

LY maps for Vertical Drift

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Simulation

- Geant4

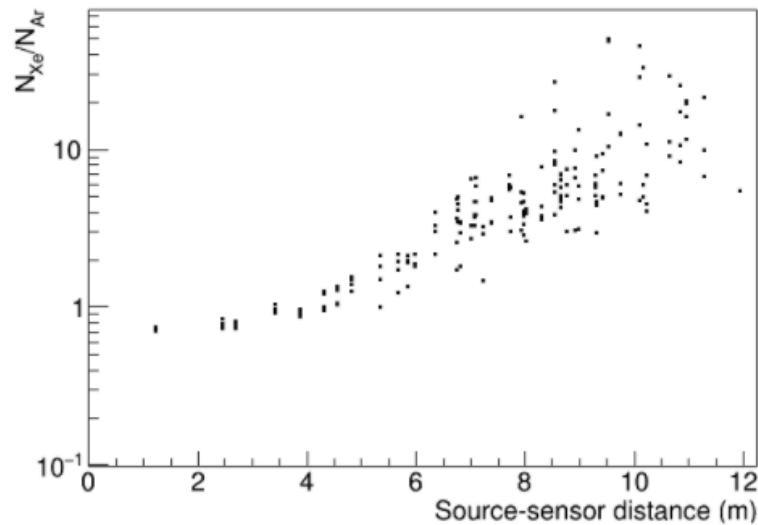
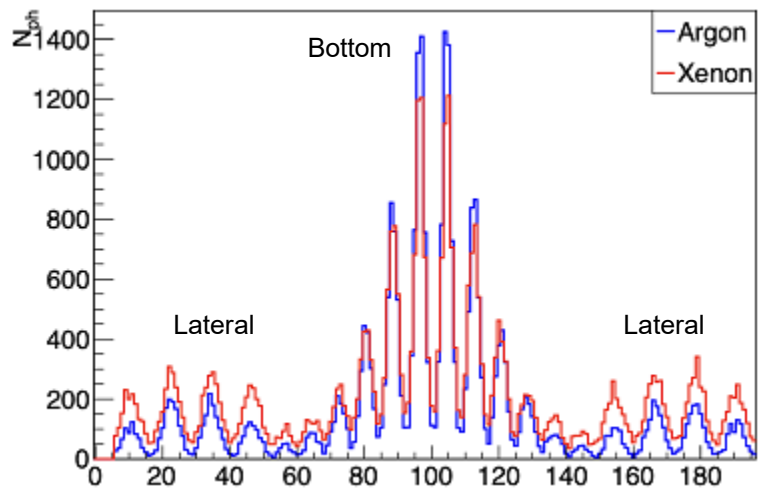
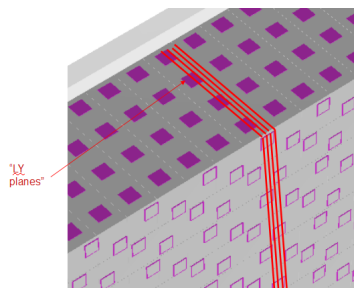
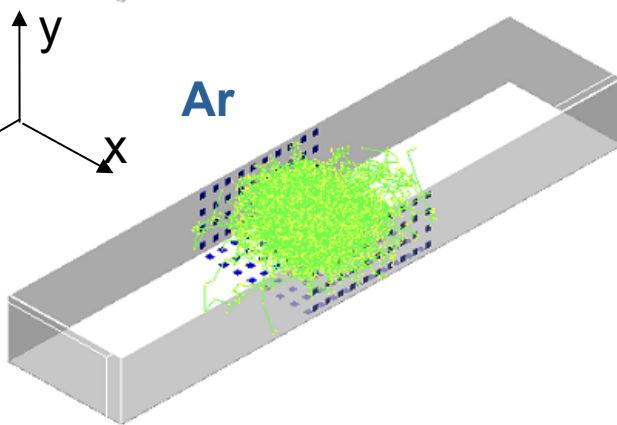
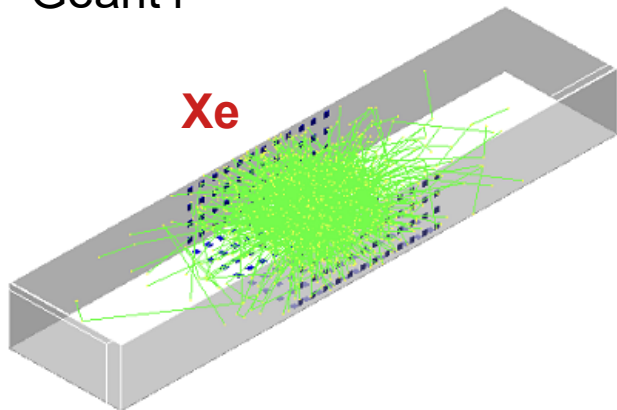
Photons per PD:

