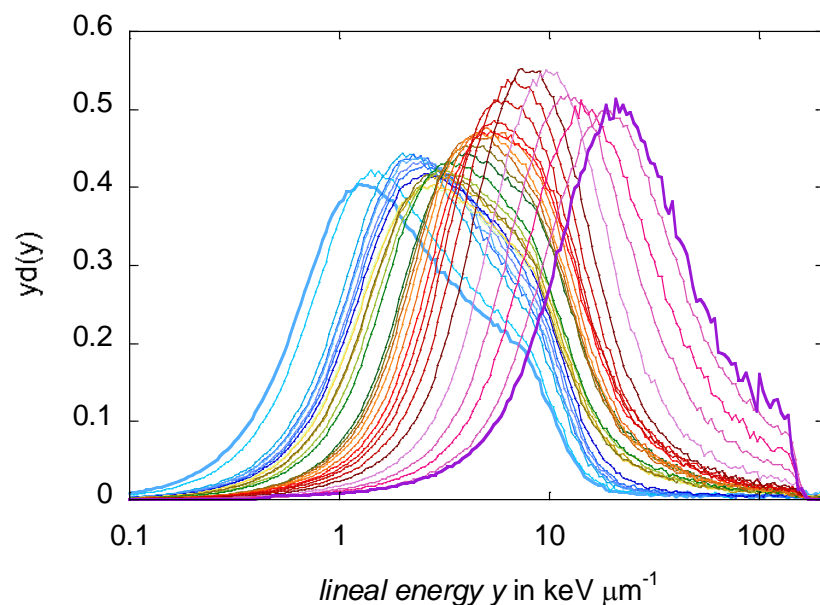


WP3 Microdosimetry (responsabile S. Agosteo, INFN-Mi)

Obiettivo: microdosimetria delle reazioni $p\text{-}^{11}\text{B}$ e $p\text{-}^{19}\text{F}$

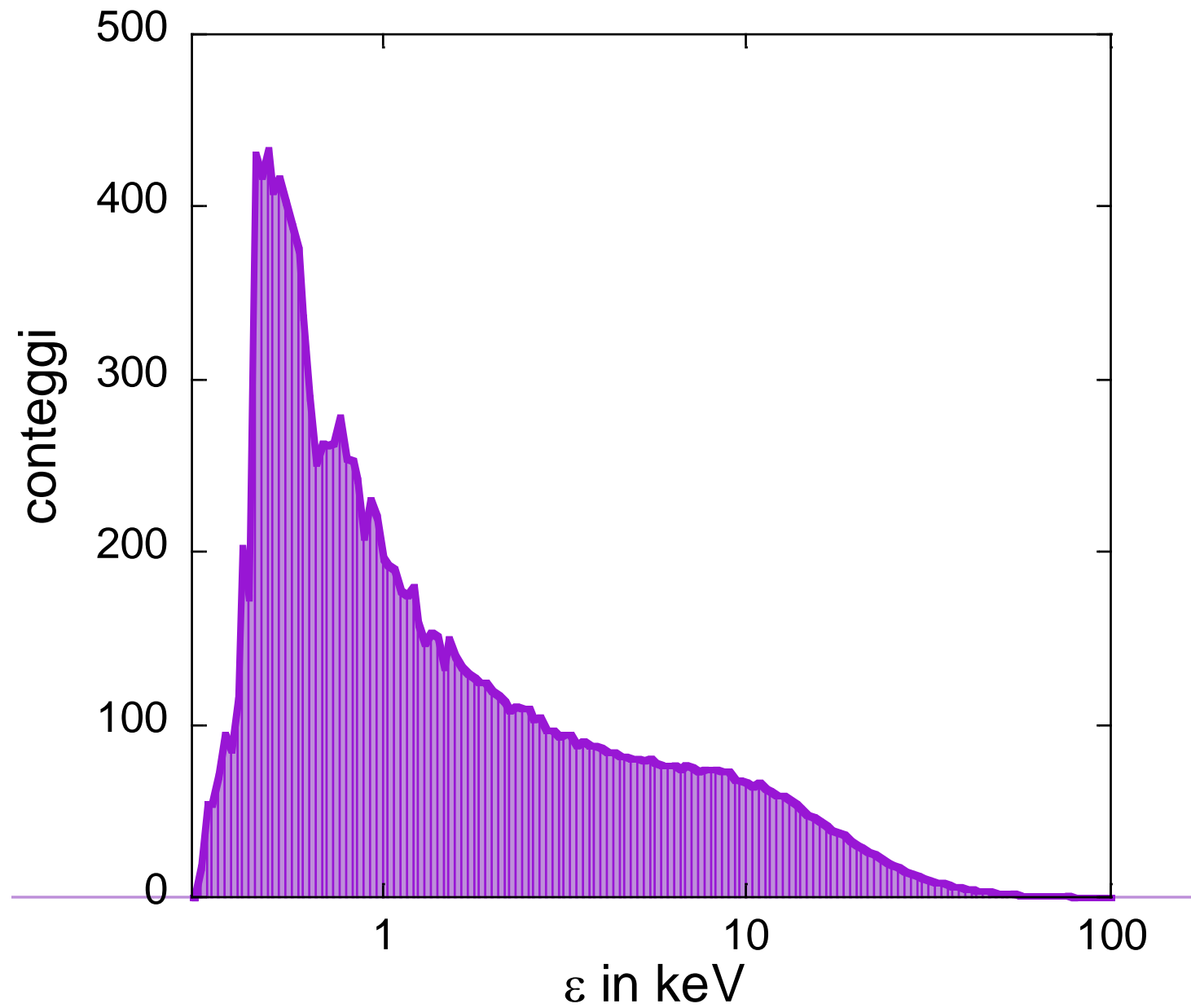
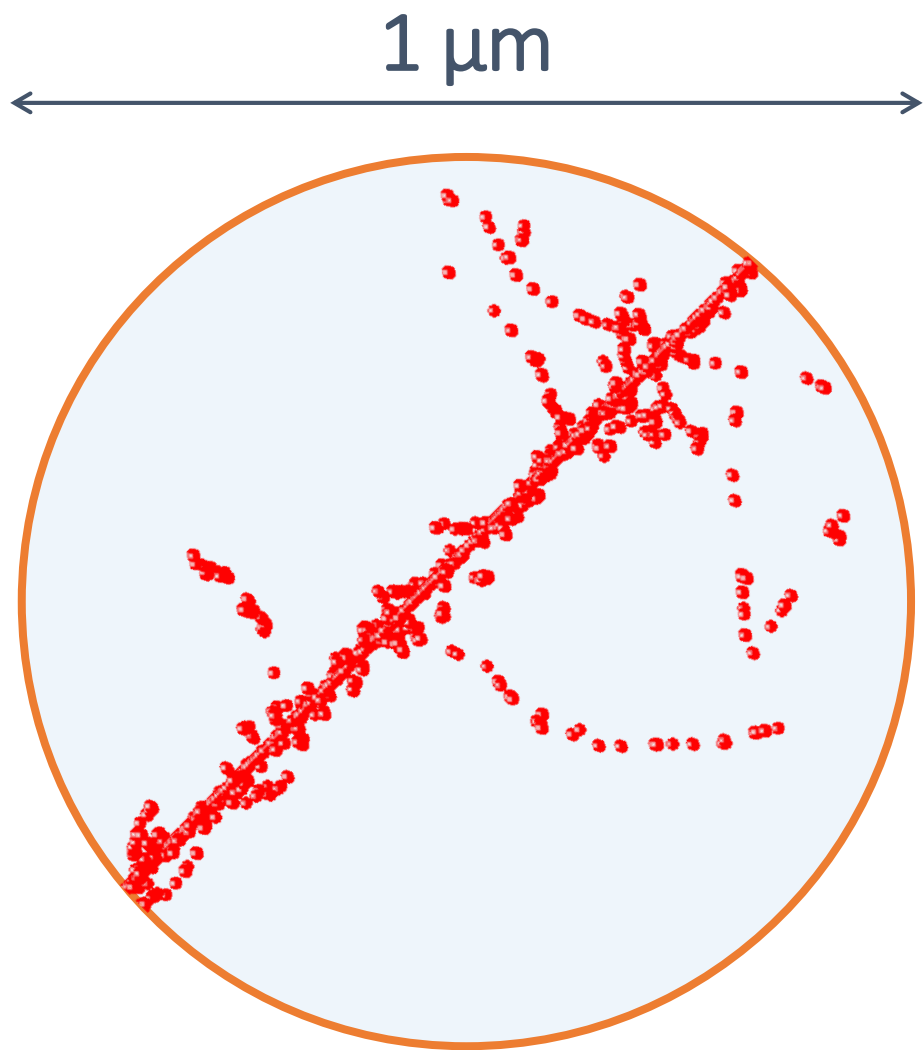
ATTIVITA'

Misure lungo il picco di Bragg del fascio di protoni con rivelatori dotati di pareti o convertitori TE arricchiti con boro e fluoro.



Nome	Titolo,Istituzione	FTE(%)
Stefano Agosteo	Professore Ordinario, PoliMi, INFN-MI	30
Davide Bortot	Assegnista, PoliMi, INFN-MI	30
Giovanni D'Angelo	Tecnico, PoliMi, INFN-MI	50
Alberto Fazzi	Professore Associato, PoliMi, INFN-MI	30
Davide Mazzucconi	Dottorando, PoliMi, INFN-MI	30
Claudio Pirovano	Tecnico, PoliMi, INFN-MI	50
Andrea Pola	Professore Associato, PoliMi, INFN-MI	20
Valeria Conte	Ricercatrice, INFN-LNL	20
Anna Selva	Assegnista, INFN-LNL	20
Anna Bianchi	Dottoranda, INFN-LNL	20
Pablo Cirrone	Ricercatore, INFN-LNS	10
Giada Petringa	Dottoranda, INFN-LNS	10
Salvatore Tudisco	Ricercatore, INFN-LNS	20
Sebastiana Puglia	Assegnista, INFN-LNS	30
Valentina Scuderi	Associata, INFN-LNL	30
Andrea Attili	Ricercatore, INFN-Roma3	10

Microdosimetry

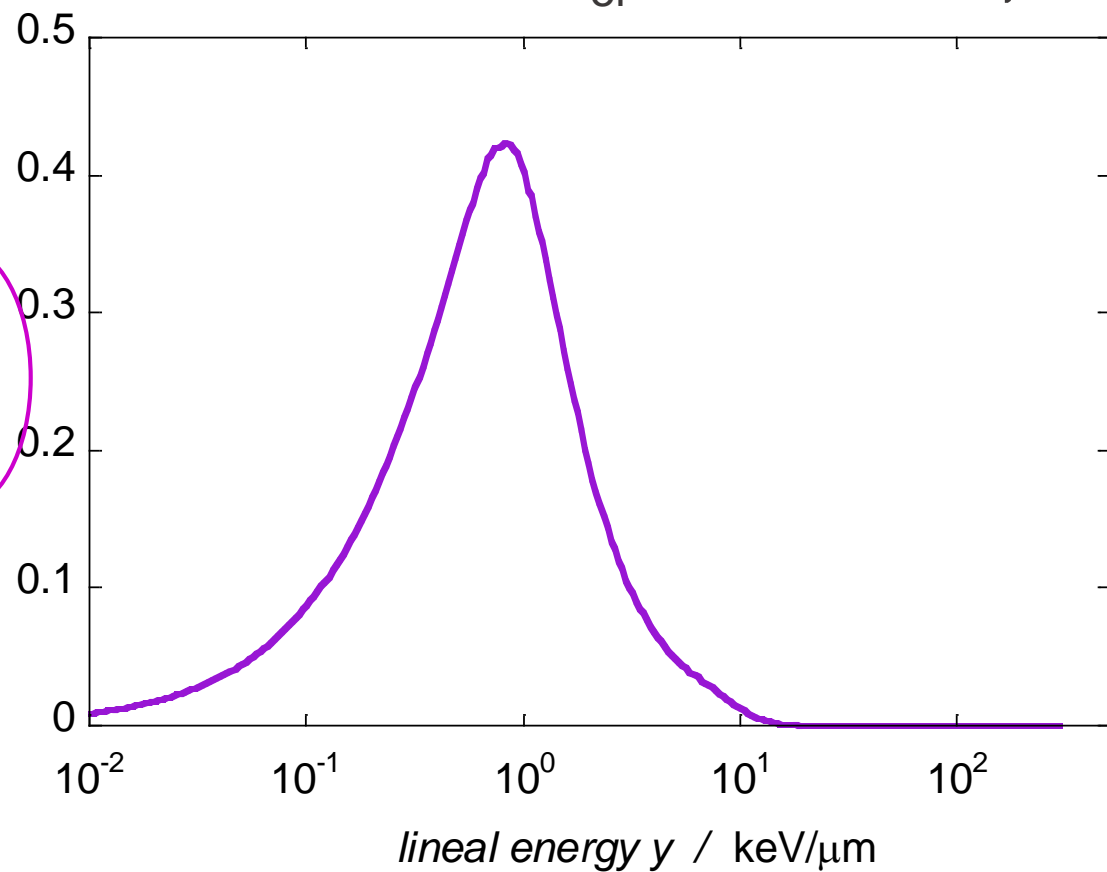


Depth = 1.2 mm in acqua

Misure a Catania (10-2018)

