Beam flux update

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Solid angle correction

- Was mentioned in last meeting that to measure absolute flux rates need difference in solid angle, ω, between S_n
- To calculate this used

$$\omega = 4\arcsin\left(\frac{l \times b}{\sqrt{(l^2 + 4d^2)(b^2 + 4d^2)}}\right)$$

- Assumes plane is perpendicular to imaginary line from $S1$ to centre of detector
- l, b are dimensions of detector in $y - z$ plane
- d is distance from $S1$ to detector

Solid angle factors

Detector	Height	Width	Distance from $S1$	Solid angle
$S2$	0.365 m*	0.1 m	1.418 m	0.01799 sr
$S3$	1.22 m	1.80 m	10.75 m	0.01891 sr
$S4$	0.78 m	1.40 m	13.99 m	0.00557 sr

- *Unsure of active area of $S2$

Figure 7 : Measured points on D2

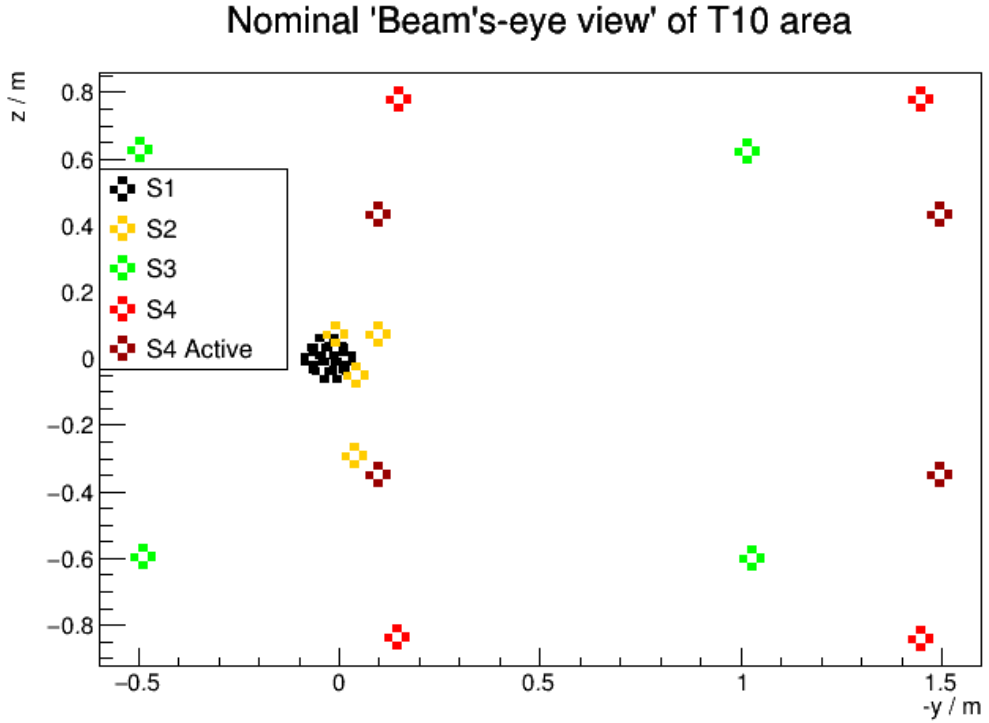
Solid angle corrections

- Now comparing absolute rates of $S1 \times S2 \times S4$ and $S1 \times S2$
- $\frac{S4 \text{ solid angle}}{S2 \text{ solid angle}} = 0.310$
- All numbers given as particles per spill

N blocks	$S1 \times S2$	$S1 \times S2 \times S4$ corrected
0	683	670
1	1913	2145
2	2949	3194
3	3415	3258
4	5630	4710