192 tiles in $\sim 1/6$
VDrift volume

Rayleigh:

$$\lambda_{\text{Ar}} = 99.9 \text{ cm}, \lambda_{\text{Xe}} = 7 \text{ m}$$

Absorption length = 20 m



Light Yield: Ar vs. Xe \rightarrow 4 π option

<LY> up ~ 20%

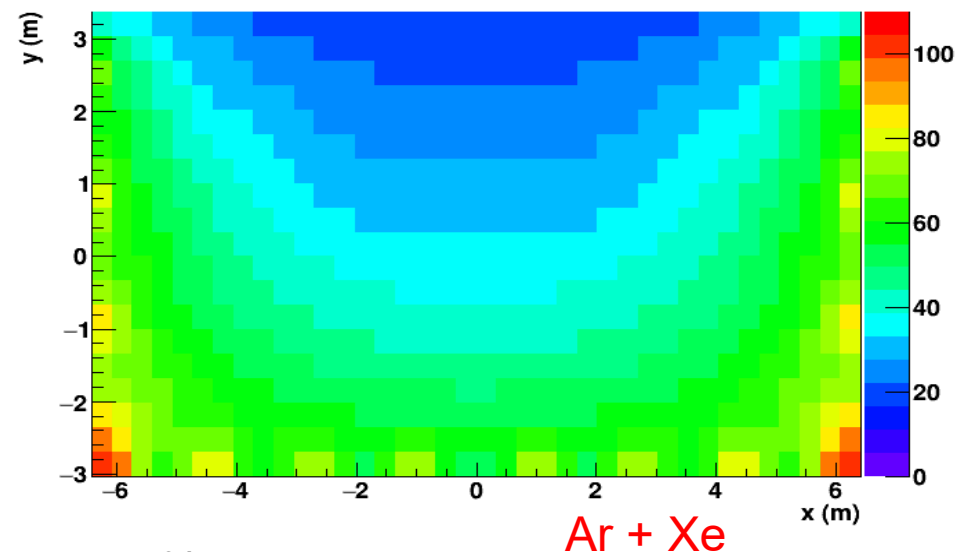
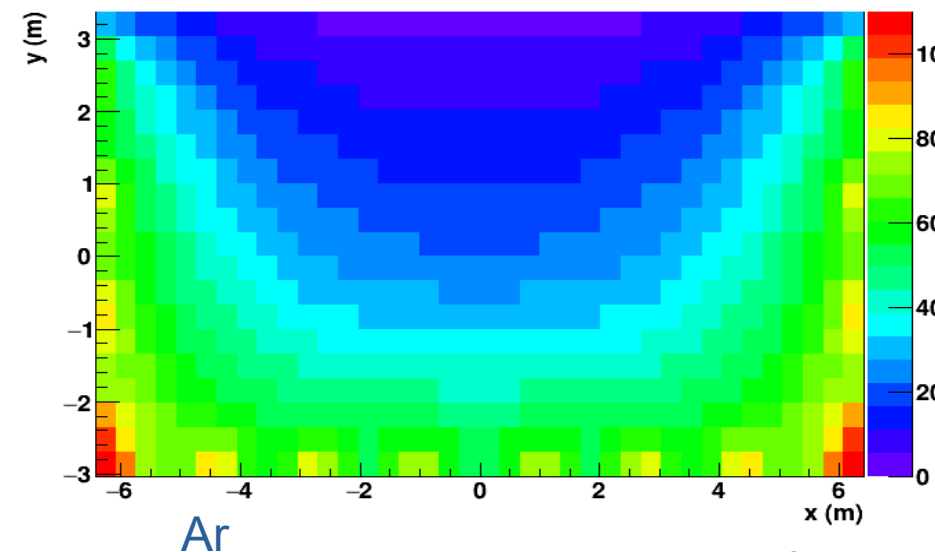
Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