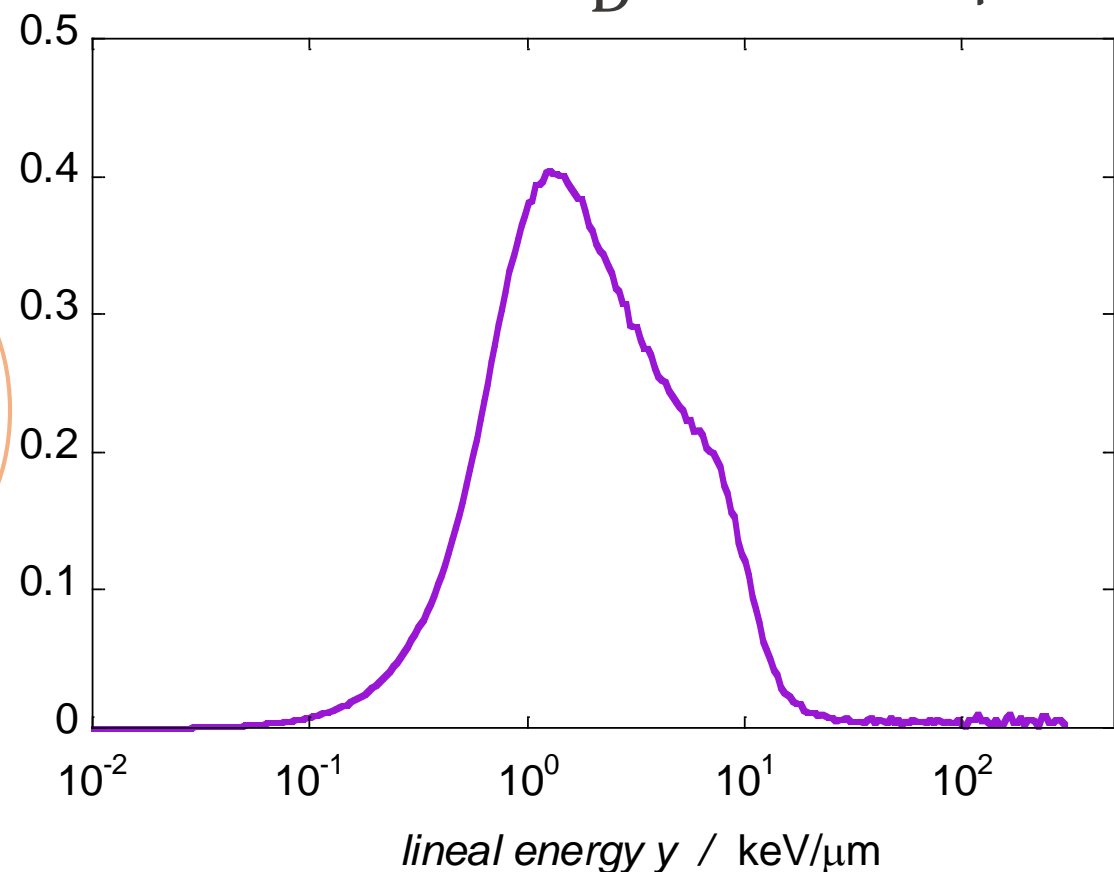
$$\bar{y}_F = 1.06 \text{ keV}/\mu\text{m}$$

$$S_{el} = 1.08 \text{ keV}/\mu\text{m}$$



$$\bar{y}_{D,\Delta} = 1.7 \text{ keV}/\mu\text{m}$$

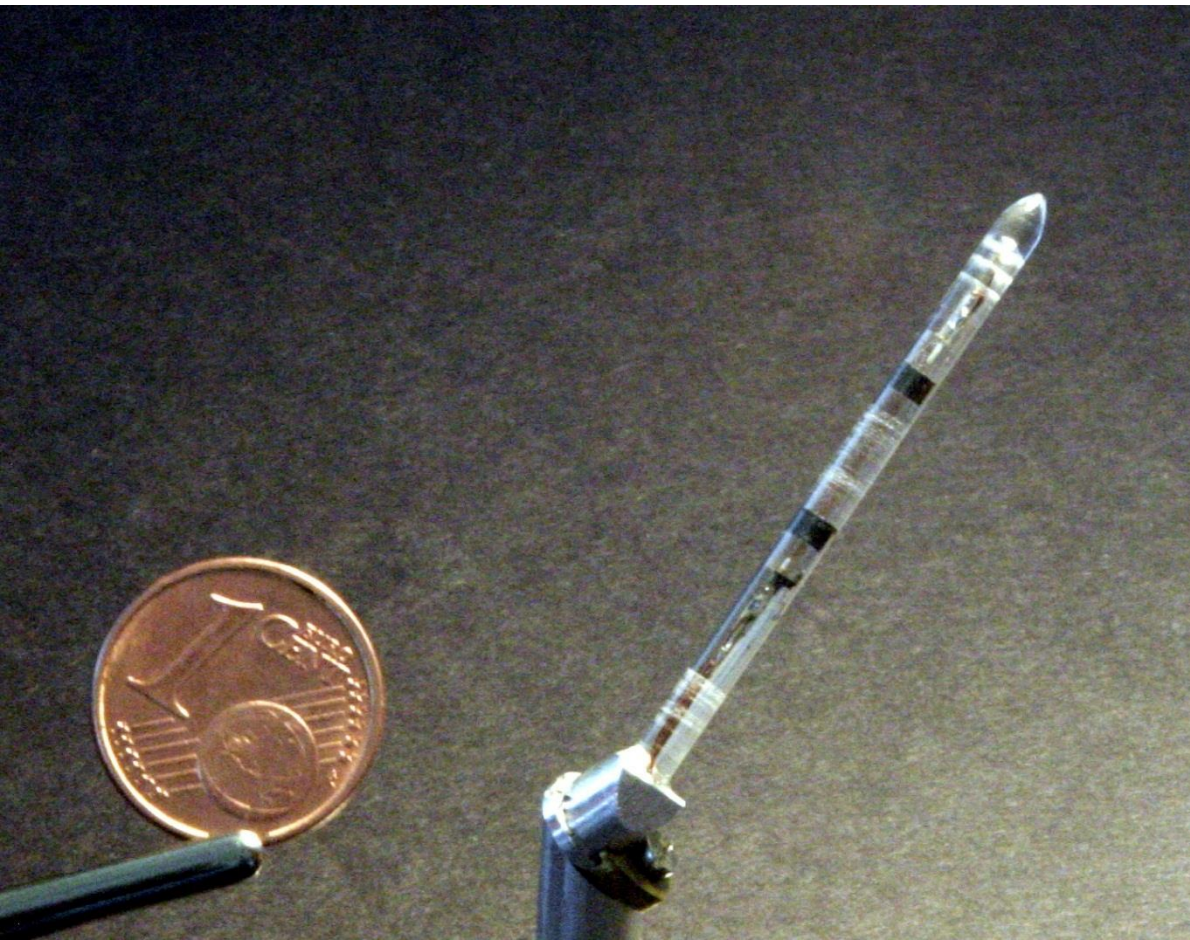
$$\overline{LET}_D = 1.6 \text{ keV}/\mu\text{m}$$



Rivelatori

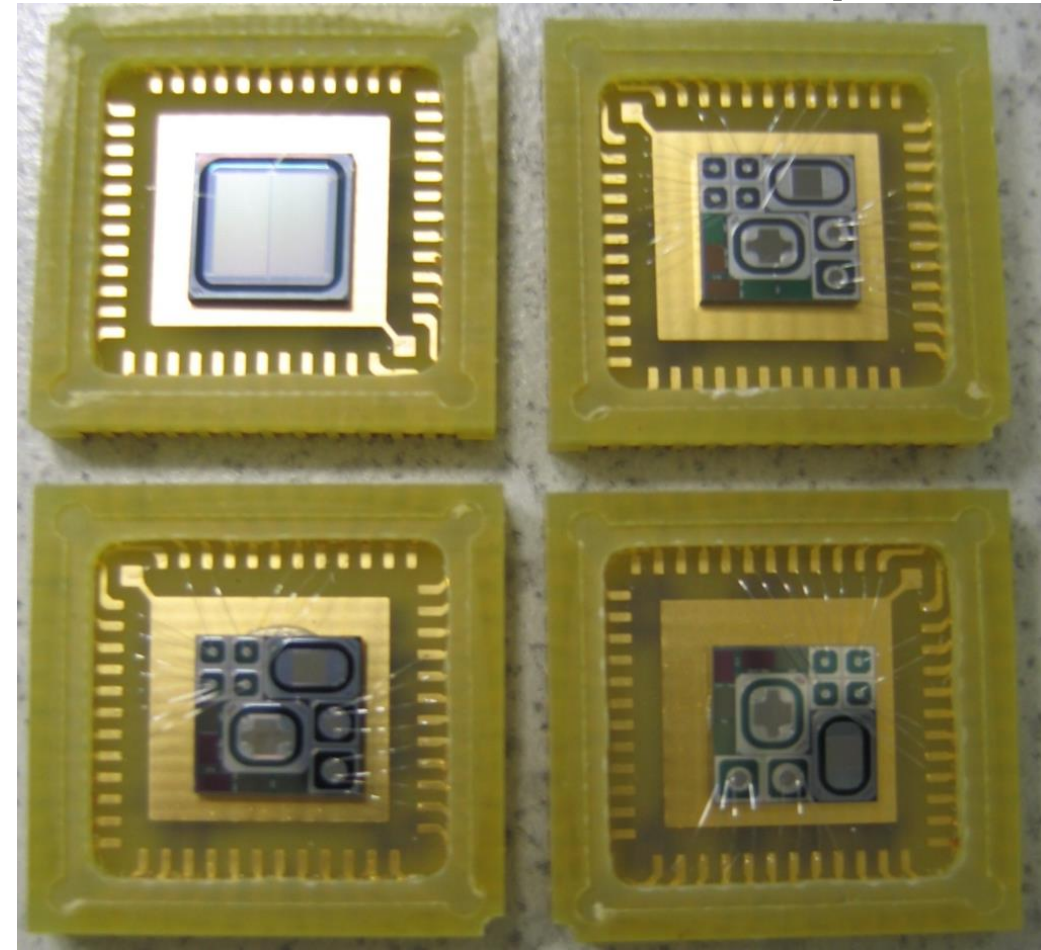
Gas detectors

Mini-TEPC for BNCT



SSD

Silicon telescope





Tessuto equivalente

Isotropia

Alta sensibilità $\sim 3 e^-$

Simulazioni di piccoli volumi $\sim 25 \text{ nm}$



Non tessuto equivalente

Anisotropia

Bassa sensibilità $\sim 3000 e^- \sim 10 \text{ keV}$

Spessore eq. minimo $\sim 3.3 \mu\text{m}$ ($1.9 \mu\text{m}$ silicon)



Ancillary equipment

SV unit singola

dimensioni spaziali $\sim 1 \text{ mm}^2$

→ Risoluzione spaziale limitata in XY

→ Corrente di fascio limitata ($10^6 \text{ p/cm}^2 \text{ s}$)



Facilità d'uso (no gas, no HV)

