

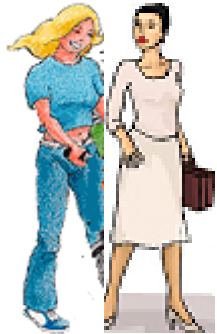
*Individuazione dei parametri del  
lettino di trattamento dal  
sistema di simulazione virtuale:  
la soluzione astigiana*

*Relatori: Antonella Ponzone*

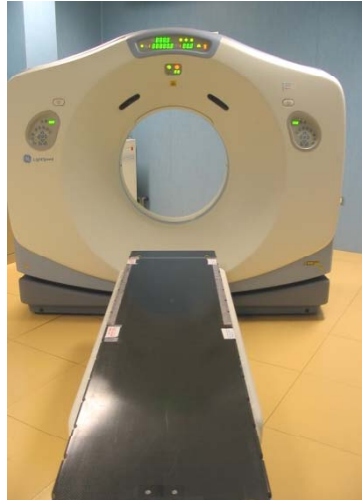
*Barbara Benedetti*

*SOC Radioterapia - Asti*

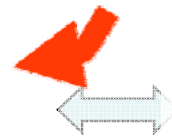
# Schema di Impostazione terapeutica presso la Radioterapia di Asti



TC-Simulatore



Simulazione di verifica



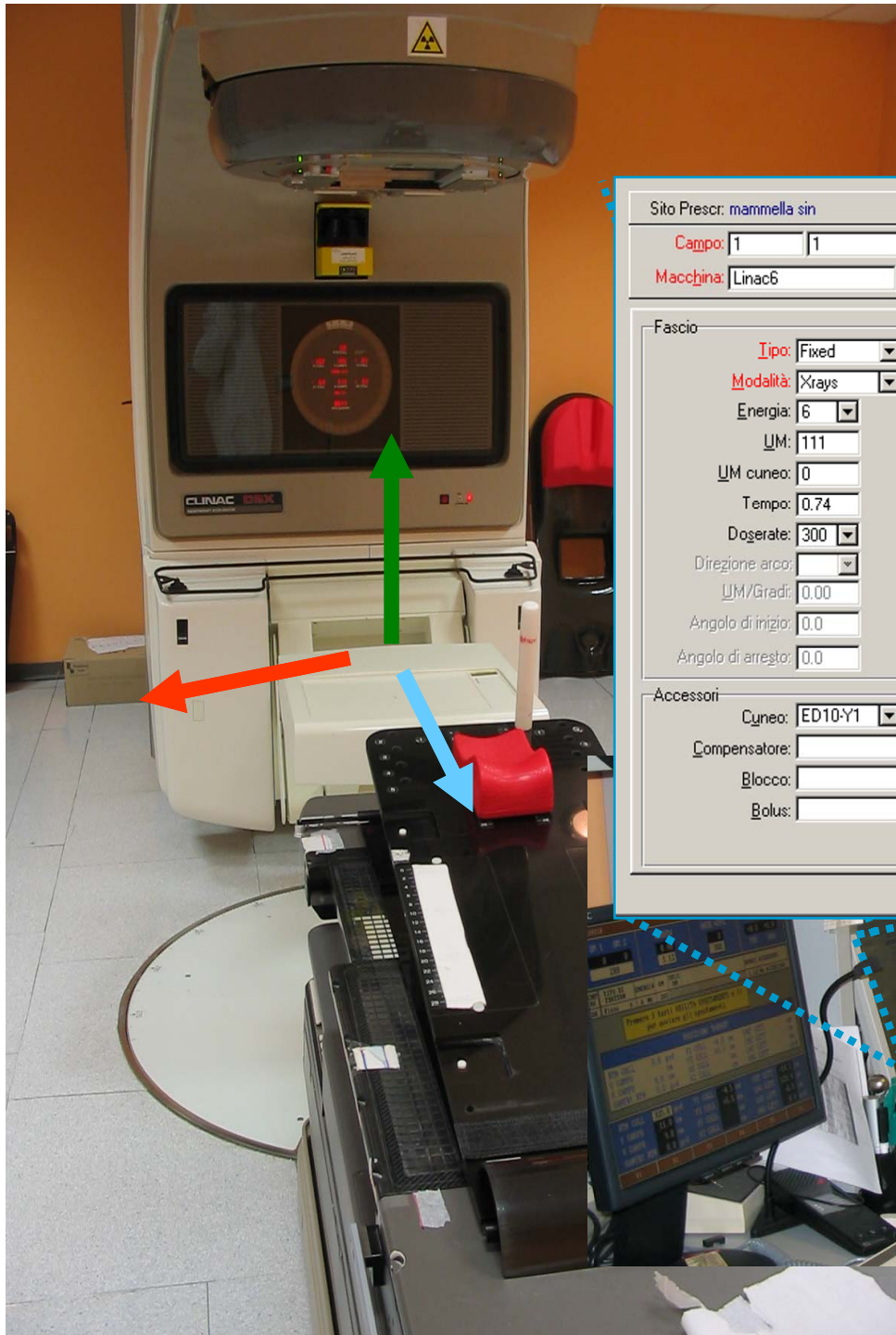
Simulazione di verifica  
ulteriore fonte di errore