<LY> = 37.2
<LY_min> = 3.9

<LY> = 45
<LY_min> = 17.3

Pe per MeV

Pe per MeV



Cathode: T = 80%

Light Yield: Ar vs. Xe \rightarrow 4π option – bottom row

Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

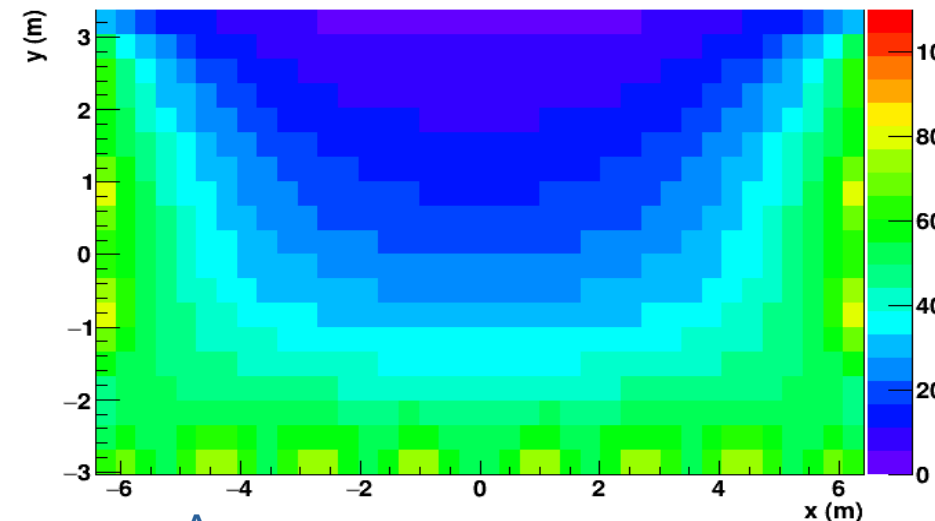
$\langle LY \rangle = 33.8$

$\langle LY_{\min} \rangle = 3.7$

$\langle LY \rangle = 40.4$