Array 2D di SV units

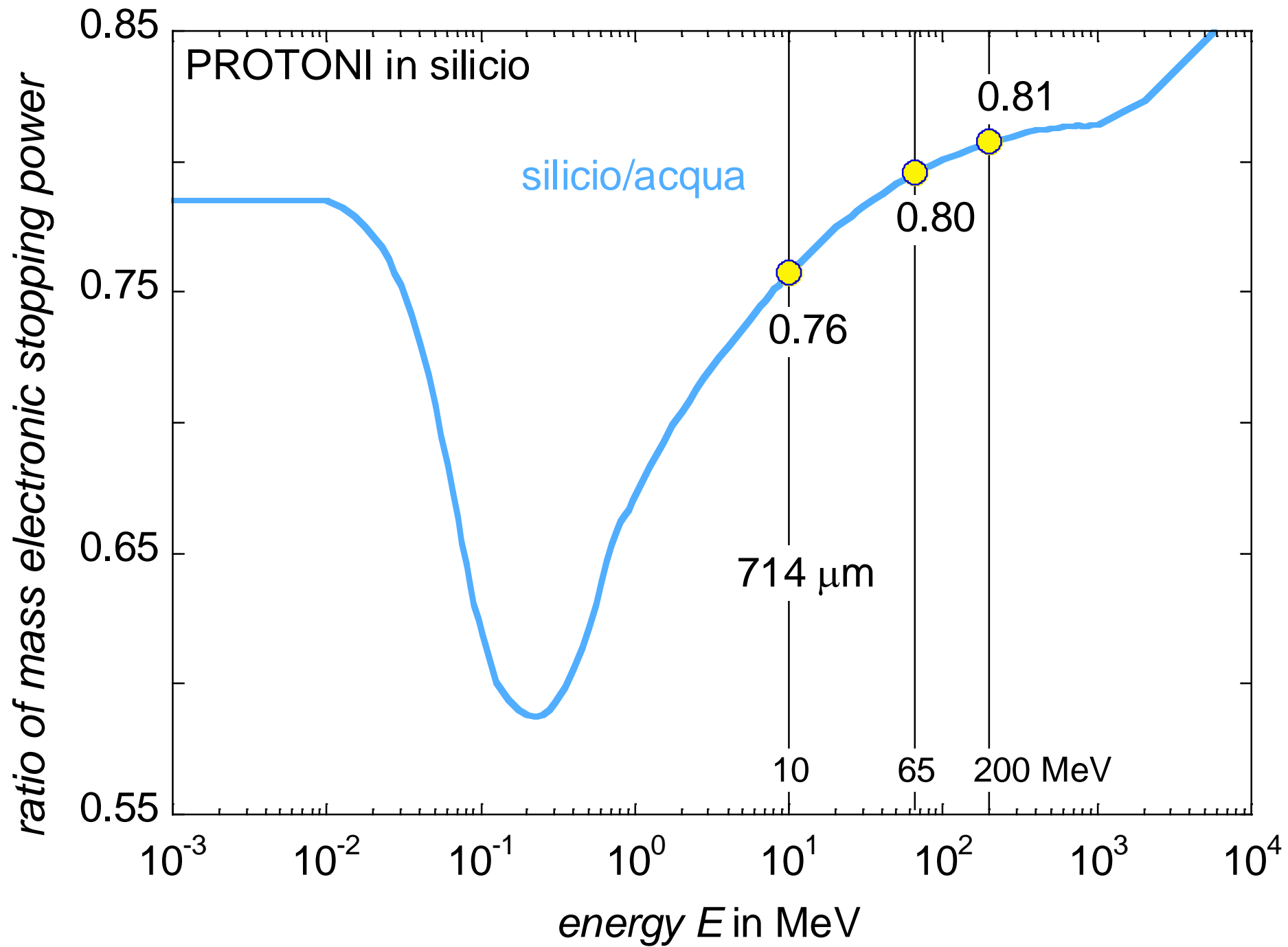
Piccola superficie 10^{-4} mm^2

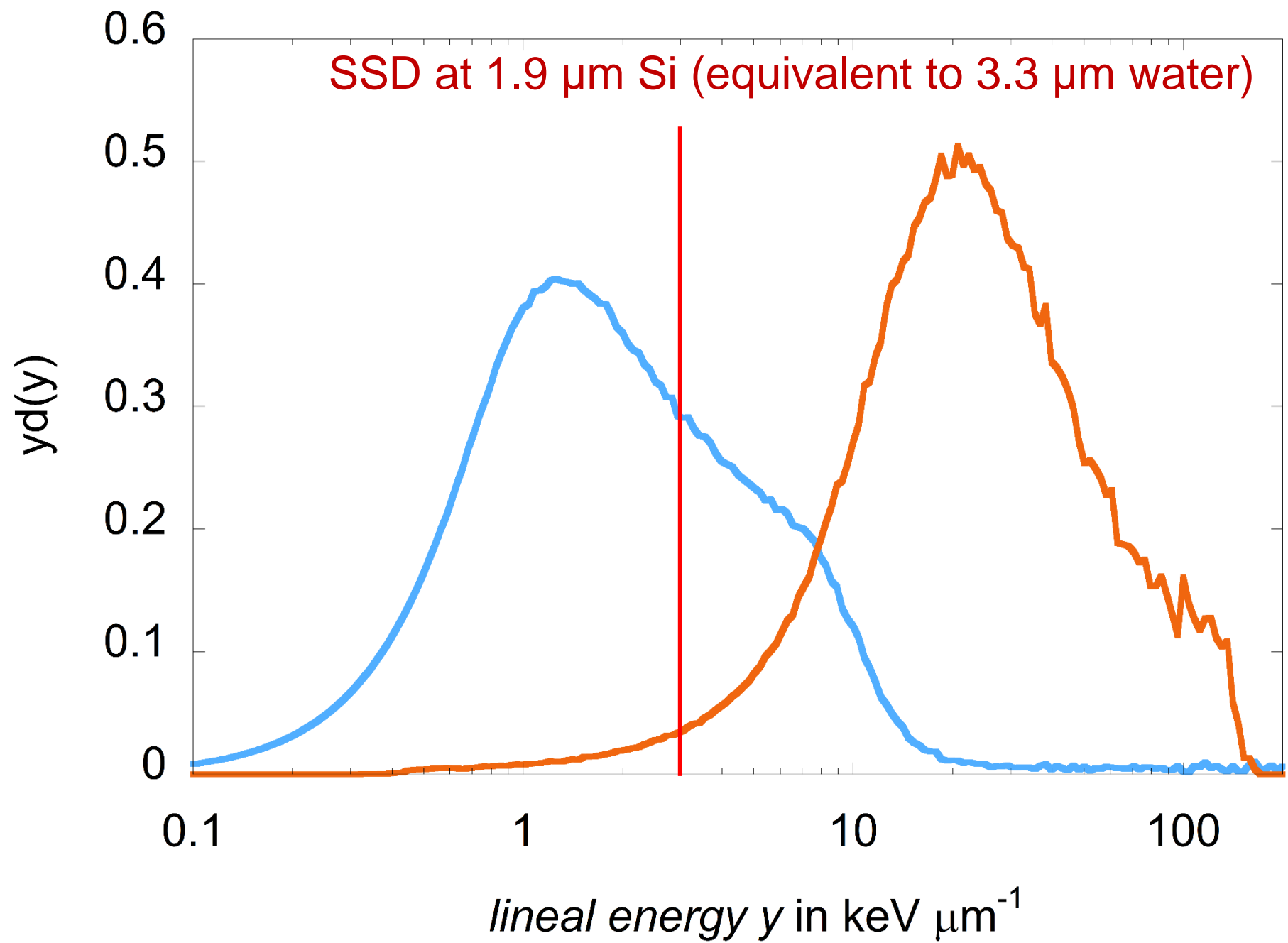
→ Alta risoluzione spaziale XY

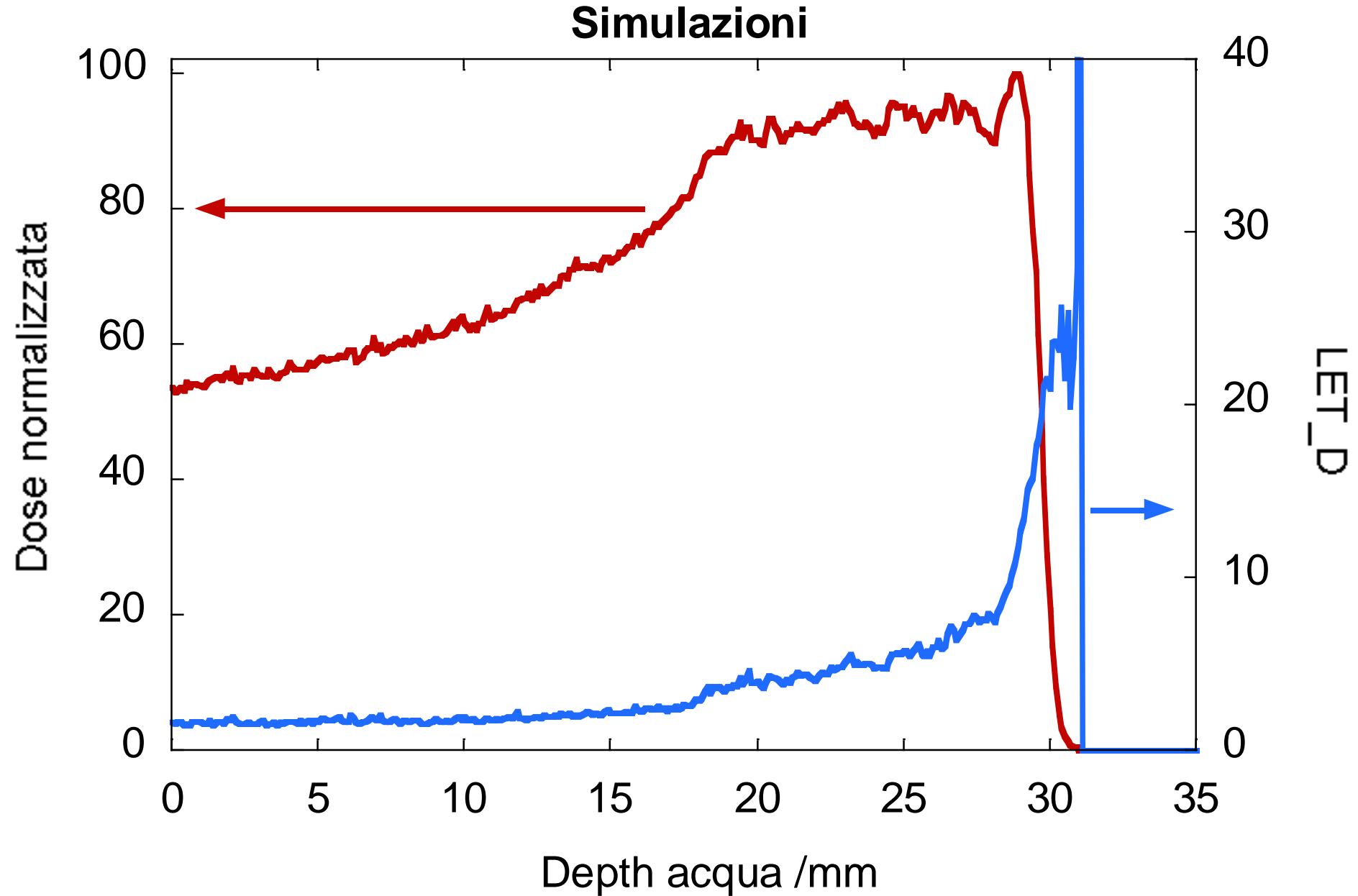
→ Correnti terapeutiche

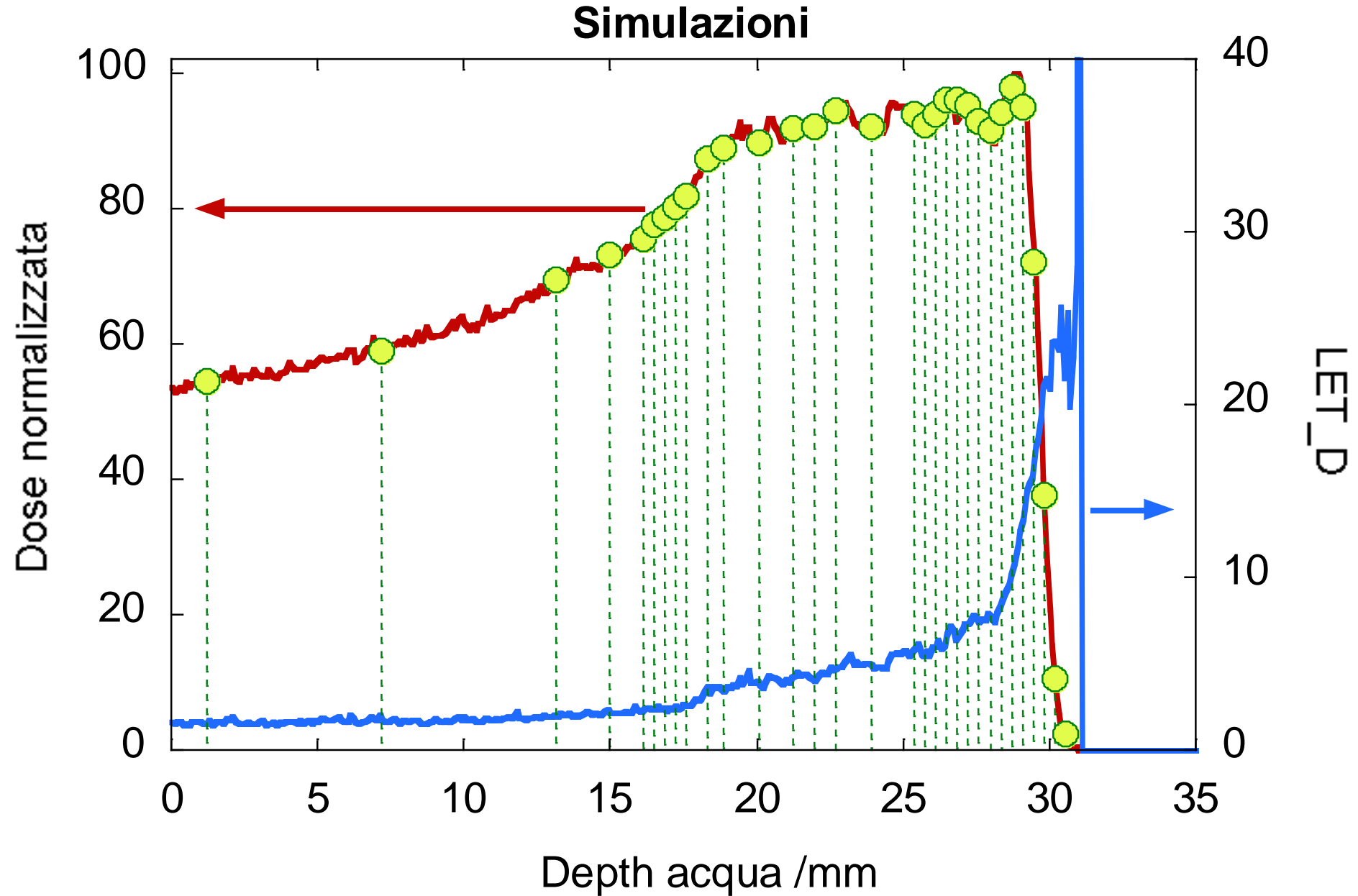


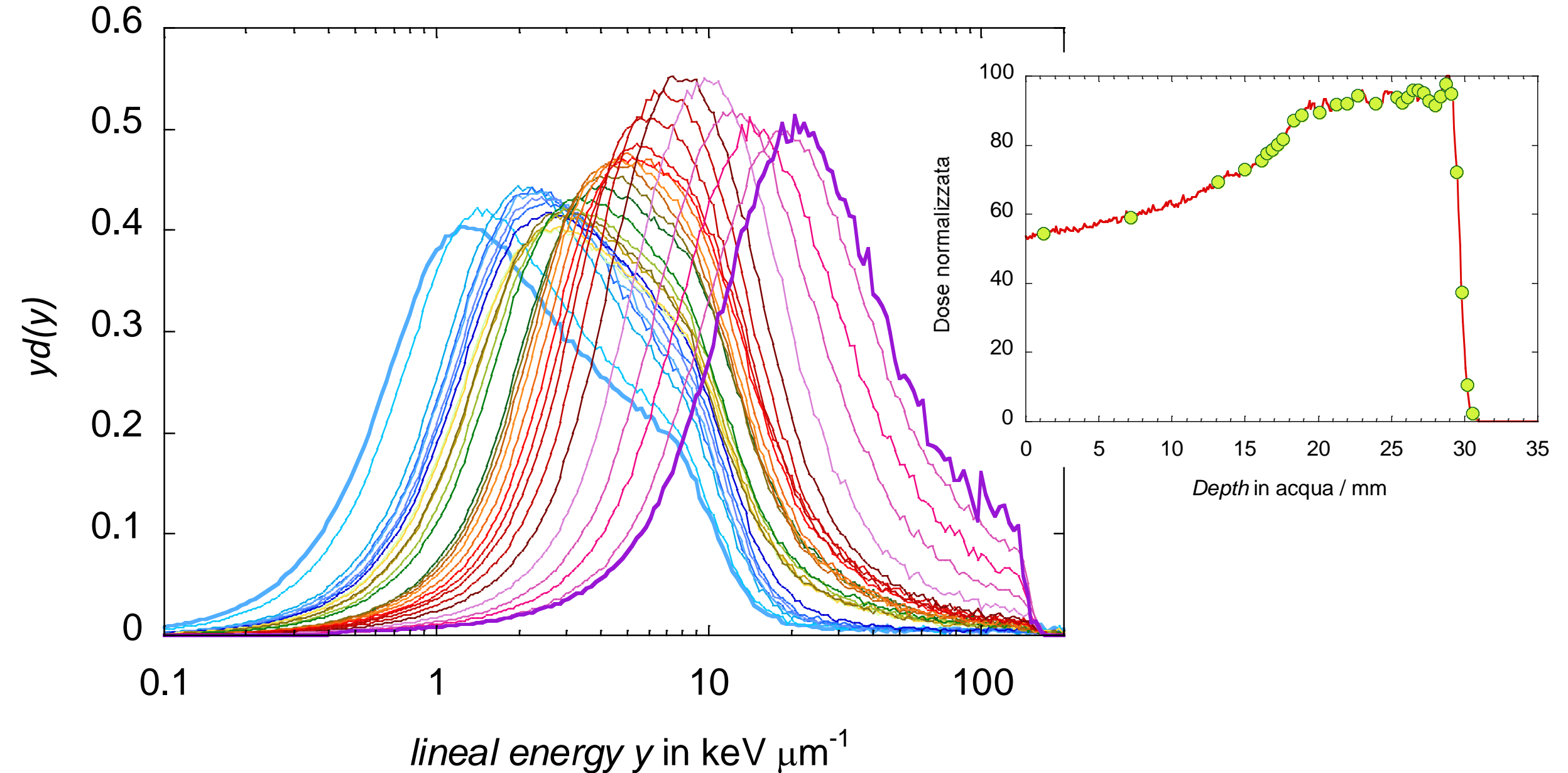
Configurazione E- ΔE per particle recognition





