

Results from
TB 2020-07 HOTNES
(planar cathode + mesh)

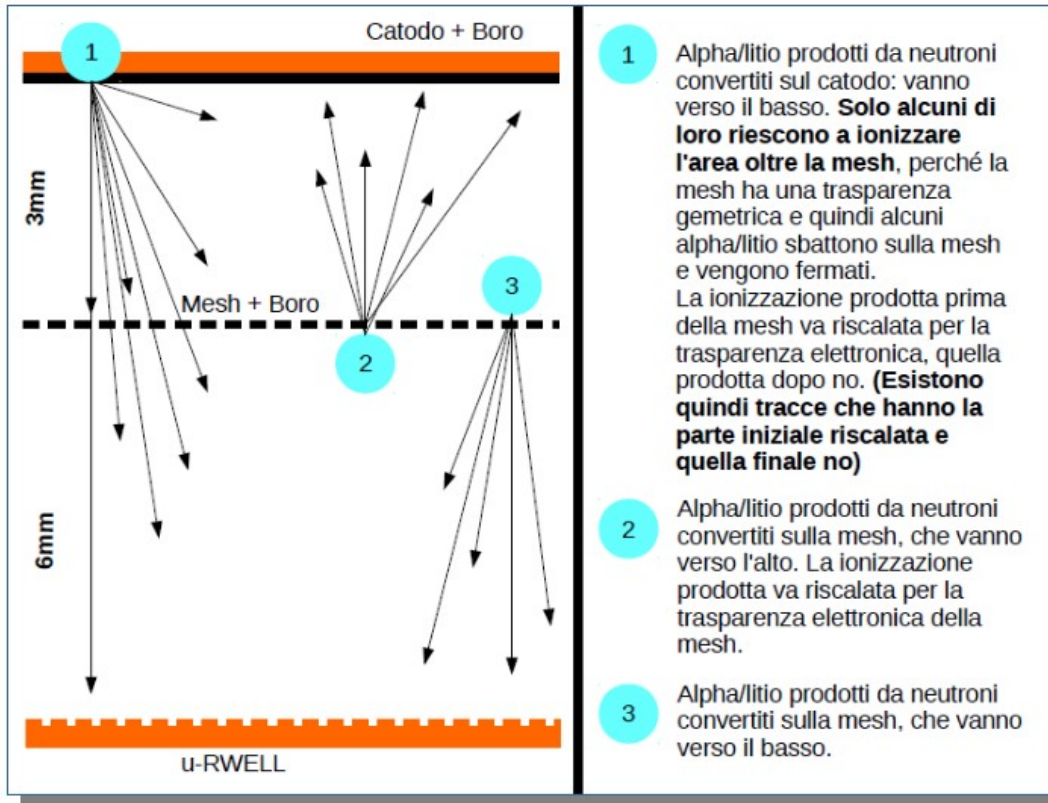
21/05/2021 – uRANIA
Matteo

Current calculation

Without the mesh:

$$i = \Phi * \varepsilon * N_{\text{ION}} * G * S$$

- i = current (C s^{-1})
- Φ = neutron flux ($758 \text{ cm}^{-2} \text{ s}^{-1}$)
- ε = efficiency = $\# \alpha \text{ seen} / \# \text{neutrons}$ → from simulation
- $N_{\text{ION}} = \# \text{ ele from ionization} = \text{primaries \& secondaries} = E_{\text{DEP}} / E_{\text{ION}}$
- G = gain
- S = surface $10 \times 10 \text{ cm}^2$



[by Matteo]

With mesh, there are four contributions:

1- α from cathode not crossing the mesh

$$i_1 = \Phi * \varepsilon_1 * N_{\text{ION},1} * G * S * T_{\text{ELE}}$$

2- α from cathode crossing the mesh

$$i_2 = \Phi * \varepsilon_2 * N_{\text{ION},2} * G * S$$

3- α from mesh forward

$$i_3 = \Phi * \varepsilon_3 * N_{\text{ION},3} * G * S$$

4- α from mesh backward

$$i_4 = \Phi * \varepsilon_4 * N_{\text{ION},4} * G * S * T_{\text{ELE}}$$

The same must be done with Li ions

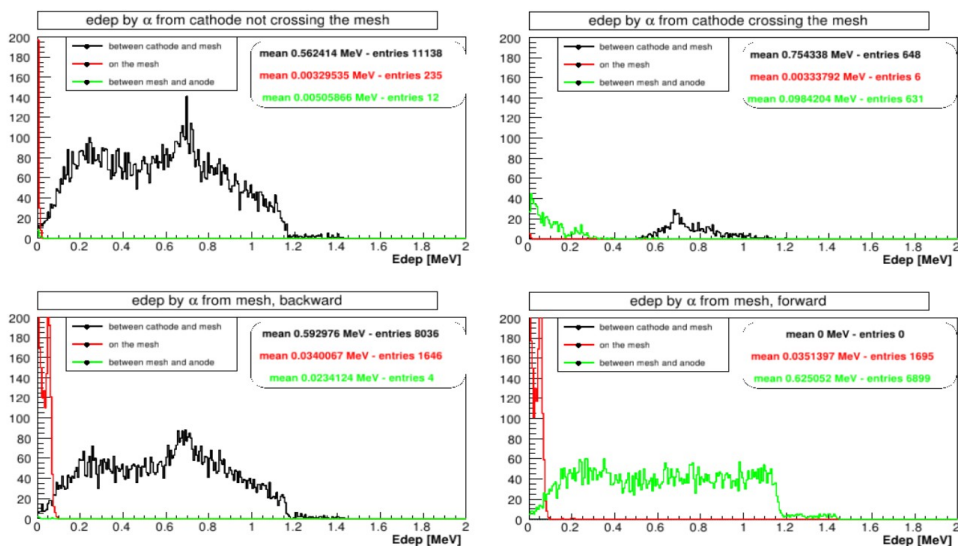
[by Lia]

Data from Lia (2020/05/14)

#alpha entering gas

	no mesh	T = 30%		T = 60%	
		3 + 6	6 + 6	3 + 6	6 + 6
total	11769	30099	29106	23397	22534
from cathode	11769	11822	12010	11935	11985
FWD not cross	11757	11174	12001	10364	11974
FWD cross	-	648	0	1571	1
BWD	12	3	9	6	10
from mesh	-	18274	17096	11456	10549
FWD	-	8568	8260	5536	5118
BWD	-	9706	8836	5920	5431

