Overall CT geometry (fan beam)

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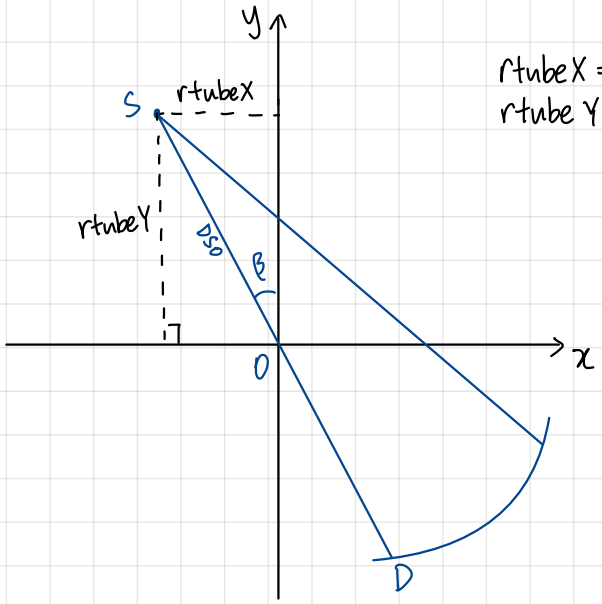


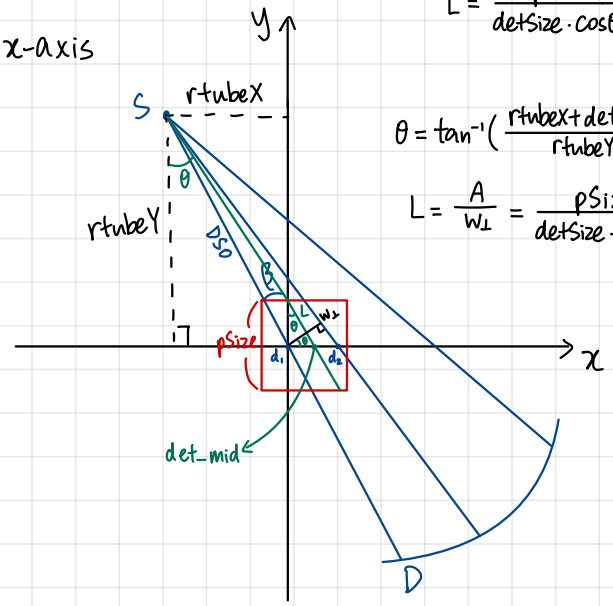
$rtubeX = DSO \sin\beta$

$rtubeY = DSO \cos\beta$

* assumptions:
- object located at origin, 0
- uniform pixel size, pixelSize
- nonuniform detector size, detSize = diff(detm)

Scaling factor calculation

e.g. if map on x-axis



$$L = \frac{pSize}{detSize \cdot \cos\theta}$$

$$\theta = \tan^{-1}\left(\frac{rtubeX + det\_mid}{rtubeY}\right)$$

$$L = \frac{A}{W_\perp} = \frac{pSize}{detSize \cdot \cos\theta} \cdot (overlap \times detvalue)$$

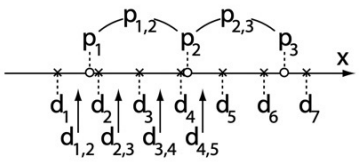
refer to overlap calculation

sinoTmp

problem! detm contains negative detvalues so multiplying by detvalue results in negative sinoTmp...

Overlap calculation

overlap kernel resampling pseudocode (Basu, 2006)

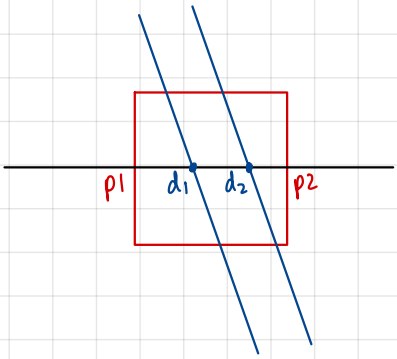



```
current pixel = first pixel in the row
current detector = first detector in the view
while (current pixel <= last pixel in the row)
  {
    if (pixelboundary <= detectorboundary)
      {
        pixelvalue += (pixelboundary
          - previousboundary) * detectorvalue;
        previousboundary = pixelboundary;
        go to next pixel;
      }
    else
      {
        pixelvalue += (detectorboundary
          - previousboundary) * detectorvalue;
        previousboundary = detectorboundary;
        go to next detector;
      }
  }
```

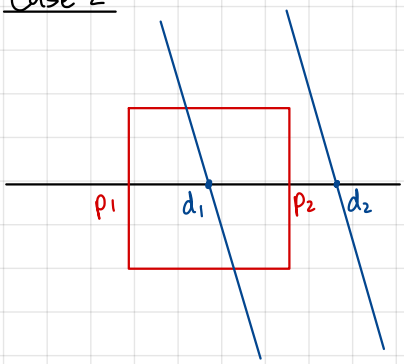
But isn't this assuming that detSize is uniform?

possible solution:
- break down into 4 cases
- follow convolution method?

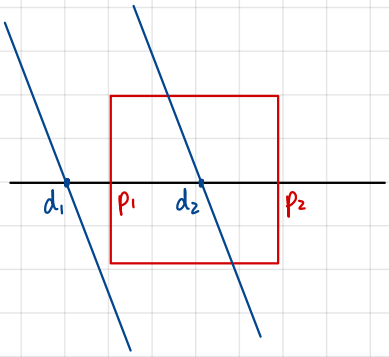
Case 1



Case 2



Case 3



Case 4