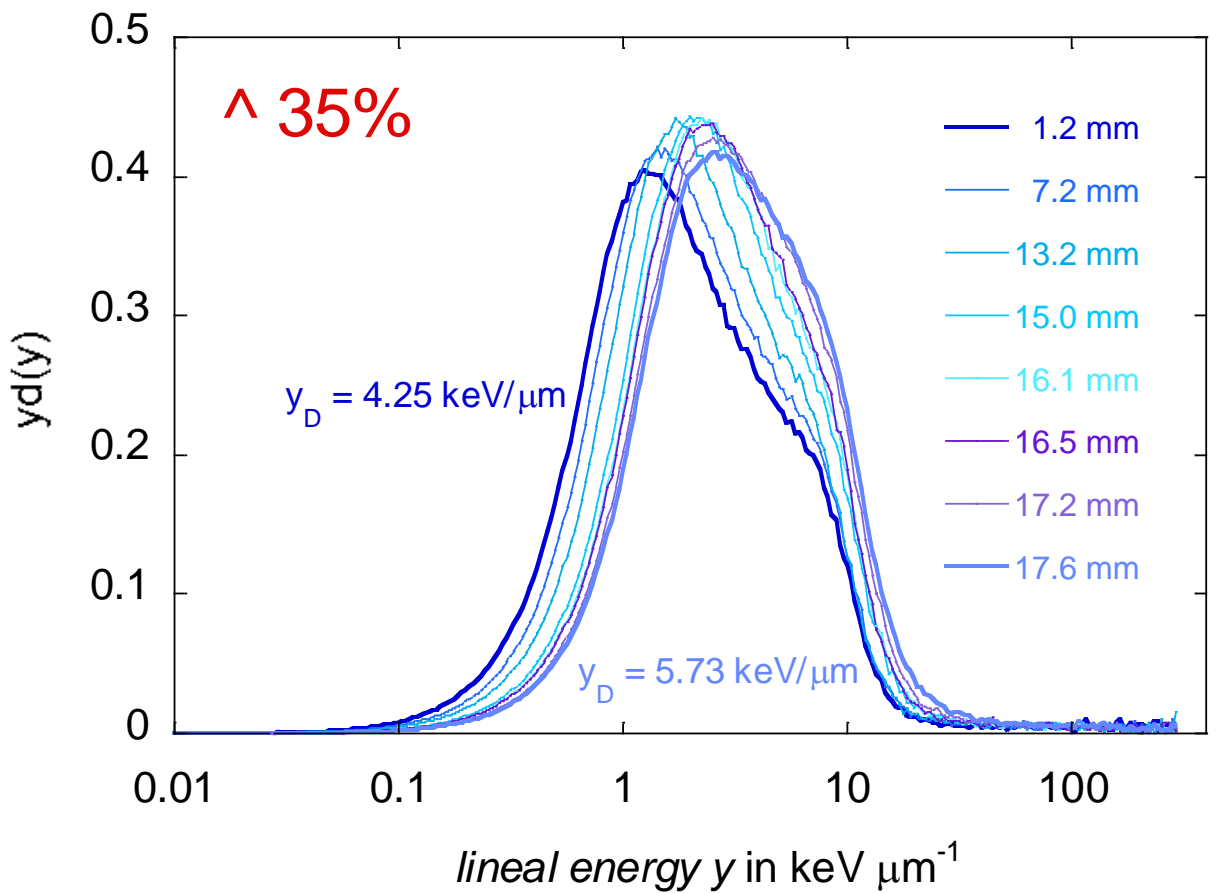
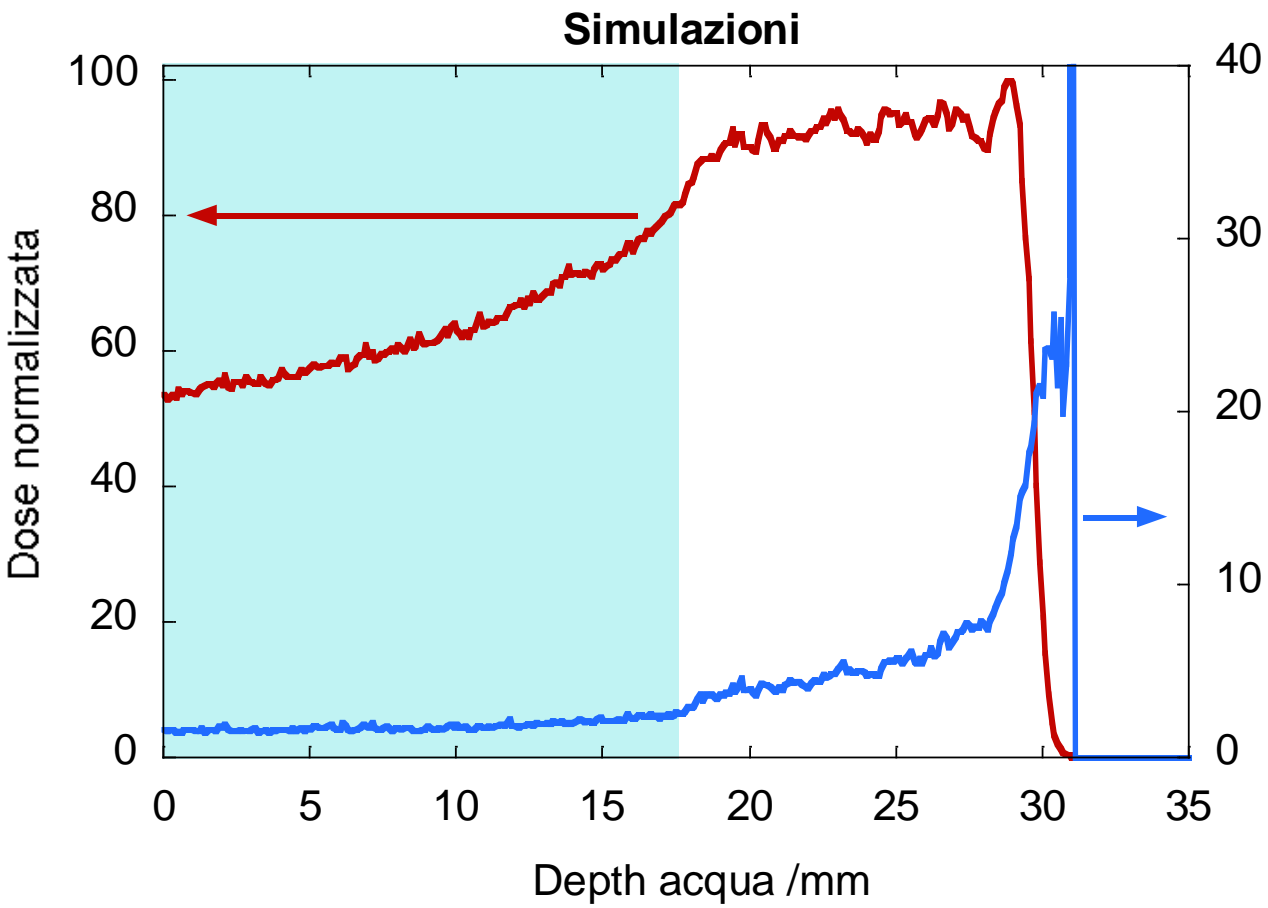






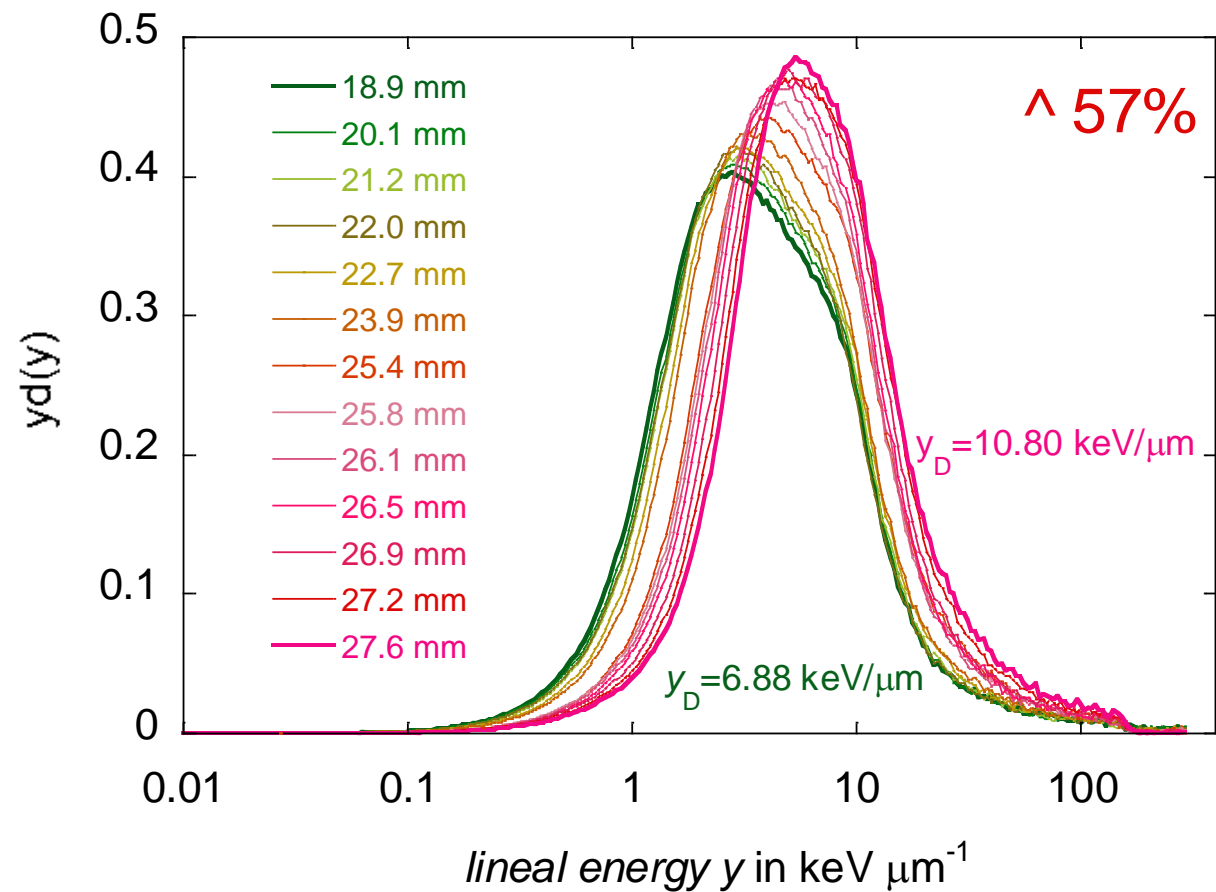
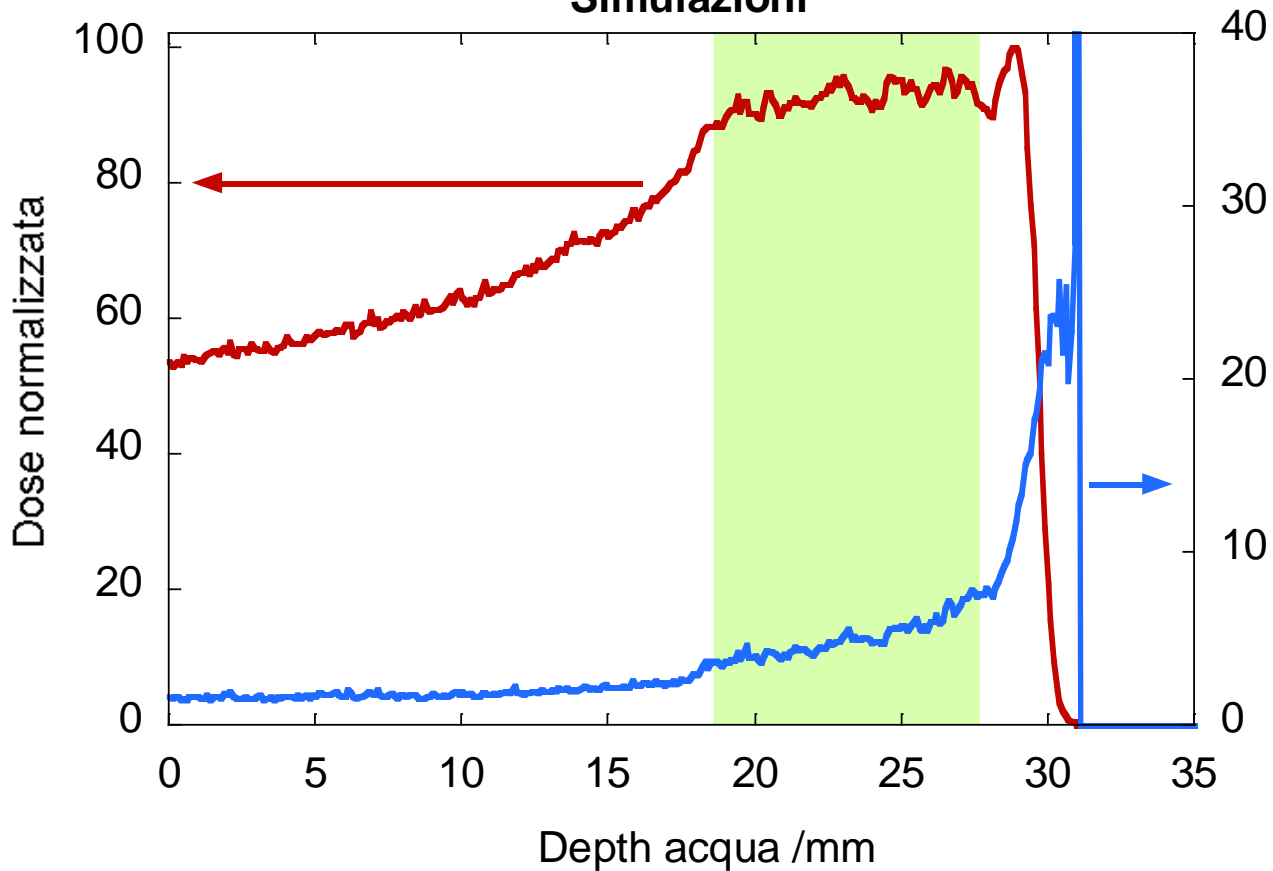
Misure a Catana con mini-TEPC (10-2018)

