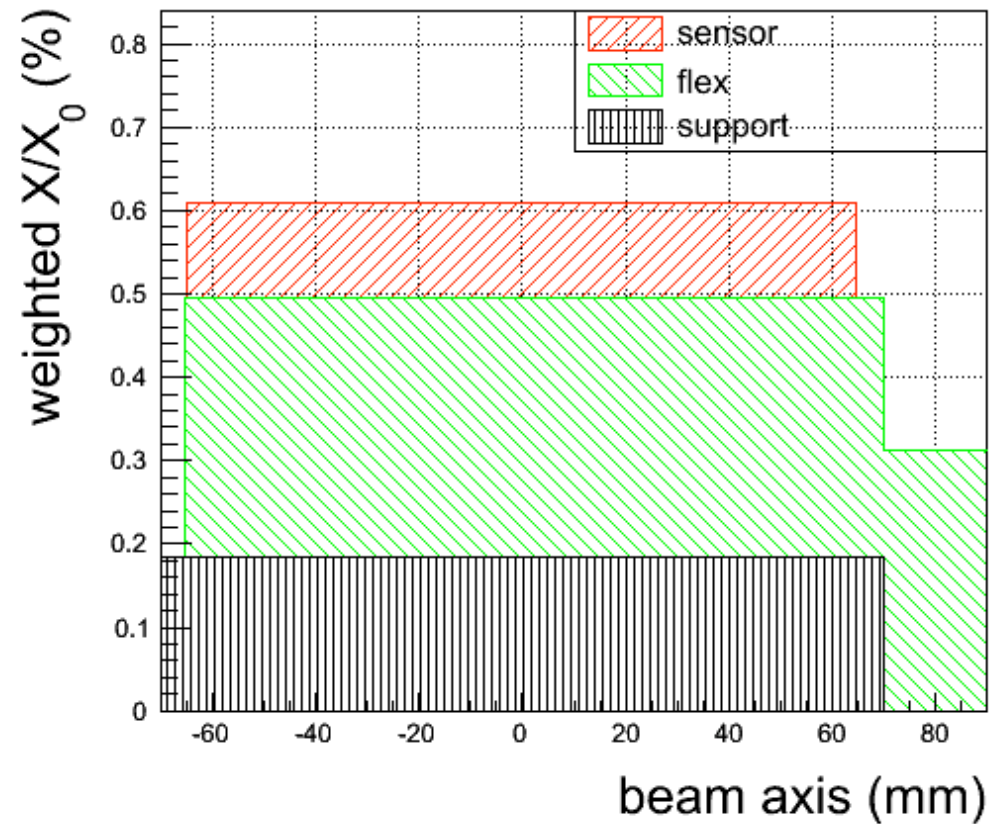
→ 5 zones X/X_0 calculation

PLUME 2010 – the numbers

Layer	Thickness	Total area (mm ²)	Area weight	X/X ₀ (%) (layer zone)	Weighted X/X ₀ (%) (zone c-d)	X/X ₀ (%) zone a-b	X/X ₀ (%) zone b-c	X/X ₀ (%) zone d-e	N. of layers
sensor	50 μm	129.55x13.7	1	0.053 (c-d)	0.053	0	0	0	2
Two metals	2x20 μm	146.00x3	0.22	0.280 (b-e)	0.061	0	0.061	0.061	2
Total kapton	100 μm	146.00x24.6	1.80	0.036 (b-e)	0.065	0	0.065	0.065	2
SMD compo.			0.02	1.5	0.030		0.030	0.030	2
Glue	10 μm	129.55x13.7	1	0.004 (c-d)	0.004	0	0	0	2
SiC foam 8%	2 mm	140.09x13.7	1	0.184 (a-d)	0.184	0.184	0.184	0	1
TOTAL					0.610	0.184	0.496	0.312	

PLUME 2010 - the plot

Total material budget (weighted/fiducial volume)



PLUME goal – the numbers

Layer	Thickness	Total area (mm ²)	Area weight	X/X ₀ (%) (layer zone)	Weighted X/X ₀ (%) zone c-d	X/X ₀ (%) zone a-b	X/X ₀ (%) zone b-c	X/X ₀ (%) zone d-e	N. of layers
sensor	35-50 μm	129.55x13.7	1	0.037 - 0.053 (c-d)	0.037 - 0.053	0	0	0	2
Two metals	2x(5-10) μm	146.00x3	0.22	0.280 (b-e)	0.007 - 0.014	0	.007- .014	.007- .014	2
Total kapton	20-50 μm	146.00x13.7	1	0.007 - 0.018 (b-e)	0.007 - 0.018	0	.007- .018	.007- .018	2
SMD compo.			0.02	0.7	0.015		0.015	0.015	2
Glue	10 μm	129.55x13.7	1	0.004 (c-d)	0.004	0	0	0	2
SiC foam 4-8%	2 mm	140.09x13.7	1	0.092 - 0.184 (a-d)	0.092 - 0.184	0.092 - 0.184	0.092 - 0.184	0	1
TOTAL					0.232 – 0.392	0.092 - 0.184	0.150 – 0.278	0.058 – 0.094	

PLUME goal - the plot

Total material budget (weighted/fiducial volume)