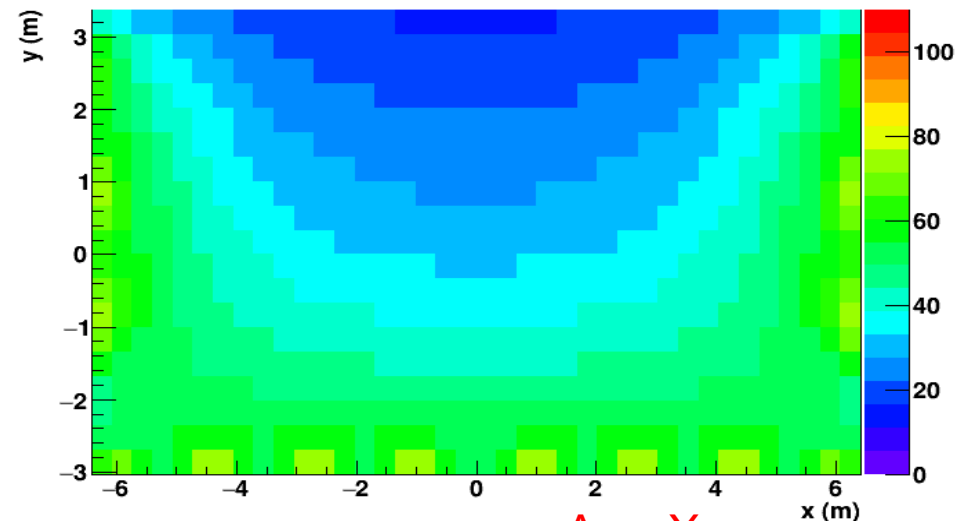
$\langle LY_{\min} \rangle = 16.0$

Pe per MeV



Ar

Pe per MeV



Ar + Xe

Cathode: T = 80%

Light Yield: Ar vs. Xe \rightarrow 4 π option – 2 bottom rows

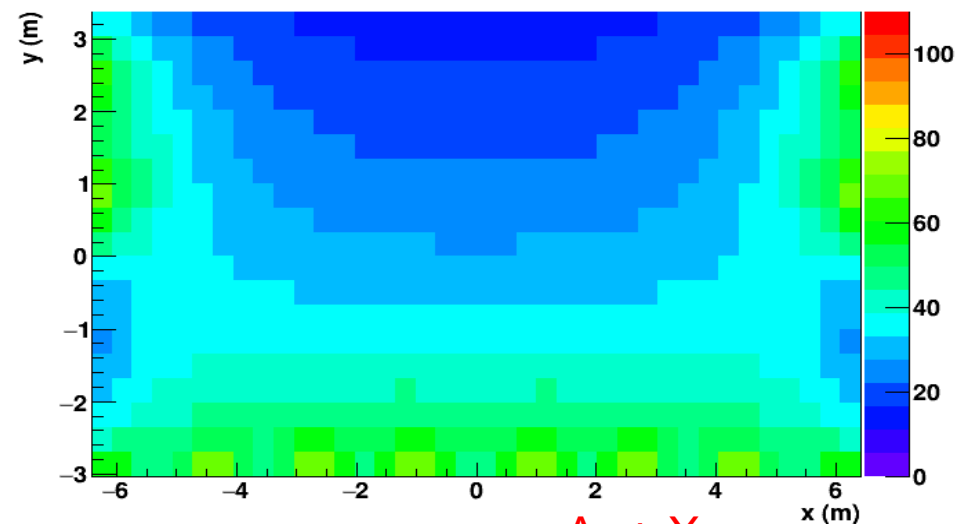
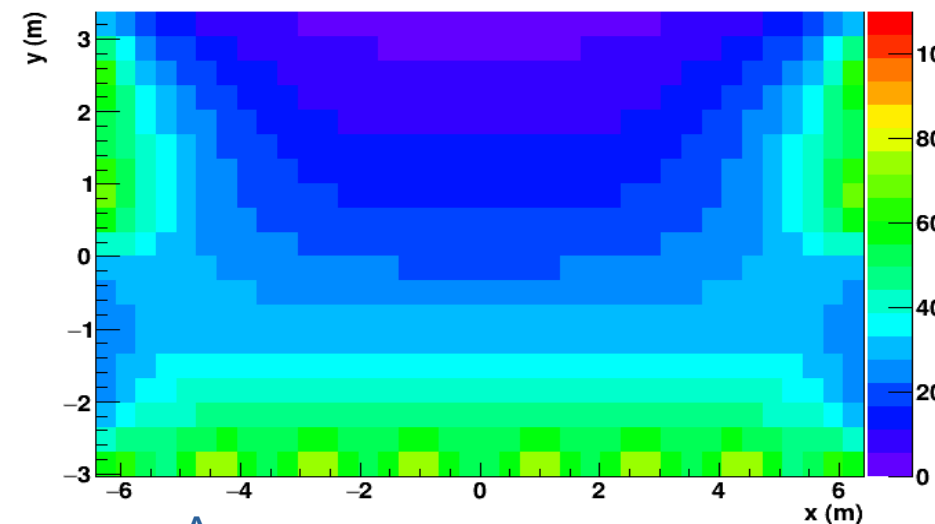
Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