\bar{y}_D aumenta del 35%



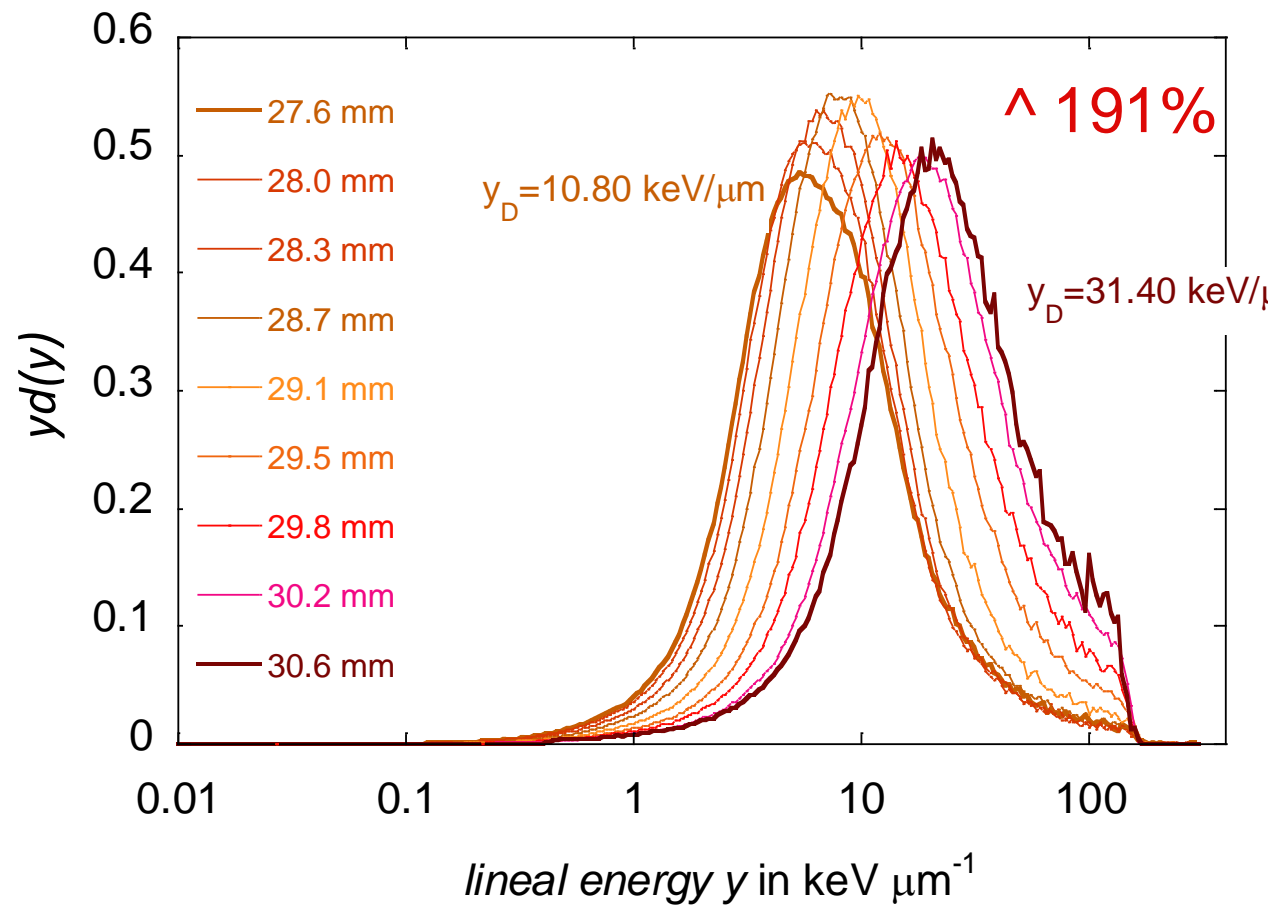
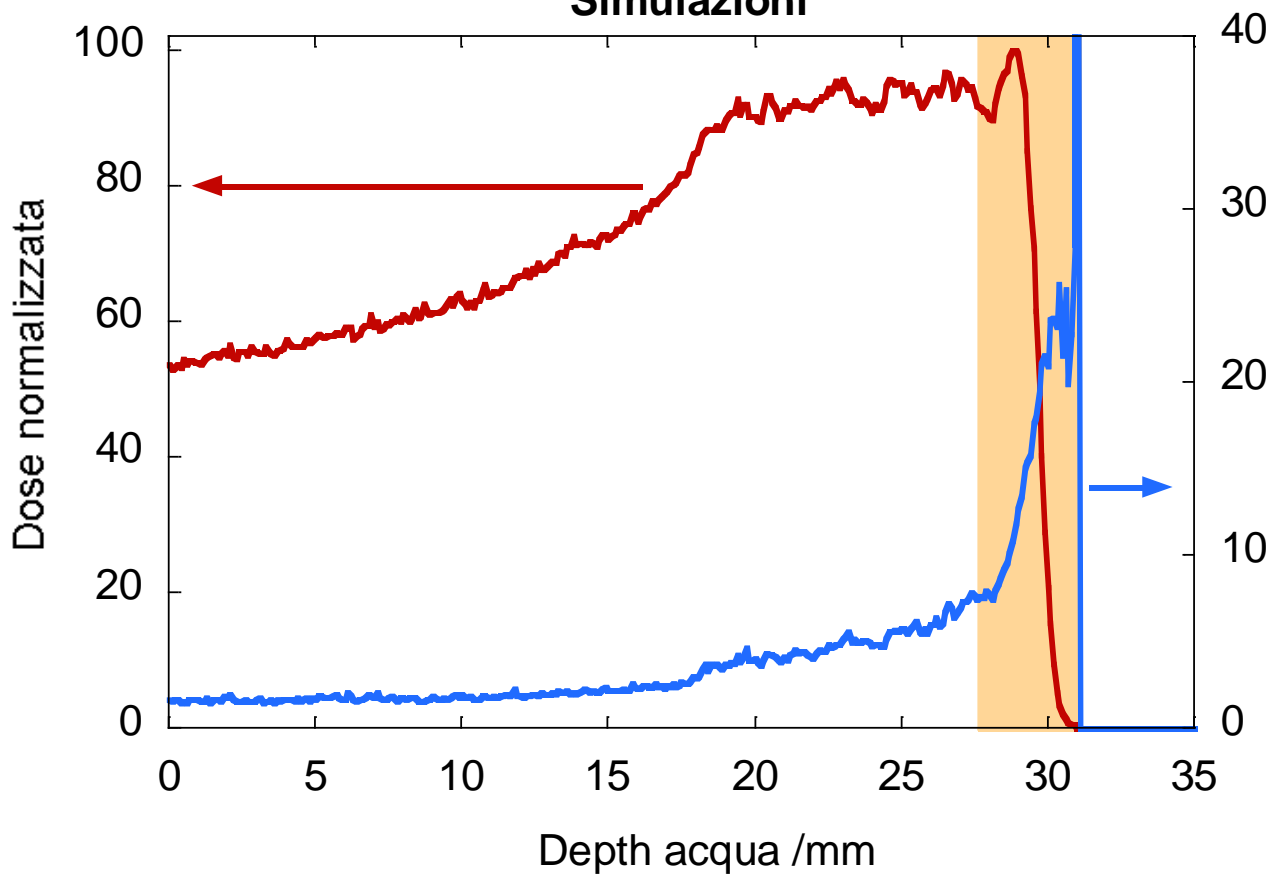
\bar{y}_D aumenta del 57%