Edep #alpha – T=30% – 3+6

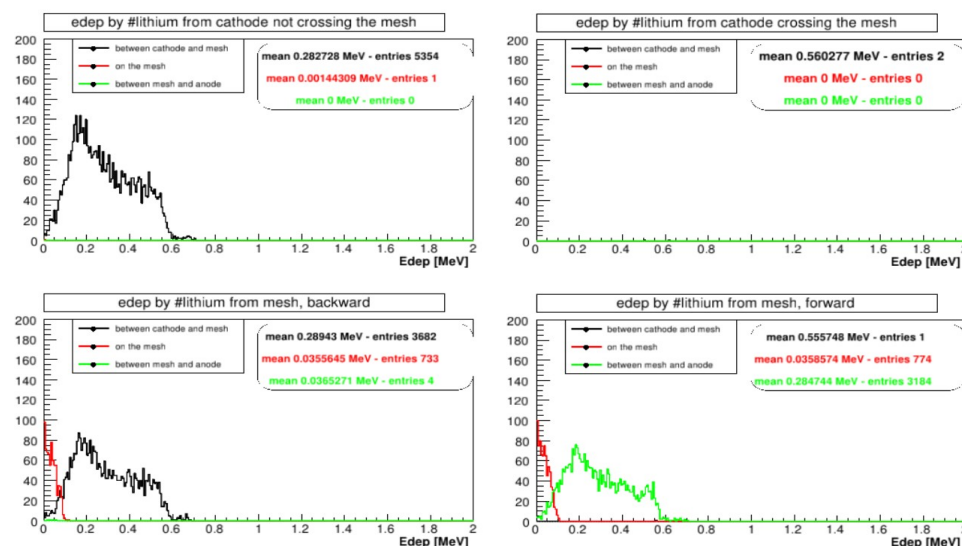


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#lithium entering gas

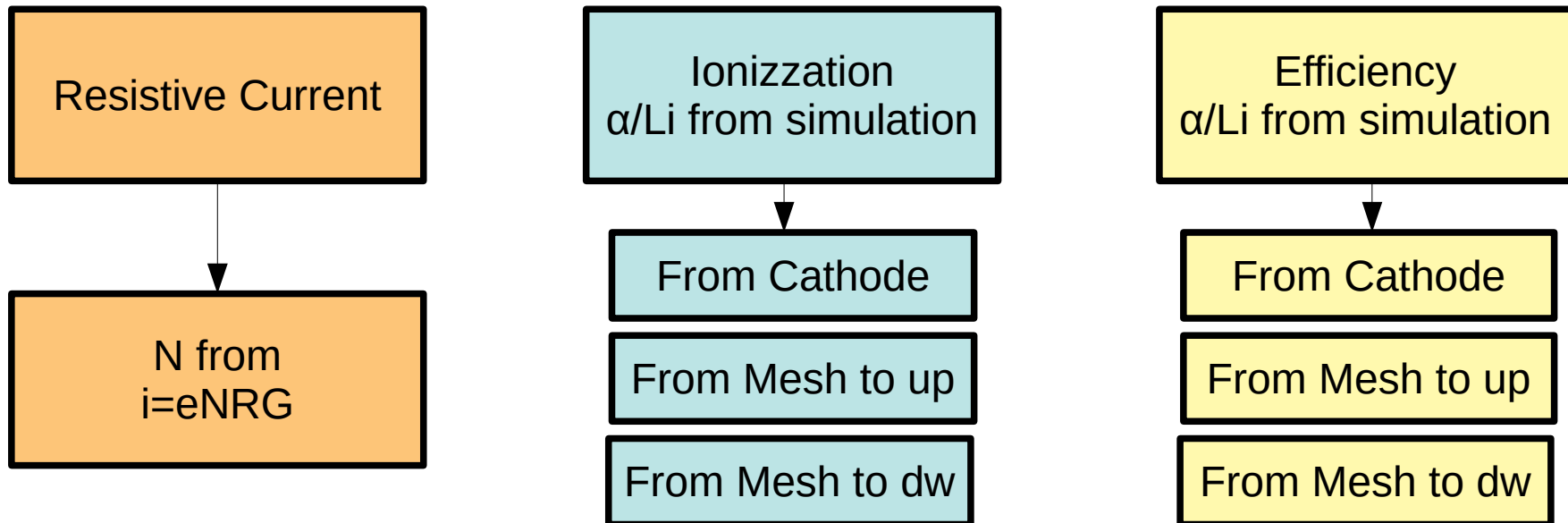
	no mesh	T = 30%		T = 60%	
		3 + 6	6 + 6	3 + 6	6 + 6
total	?	13719	13099	10858	10205
from cathode	?	5365	5349	5359	5177
FWD not cross	?	5363	5346	5346	5163
FWD cross	-	2	0	2	0
BWD	?	10	3	11	14
from mesh	-	8344	7750	5499	5028
FWD	-	3931	3699	2585	2451
BWD	-	4413	4051	2914	2577

Edep #lithium – T=30% – 3+6



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Analysis flow



$$\epsilon = \underbrace{\epsilon_{\text{from simulation}}}_{\text{Yellow}} \frac{\tilde{N}_{\text{from measure}}}{\tilde{N}_{\text{from simulation}}}$$

Results of the Source test

CAT [um]	MESH [um]	type	Ed/Et [kV/cm]	G	iRes [nA]	Transp.	SIM %	Eff %
2.5			3.5	700	4.1	1	1.8	2.2 ± 0.4
2.5	NO	Cu66	0.2 2.7	420	1.5	0.97	1.7	1.9 ± 0.4
NO	2.5	Al33	0.1 2.7	420	2.4	0.5	2.7	4.7 ± 1.0
2.5	3.5	Al33	0.1 4.0	420	2.3	0.55	4.4	4.6 ± 1.0
2.5	1.5	Al33	0.1 4.0	434	1.1	0.55	4.4	2.1 ± 0.5

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Questi valori sono sensati

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Tira davvero troppa corrente
Considerata la trasparenza

La corrente tirata da questa camera
È sospettosamente poca