$\langle LY \rangle = 28.5$
 $\langle LY_{\min} \rangle = 3.3$

$\langle LY \rangle = 34.1$
 $\langle LY_{\min} \rangle = 13.9$

Pe per MeV

Pe per MeV



Ar

Ar + Xe

Cathode: T = 80%

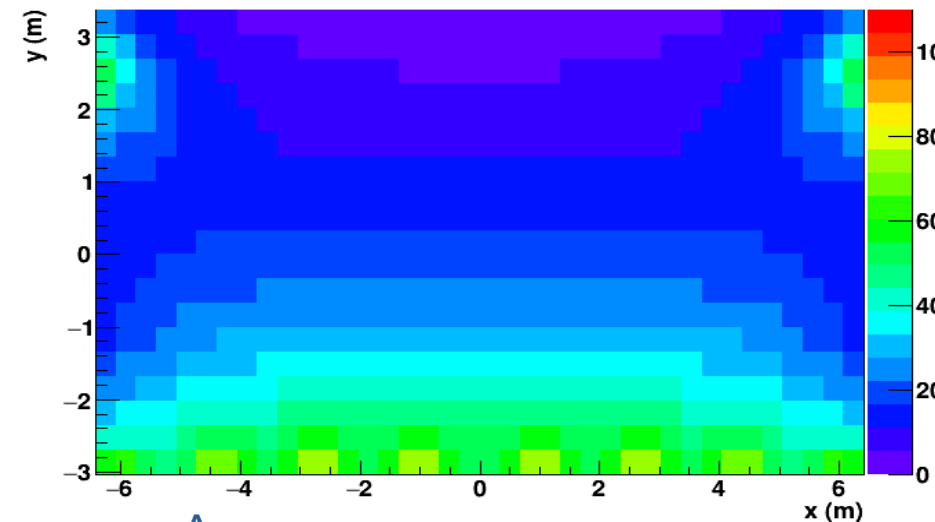
Light Yield: Ar vs. Xe \rightarrow 4π option – 3 bottom rows

Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

$\langle LY \rangle = 23.1$

$\langle LY_{\min} \rangle = 2.7$

Pe per MeV

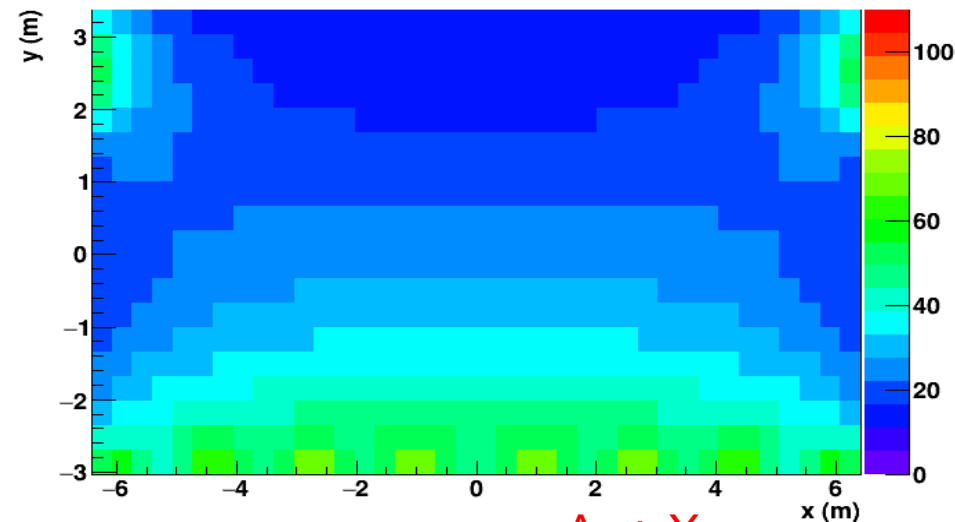


Ar

$\langle LY \rangle = 27.5$

$\langle LY_{\min} \rangle = 11.3$

Pe per MeV



Ar + Xe

Cathode: T = 80%

Light Yield: Ar vs. Xe \rightarrow 4 π option – 2 bot & 1 up rows

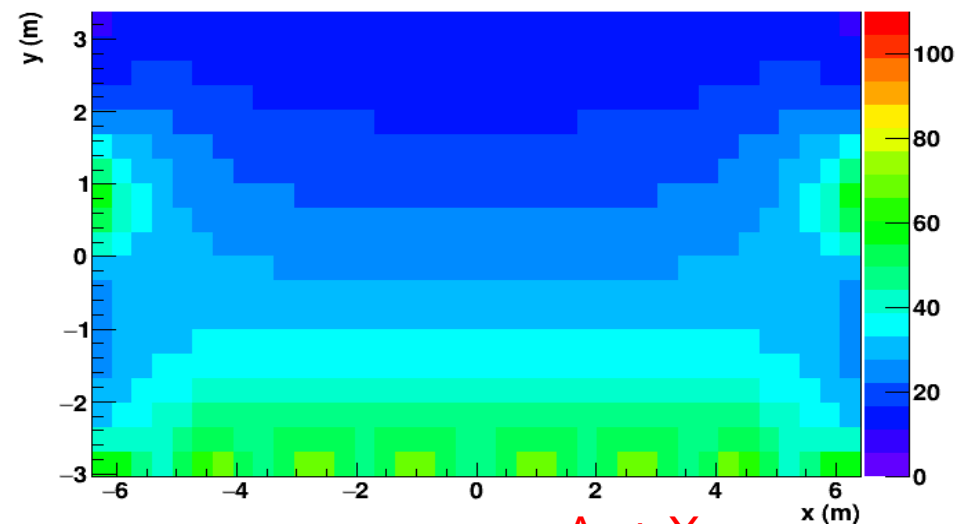
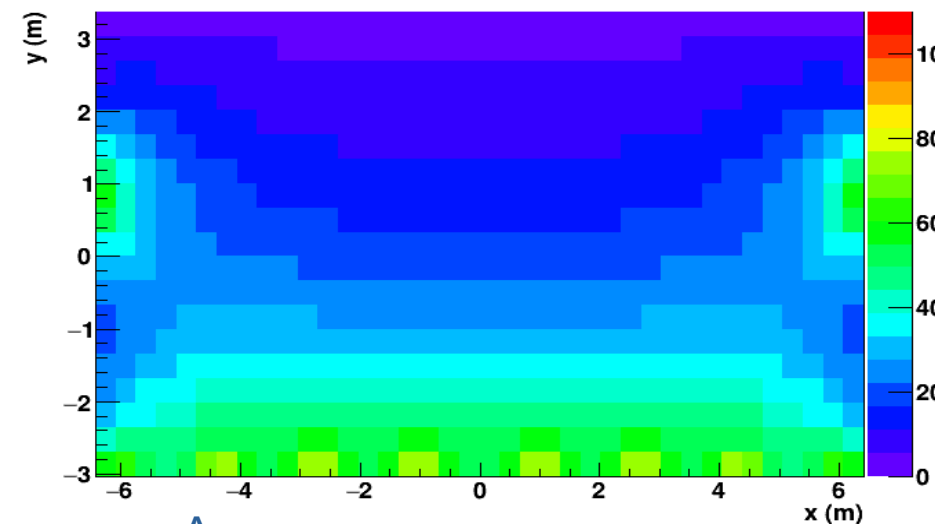
Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