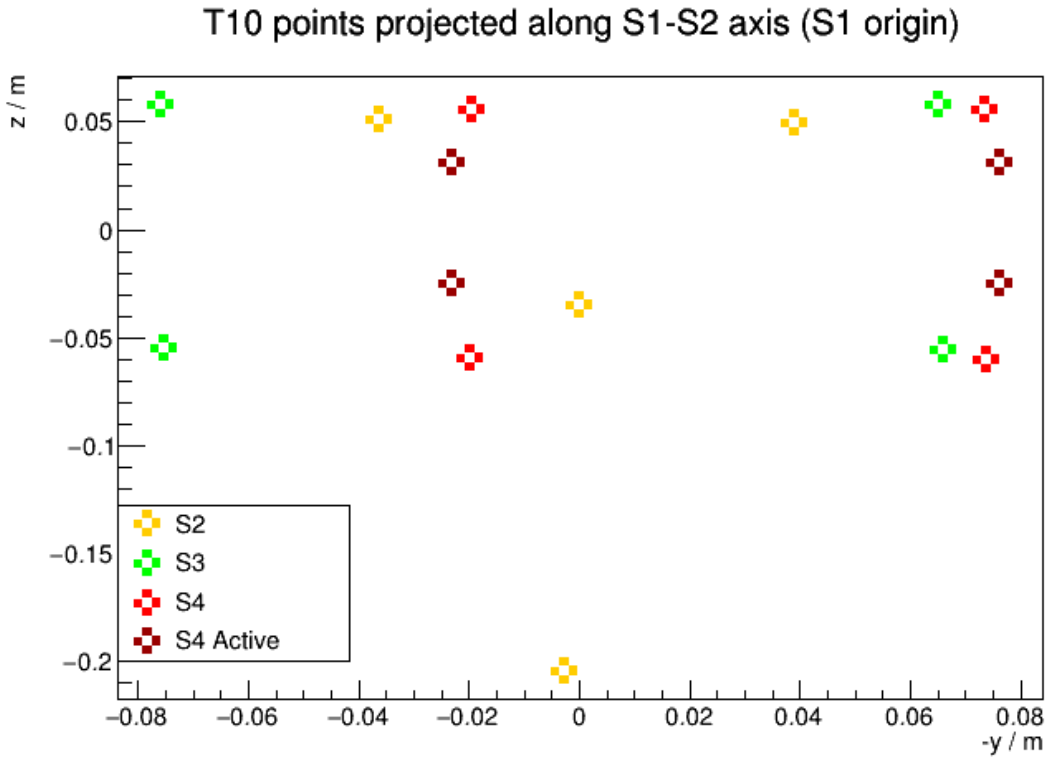
- Note, this is a naive correction:
  - Does not take into account spatial overlap
  - Method will not work when comparing $S1 \times S2 \times S4$ and $S1 \times S2 \times S3$ – must take into account how flux changes with angle

T10 $y - z$ view



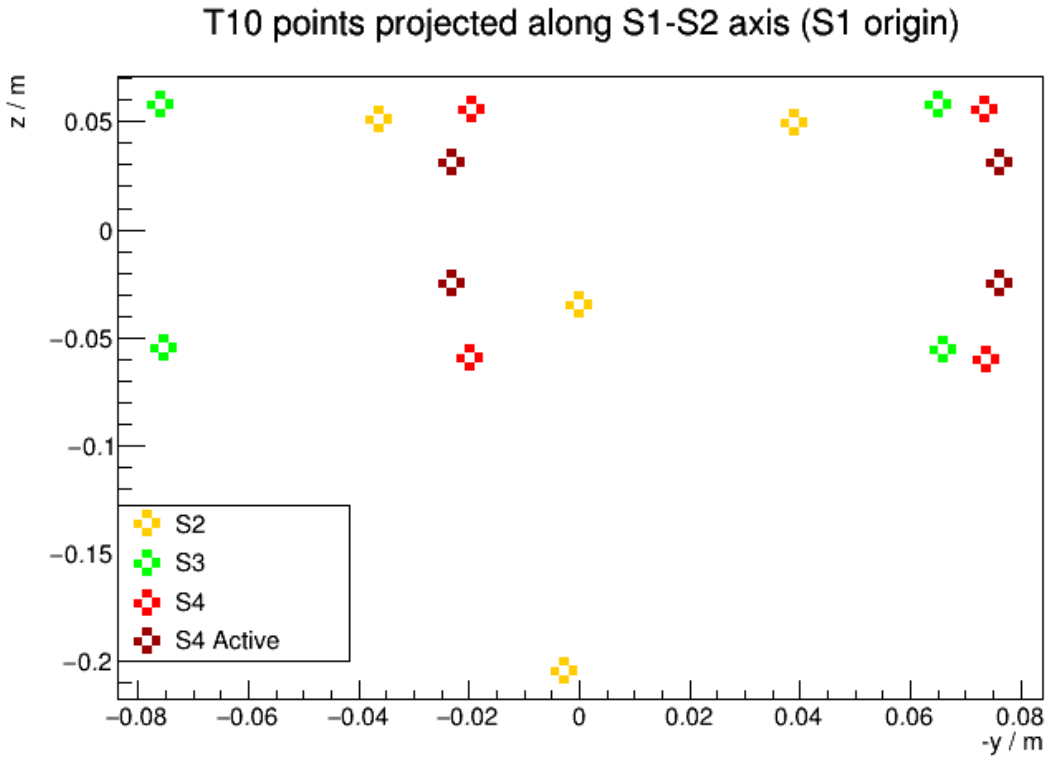
- x direction is beam direction – not shown here
- Have flipped the y coordinate to look as though we are at nominal beam origin looking down beamline
- Have calculated points representing active area of $S4$

T10 $y - z$ view projected ($S1$ origin)



- Shifted coordinate system such that $S1$ is at $(0, 0, 0)$
- Rotated about z (vertical) axis such that x axis now passes straight through $S1$ and $S2$ (1.72 degree rotation)
- Projected y, z coordinates such that $y' = y/x$ and $z' = z/x$

T10 $y - z$ view projected ($S1$ origin)



- In this projection only 62.5% of $S4$ active area is covered by $S2$
- Apply this factor and there will appear to be many more $S1 \times S2 \times S4$ hits than $S1 \times S2$ hits
- Overestimating the active area of $S2$?