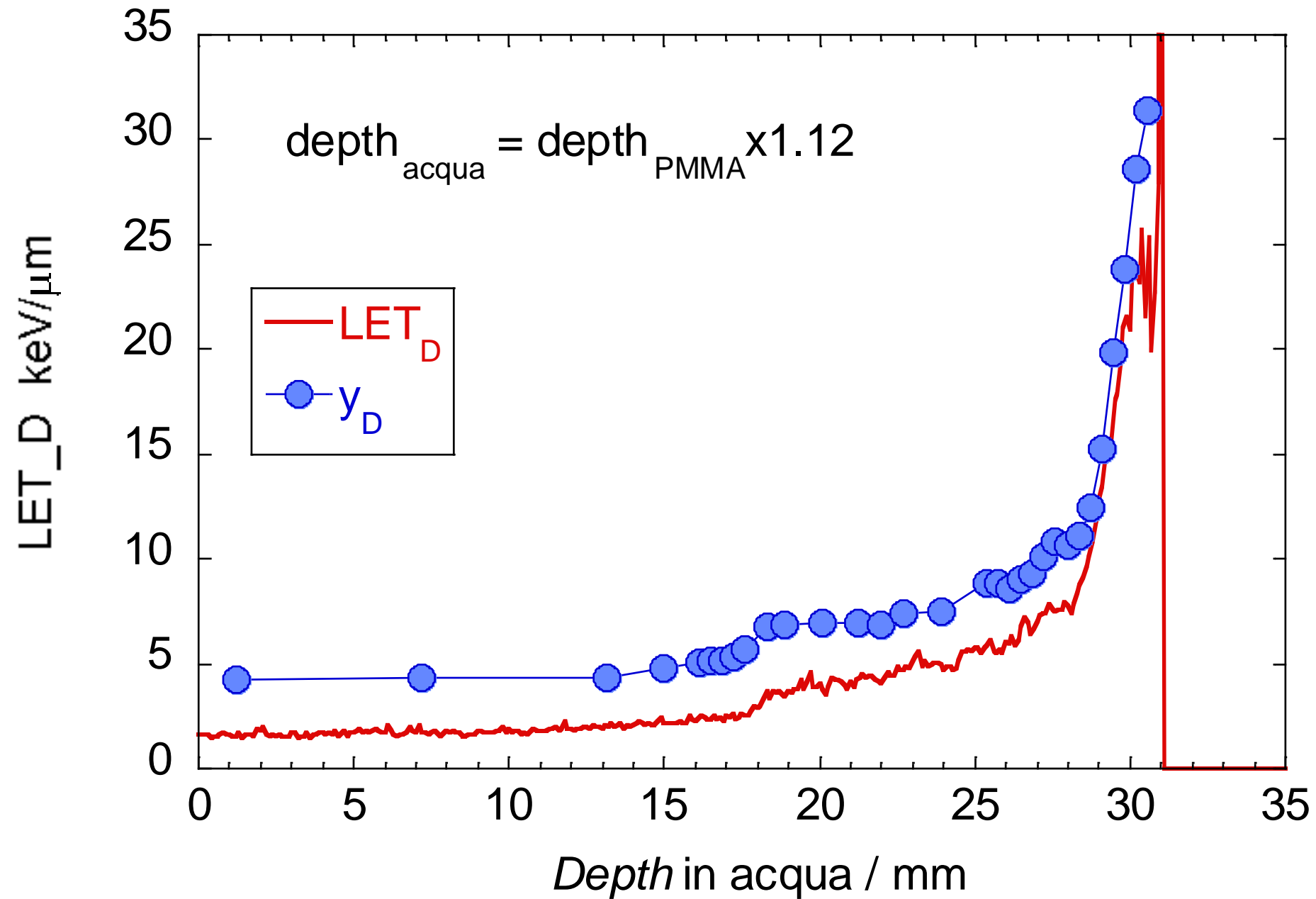
Simulazioni

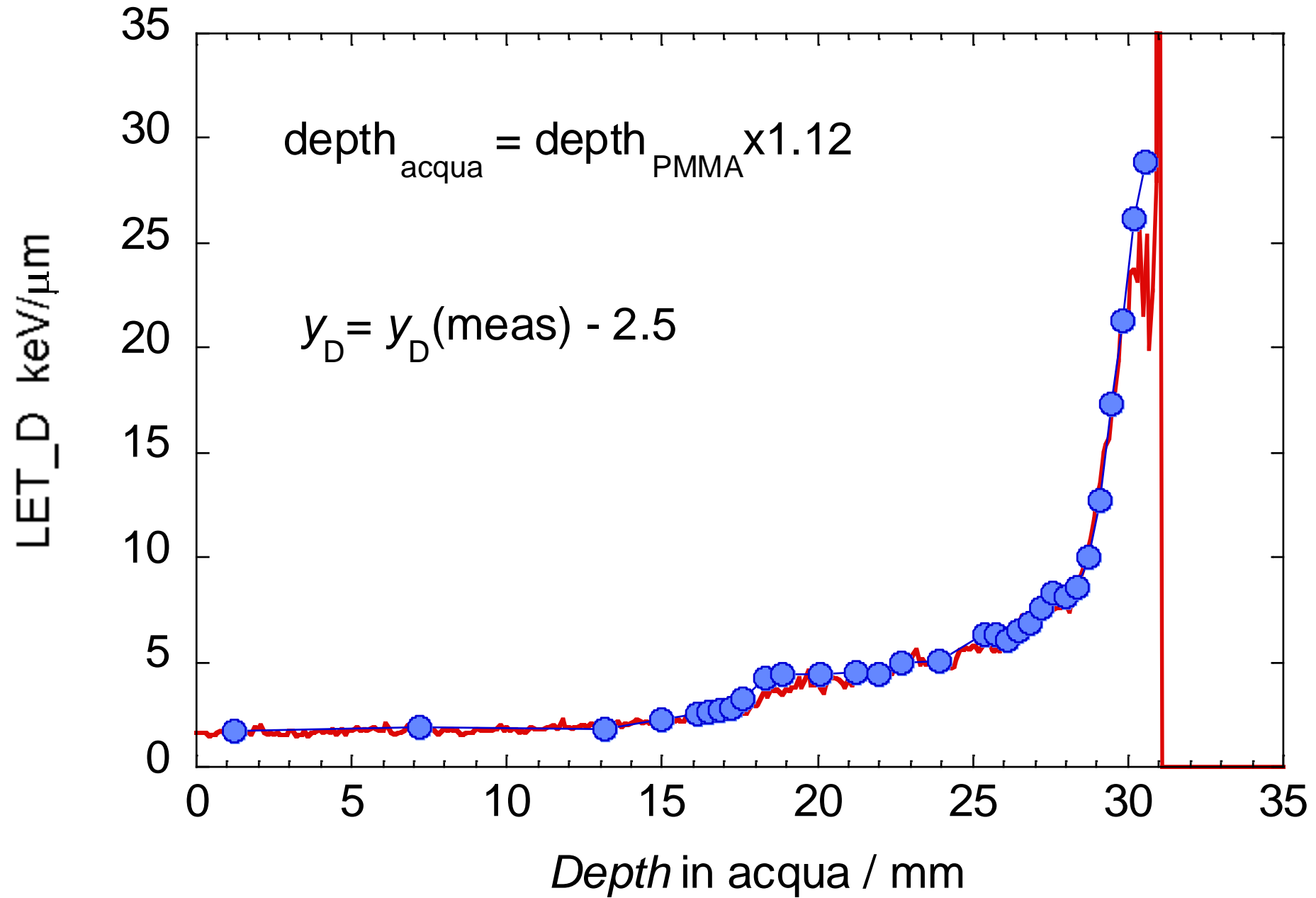


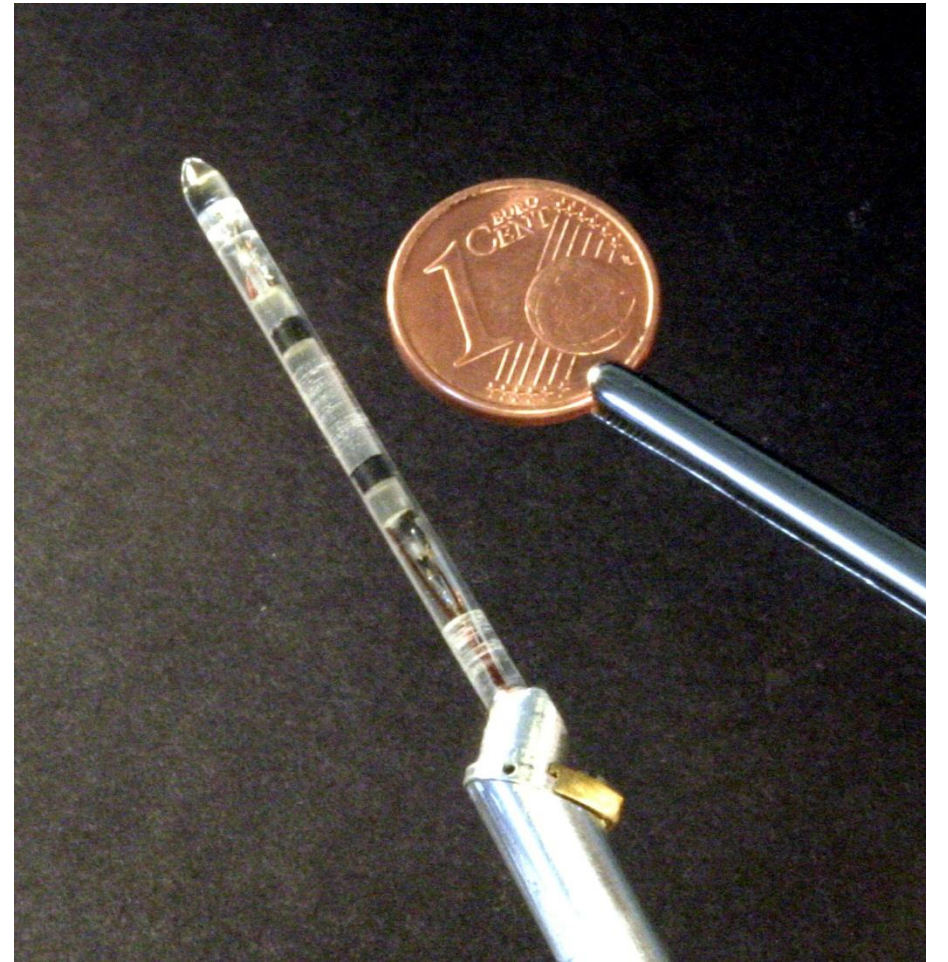
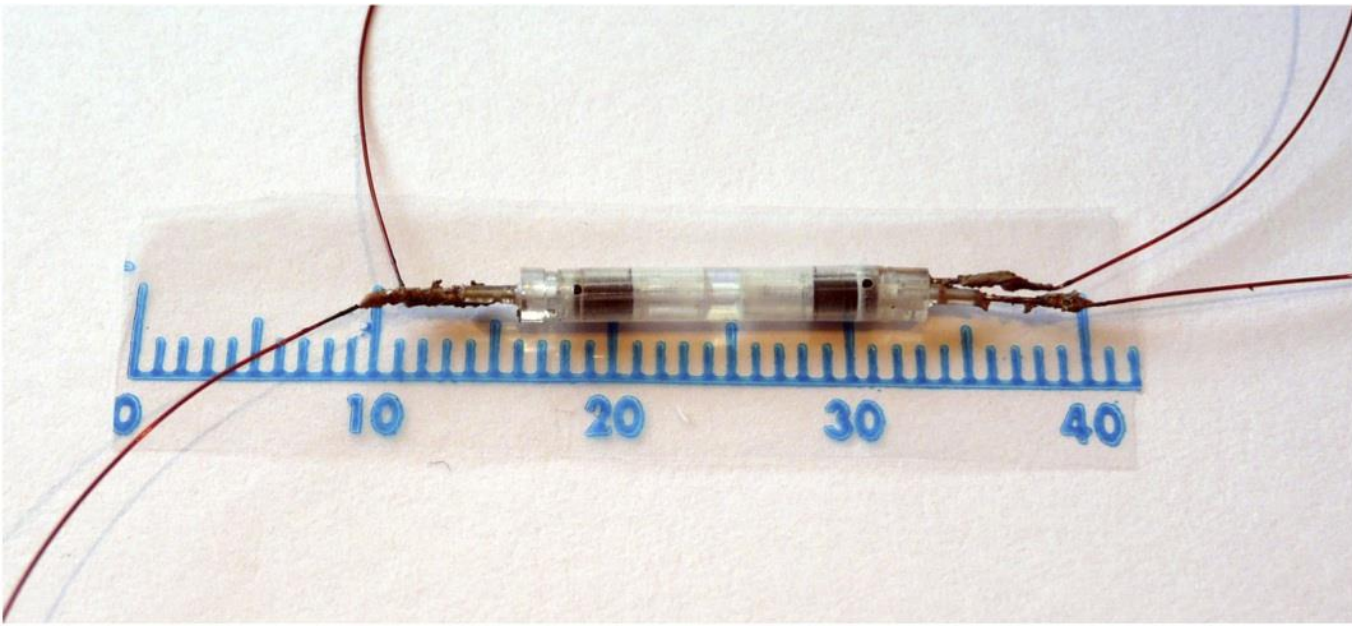
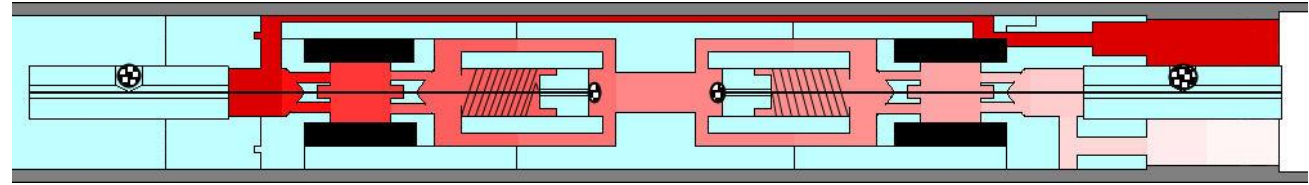
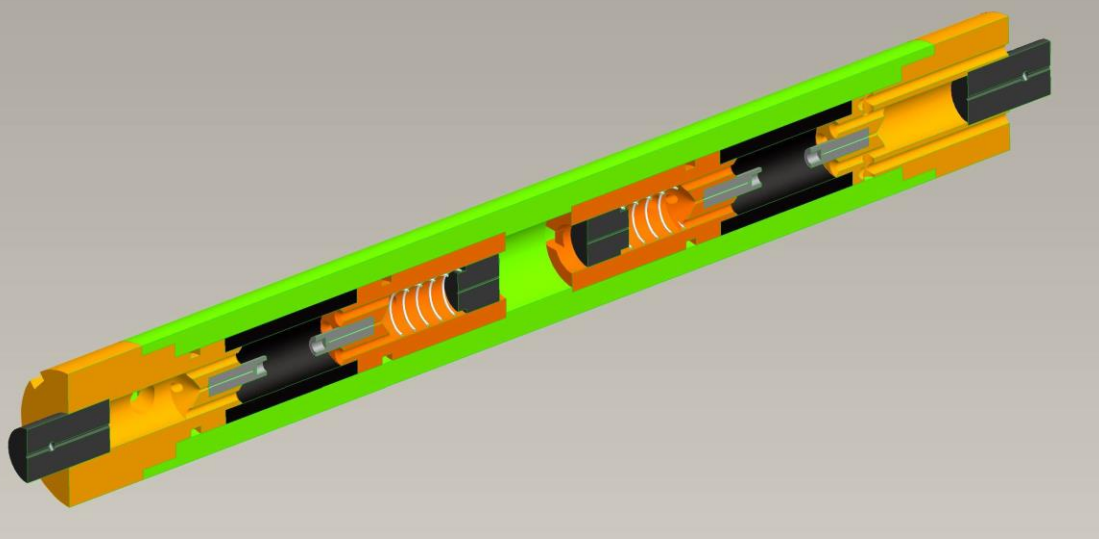
\bar{y}_D aumenta del 191%