$\langle LY \rangle = 24.8$
 $\langle LY_{\min} \rangle = 2.9$

$\langle LY \rangle = 28.8$
 $\langle LY_{\min} \rangle = 10.2$

Pe per MeV

Pe per MeV



Ar

Ar + Xe

Cathode: T = 80%

Light Yield: Ar vs. Xe \rightarrow Cathode

$\langle \text{LY} \rangle$ up $\sim 15\%$

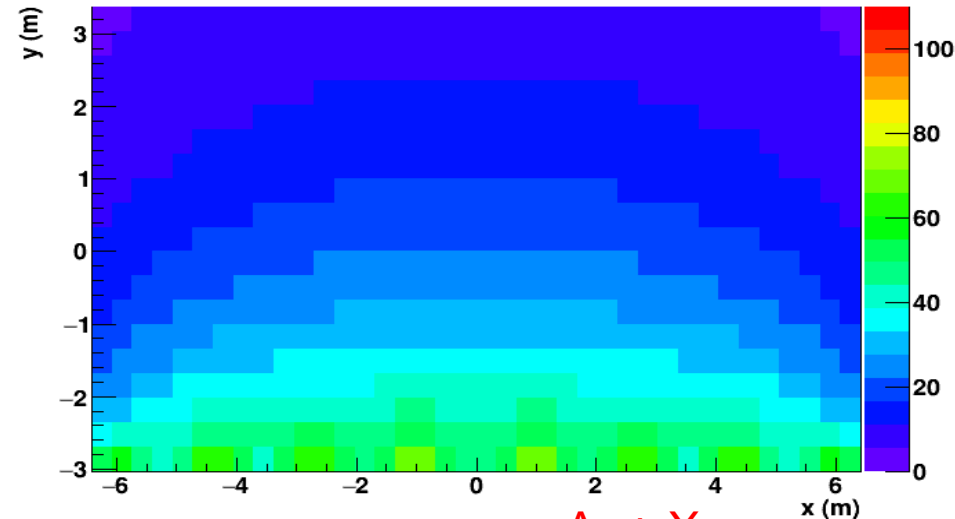
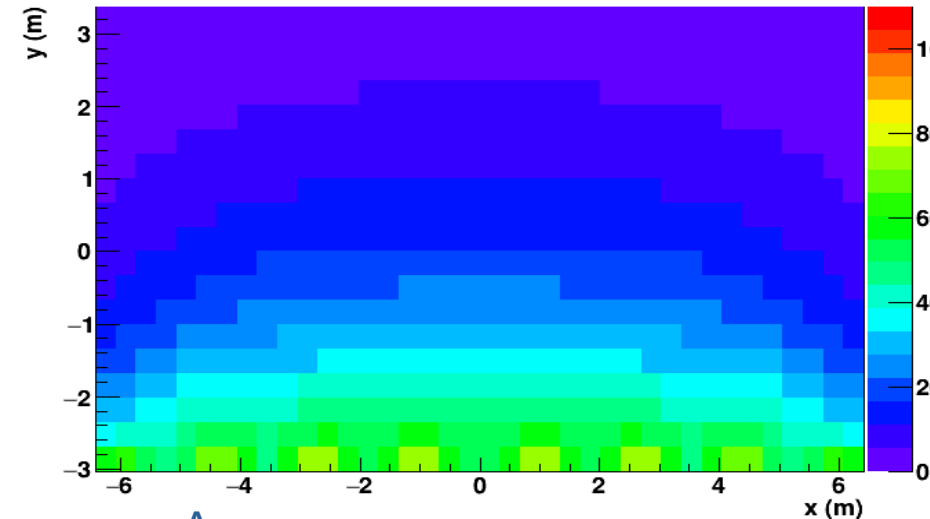
Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

$\langle \text{LY} \rangle = 19.4$
 $\langle \text{LY}_{\text{min}} \rangle = 0.8$

$\langle \text{LY} \rangle = 22.2$
 $\langle \text{LY}_{\text{min}} \rangle = 4.9$

Pe per MeV

Pe per MeV



Ar

Ar + Xe

Cathode: T = 80%

Light Yield: **Ar + Xe** → Membrane option

Assuming 24000 photons per MeV of energy deposited (70% for Xe and 30% for Ar) and 3% detection efficiency. 25% anode reflection for Xe light.

