



LITTLE UPDATE ON SOLID ANGLE

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SOLID ANGLE EVALUATION

- In the context of the calculation of the photons per secondary electron with negative ions data, I needed to evaluate solid angle (Davide told me that the golden rings would modify it)
- Previously it was calculated starting from geometrical acceptance

$$\Omega = \frac{\pi \left(\frac{D}{2}\right)^2}{4 \pi s^2}$$

s → distance between lens and source

D → diameter of aperture

- Assuming source centred, point-like and infinitely far away

SOLID ANGLE EVALUATION

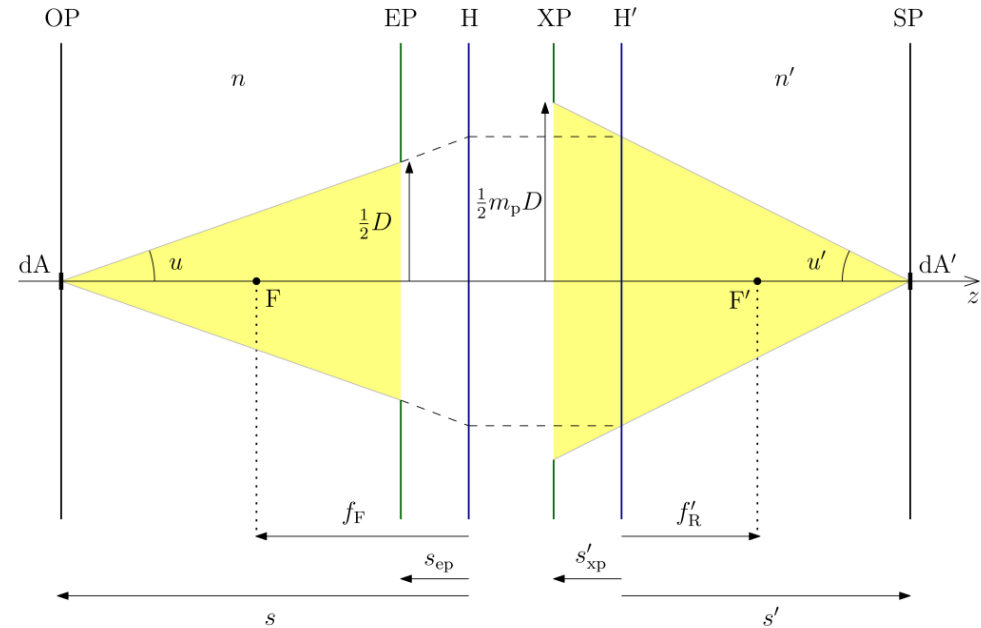
- I found a chapter of a book on photographic optics and I found the calculation of the general solid angle for a centred source

$$\Omega = \frac{\pi \left(\frac{D}{2}\right)^2}{s^2} = \frac{\pi}{\left[2\left(\frac{1}{I} + 1\right)N\right]^2}$$

$N \rightarrow$ f-number/aperture value (0,95)
 $I \rightarrow$ ratio between the sensor size (14,976 mm) and the imaged size (350 mm)

- It turns out there is a factor 4π less on the denominator (factor 10)

- The source is still paraxial, but moving the source from the axis just raises the vignetting effect which we correct for



SOLID ANGLE EVALUATION

- To confirm it makes sense, the evaluation of the photons per secondary electron for a value of ED voltage is

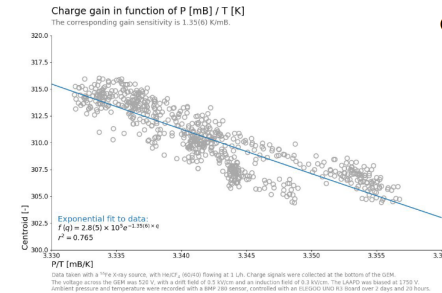
$\alpha \sim 0.38$ Old solid angle

$\alpha \sim 0.03$ New solid angle
And also considering

- T_m , transparency of the ITO $\sim 90\%$
- T_l , transmittance of the lenses $\sim 85\%$
- Q_e , quantum efficiency of the sensor $\sim 80\%$

Consistent with
Our pressure expectation →

P/T detector response - charge gain



- During simulation, these are multiplicative factors that can be normalized to data, but for the calculation of other parameters, a better evaluation could be useful