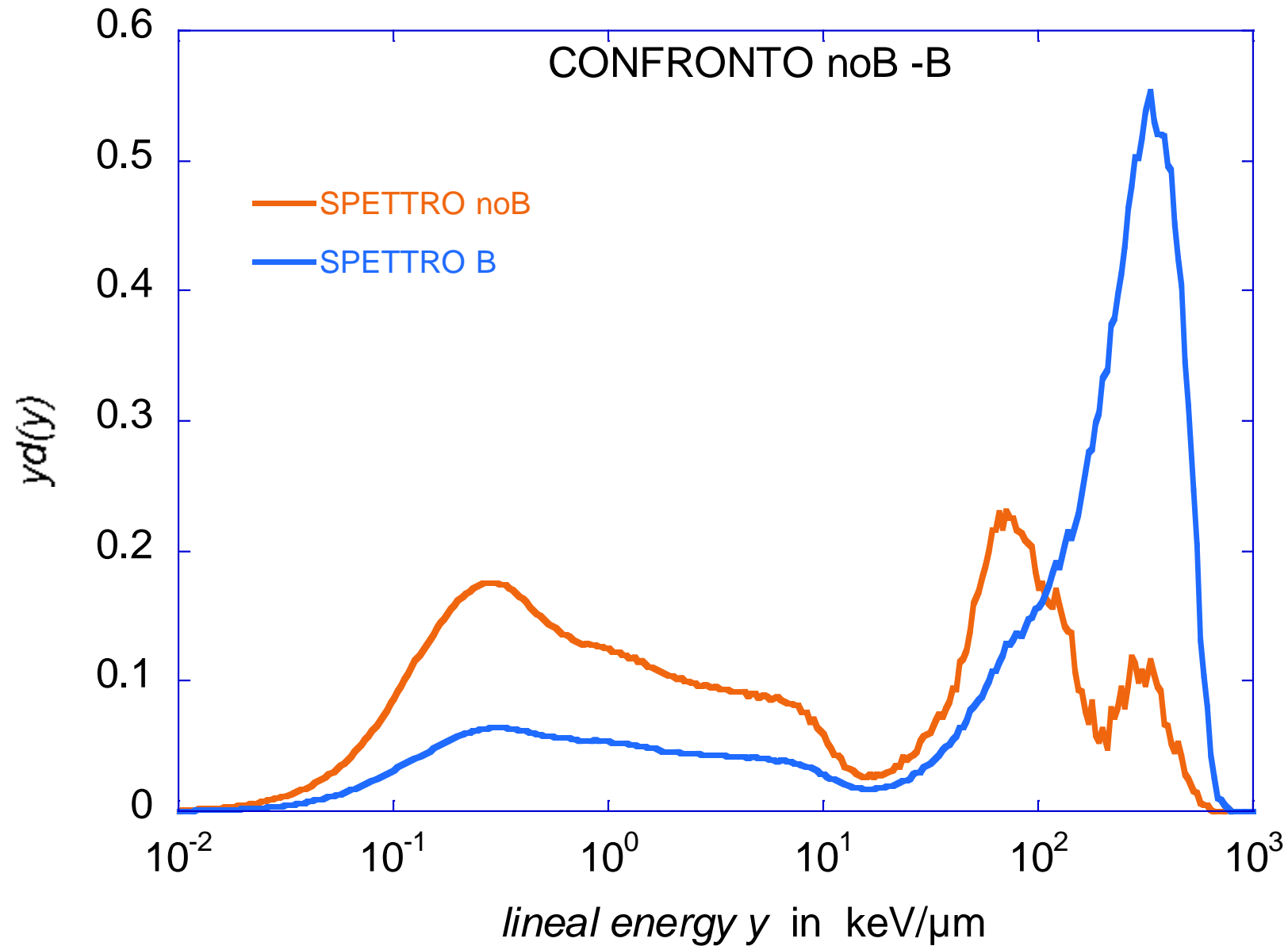
Simulazioni

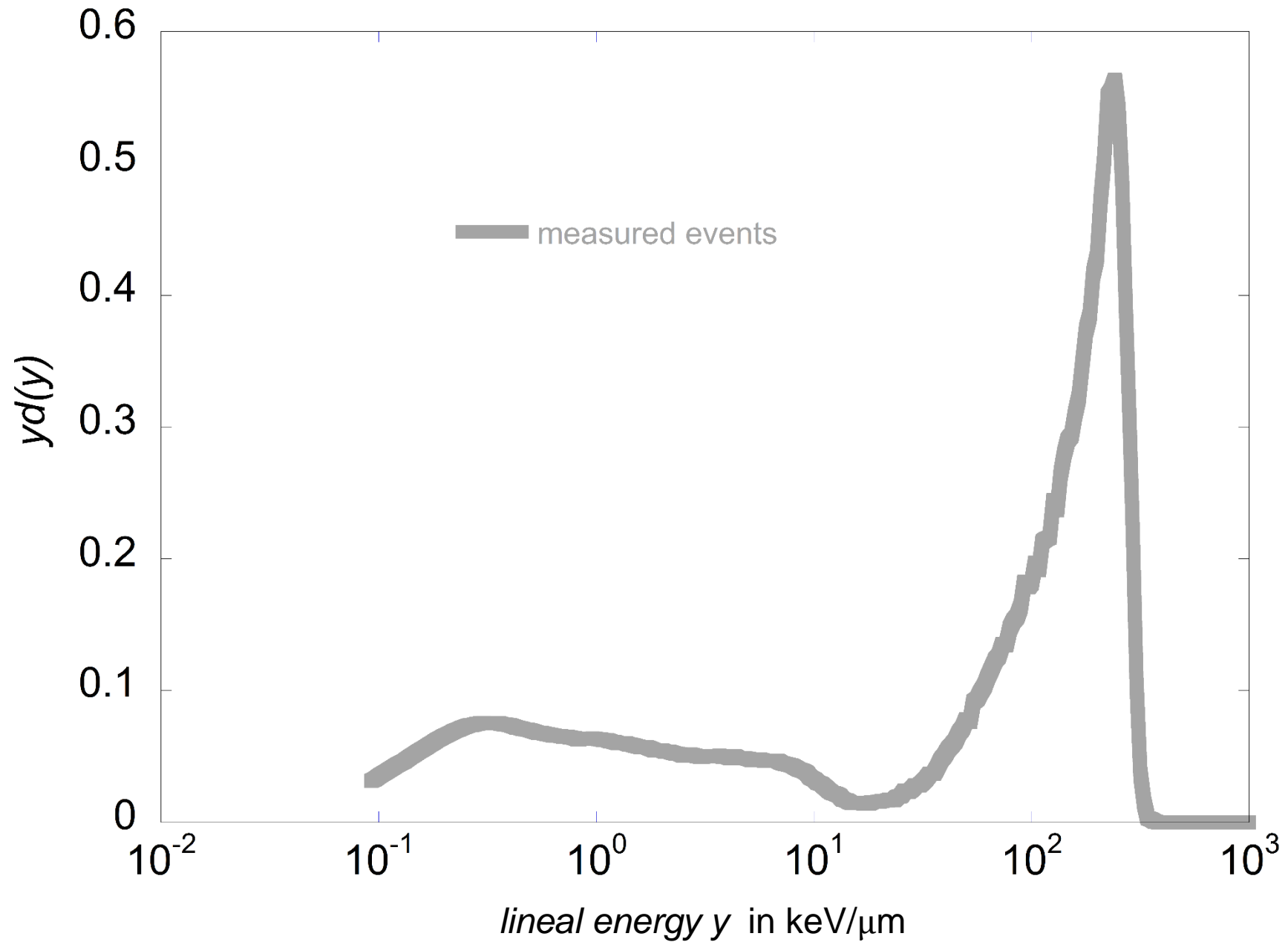


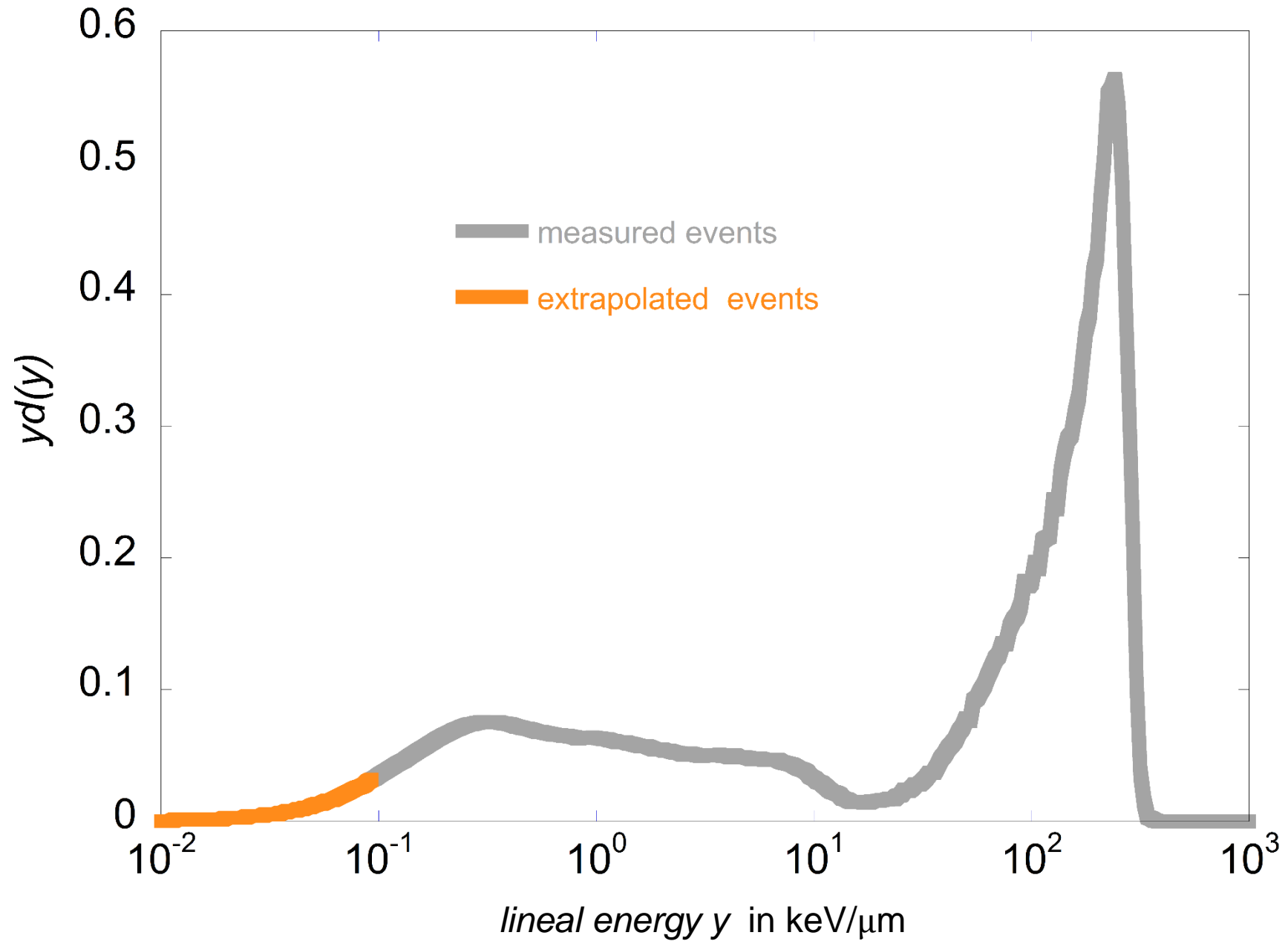


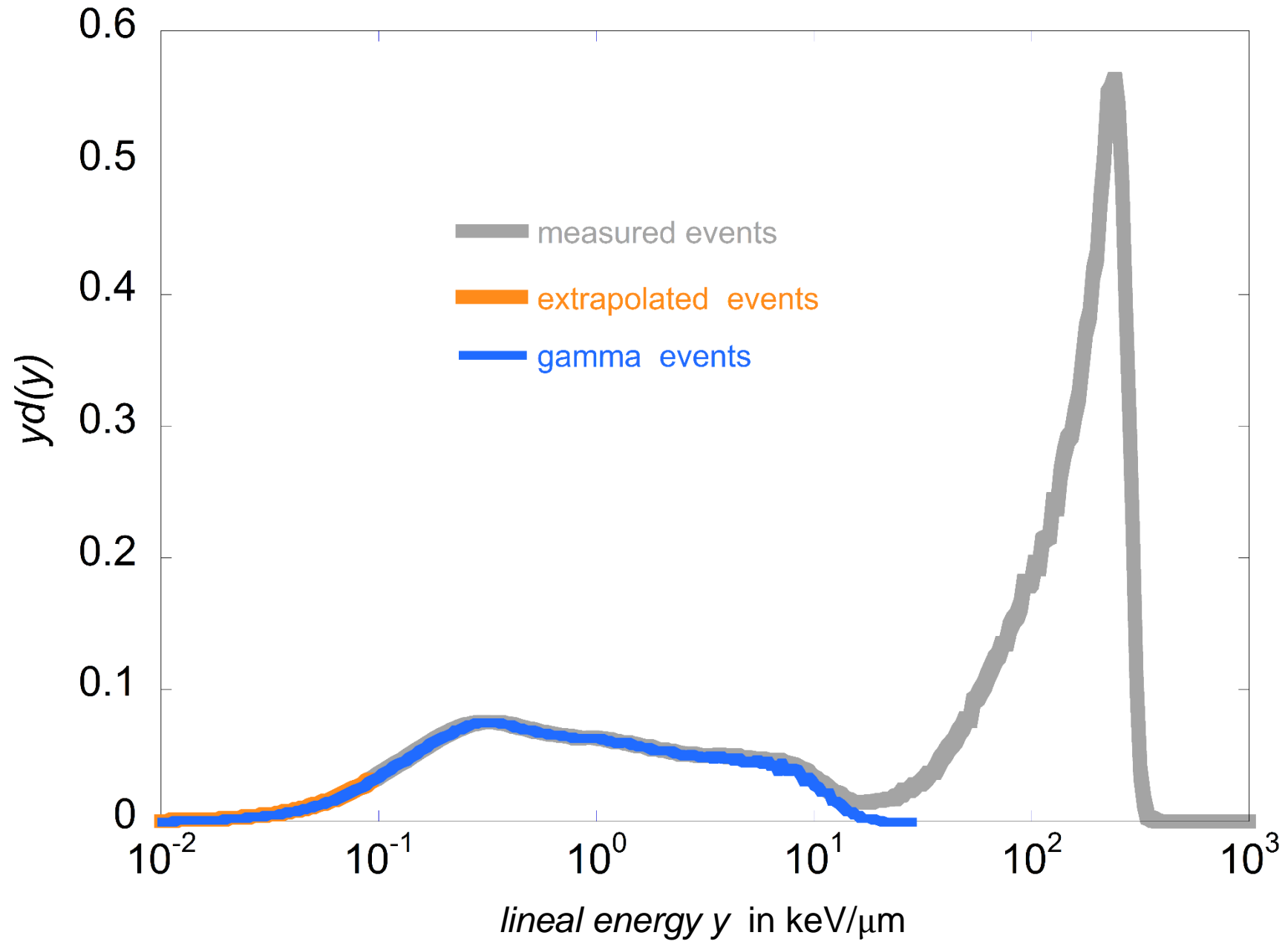


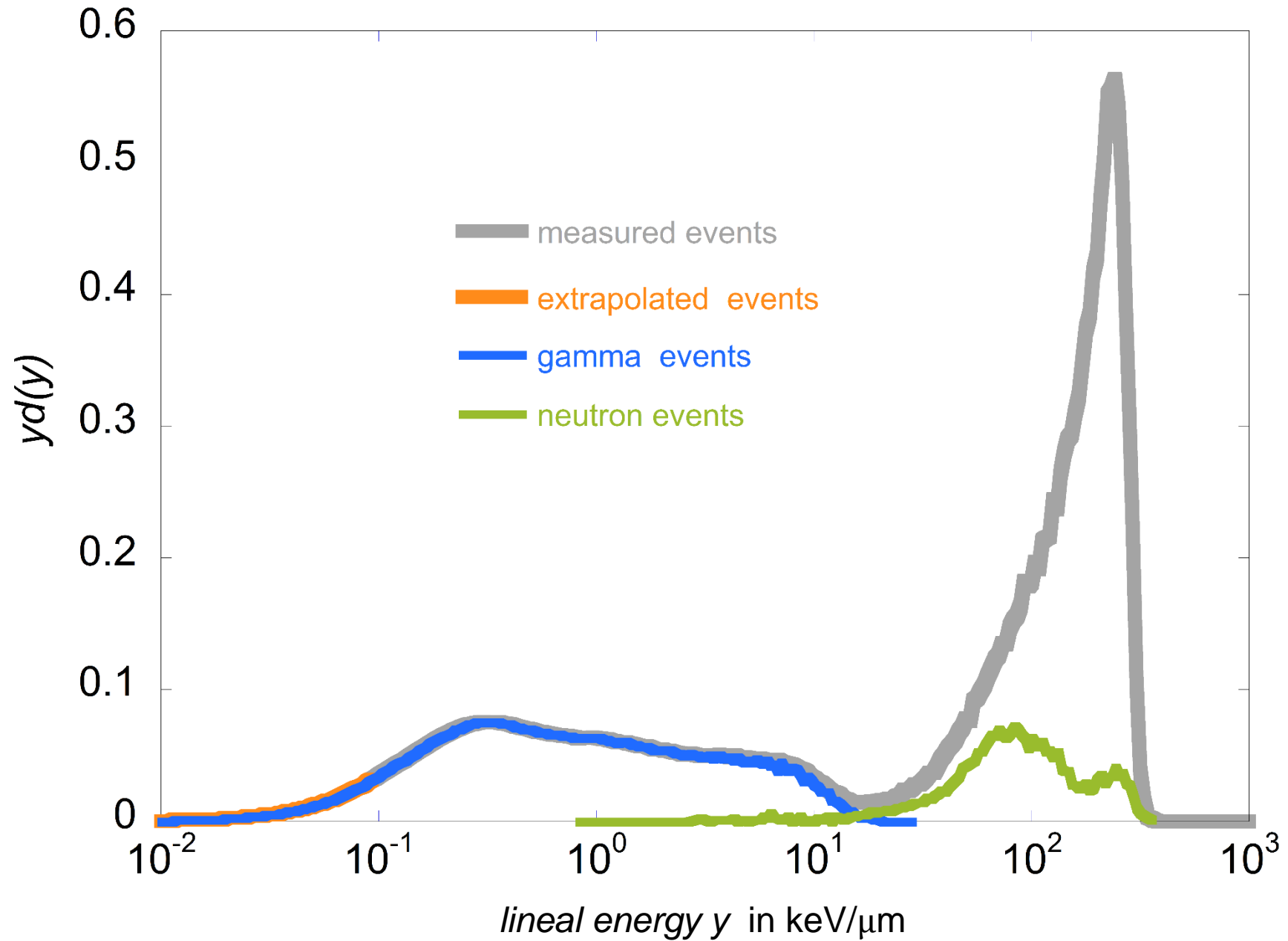


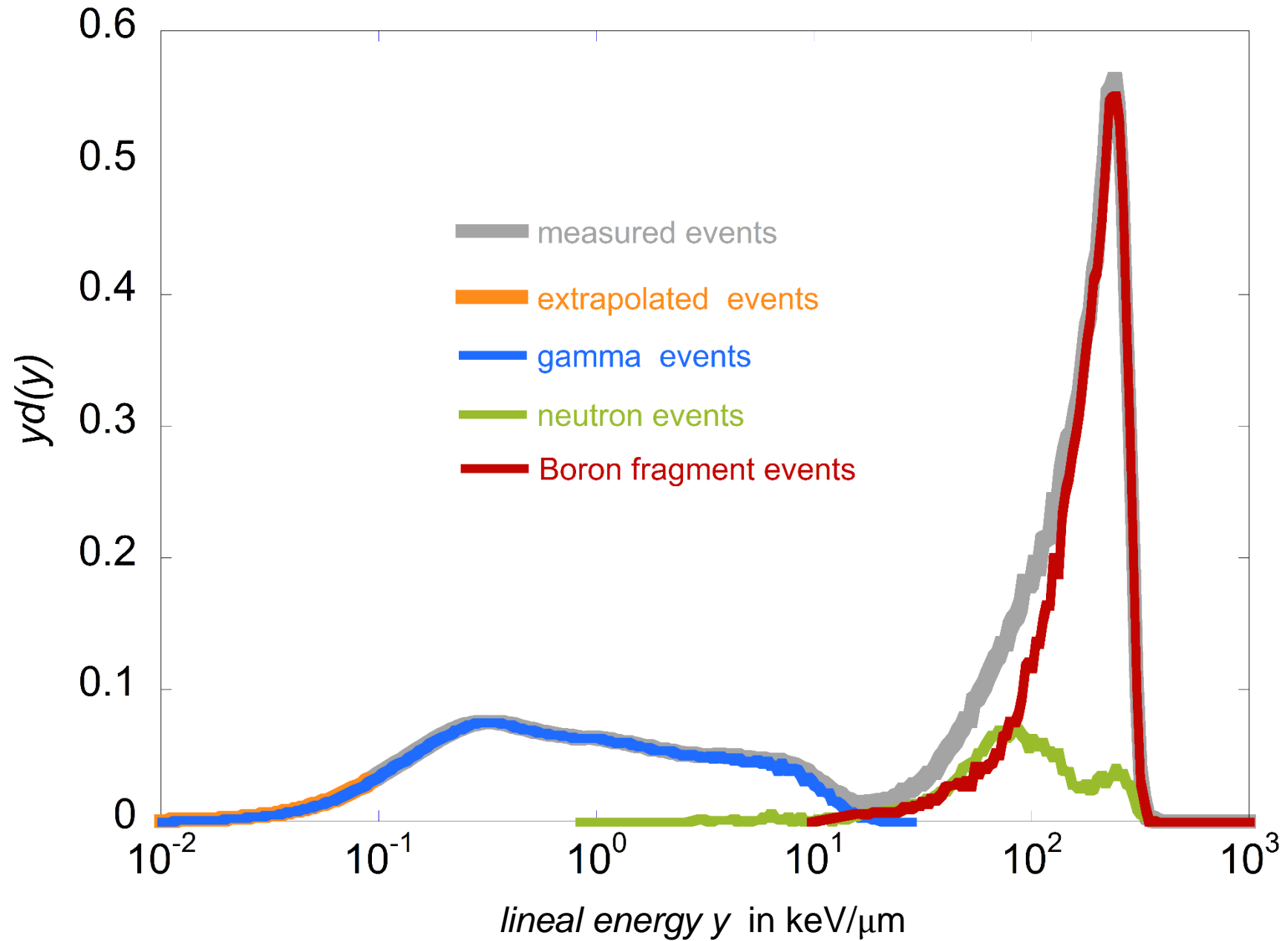








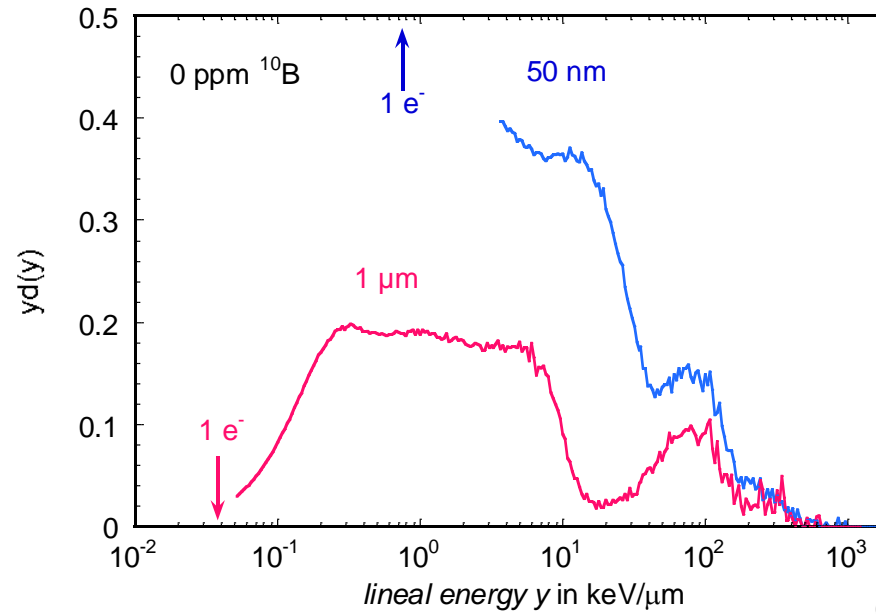
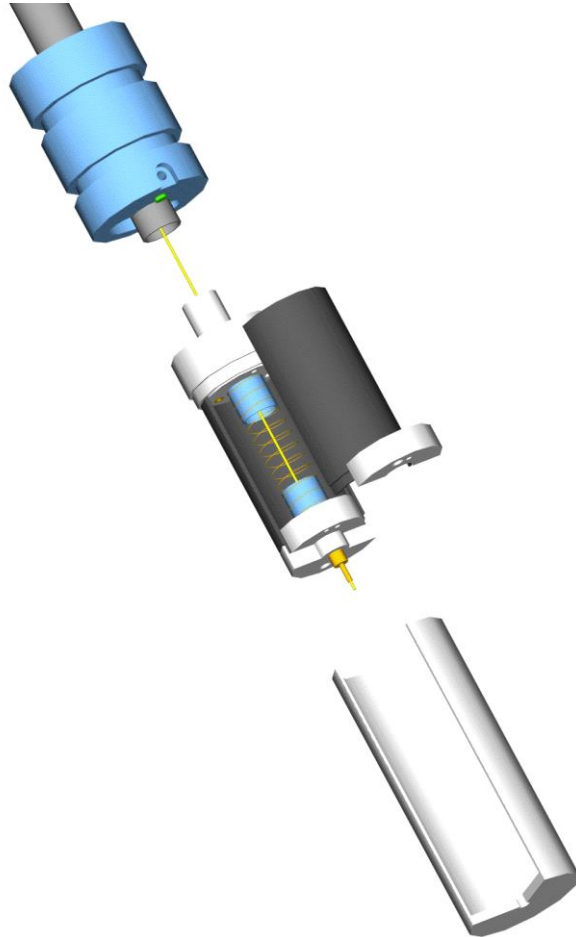




Il nano-TEPC per BNCT

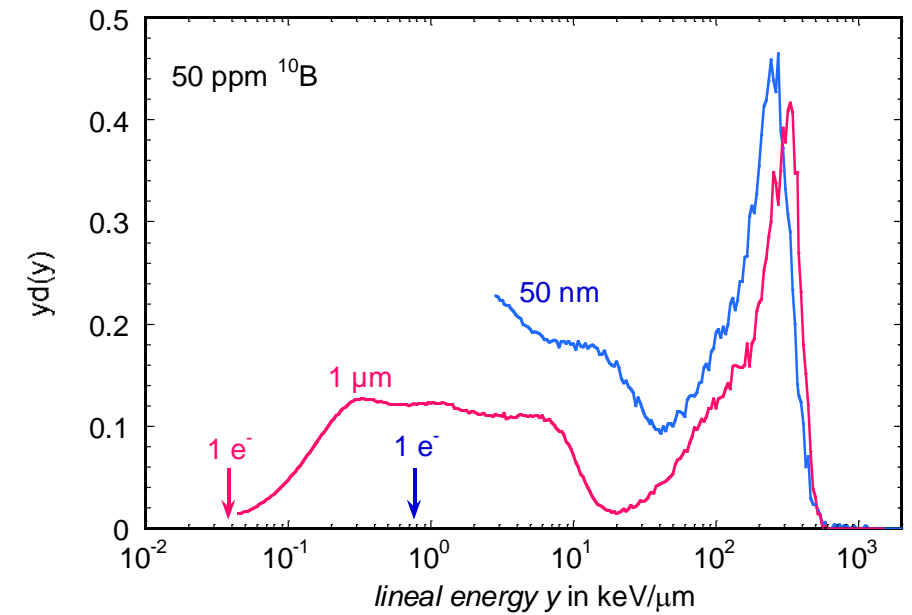
Misure alla colonna termica del CN

$p(5 \text{ MeV}) + {}^9\text{Be}$



Senza Boro

Con 50 ppm di ${}^{10}\text{B}$



Slides di riserva

Attività

1) Microdosimetria del campo di radiazione con:

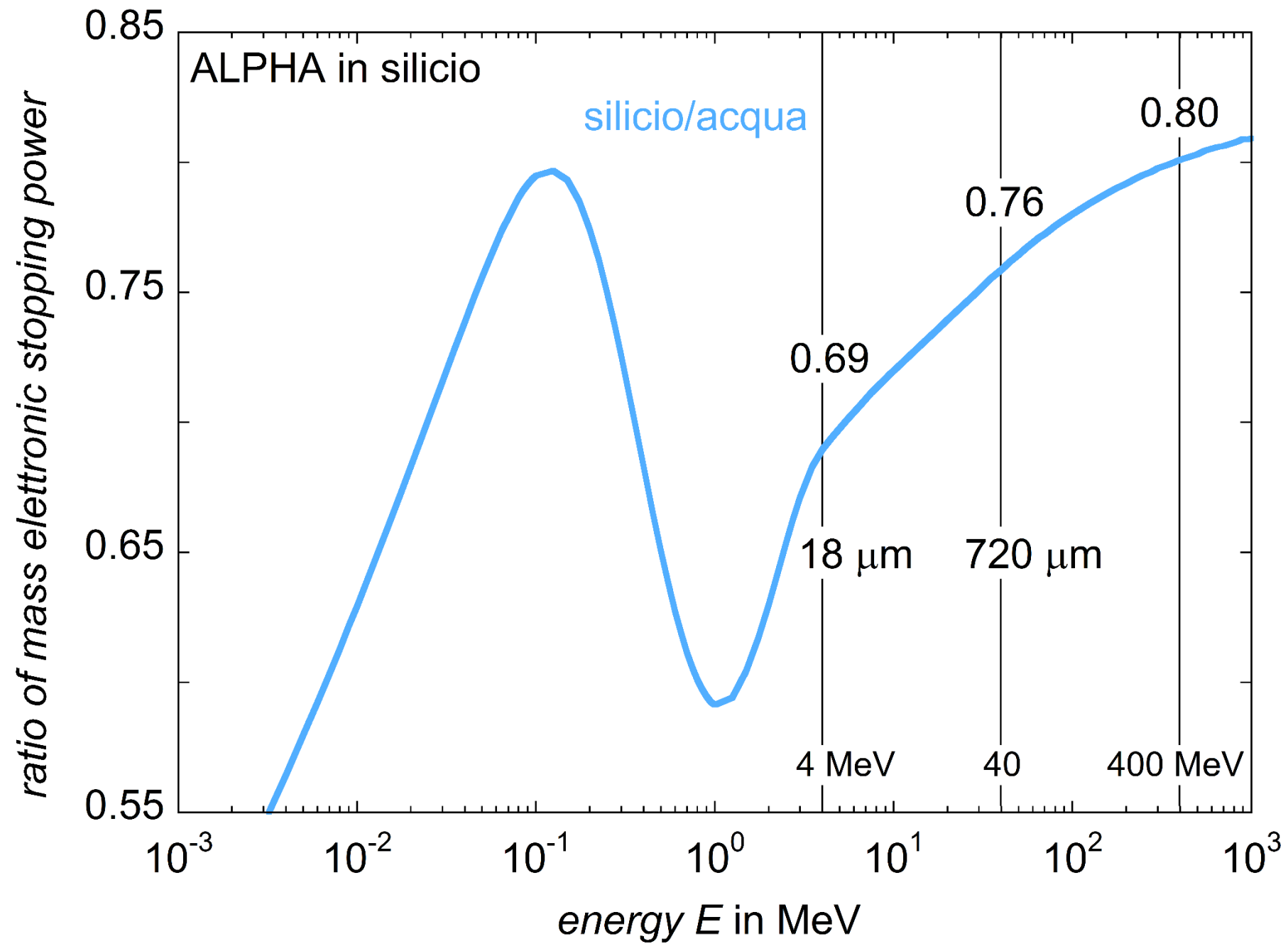
- silicio a doppio stadio E-DE (esistenti + nuove configurazioni) accoppiati a plastiche TE contenenti boro e fluoro;
- mini-TEPC e nano-TEPC con pareti TE contenenti boro e fluoro;

2) Microdosimetri al carburo di silicio (SiC) - fattibilità

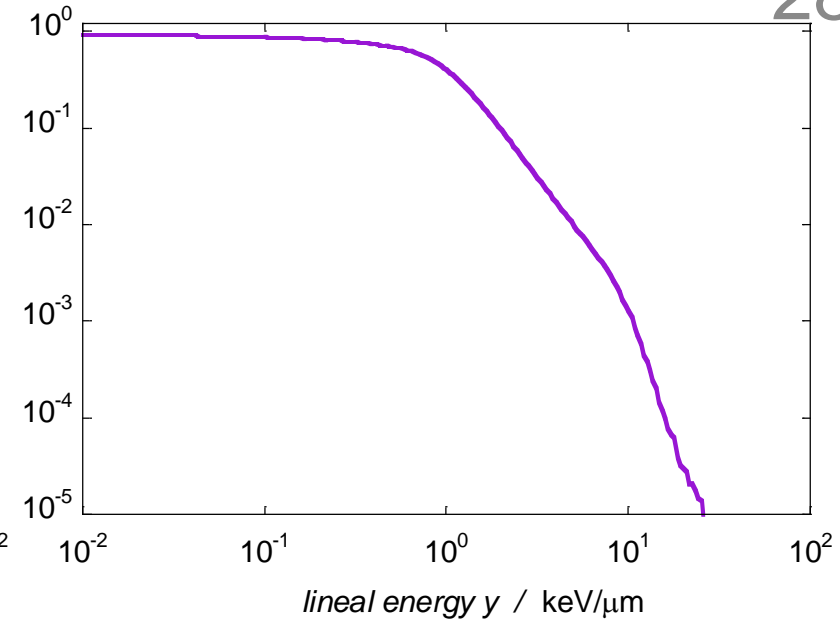
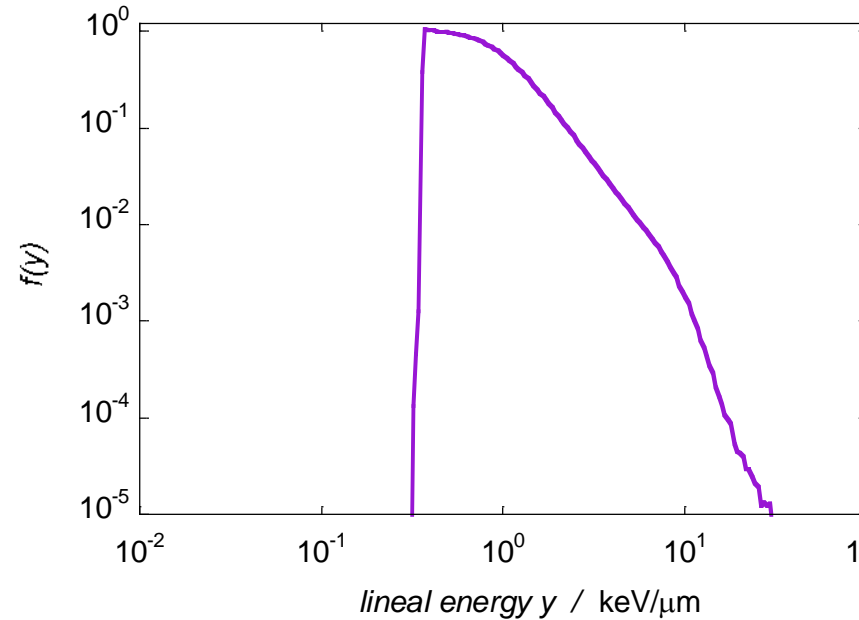
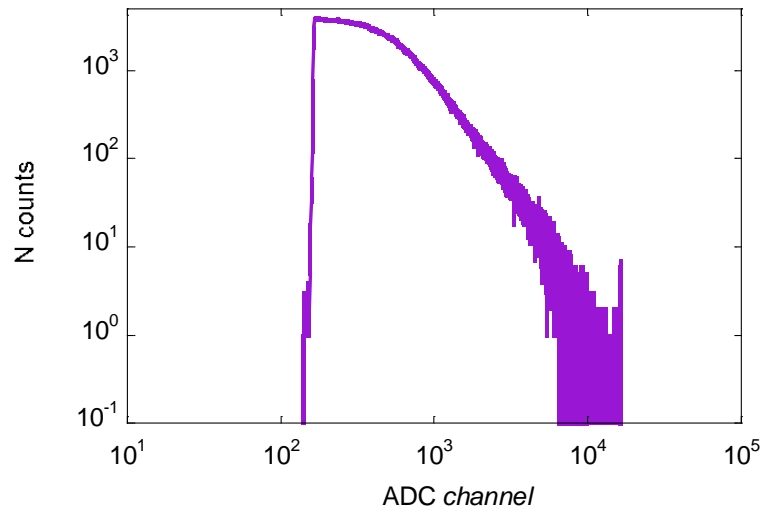
Microdosimetry WP3: Milestones

Milestones		
	Month	Description
M3.1	1-6	Preliminary measurements with silicon telescopes and TEPCs with available B converters
M3.2	1-6	Design of E plastics containing B-11 and F for TEPC walls and SiC converters
M3.3	6-12	Continuation of preliminary measurements with silicon telescopes and TEPCs
M3.4	6-12	Comparison between simulation data D1.1 and experimental data from WP2. Inclusion of cell survival data from WP4.
M3.5	12-24	Comparison between simulation data D1.1 and experimental data from WP2. Inclusion of ROS-production data from WP4.
M3.6	12-24	Comparison between simulation data (D1.1, M1.3, D1.2 and M1.5) and experimental data from WP2. Inclusion of experimental data (cell survival, DSB, CA, foci) from WP4.
M3.7	24-36	Measurements with Si telescopes, SiCs with and without F
M3.8	24-36	Measurements with avalanche confinement TEPCs with and without F

Deliverables		
	Month	Description
D3.1	12	Microdosimetric spectra from measurement at LNS with already available detectors (for WP1 and WP4) mini+Silicon
D3.2	12-24	Microdosimetric spectra with the avalanche confinement detectors simulating different site sizes (for WP1)
D3.3	30	Microdosimetric spectra and scattered plots with F loaded converters



Misura a Catana (10-2018)



Depth = 1.2 mm in acqua