Linac



# Record & Verify



Sito Prescr: mammella sin      Dose: 805 cGy/ 4500 cGy      Frazioni: 5/25      Approvato: ELR 12/09/2008

Campo: 1      Dose: 85 cGy      Campo Tr.: [5]      Approvato: ELR 15/09/2008

Macchina: Linac6      cGy/MU : 0.766      Tolleranza: 1 Photon      Ultimo Tratt: 22/09/2008

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Fascio:      Tipo: Fixed      Gantry/Collimatore:      Tol:      View: IMG BEV Note

Modalità: Xrays      Angolo gantry: 315.0      0.3

Energia: 6      Angolo Coll: 90.0      0.3

UM: 111

UM cuneo: 0

Tempo: 0.74

Doserate: 300

Direzione arco:      **Tavolo**

UM/Gradi: 0.00      Verticale: -23.8

Angolo di inizio: 0.0      Laterale: -17.1

Angolo di arresto: 0.0      Longitudinale: 142.6

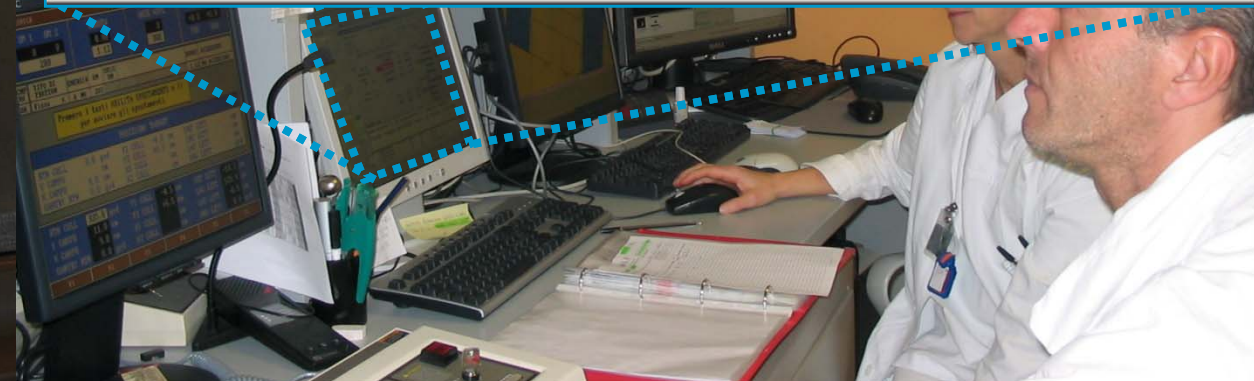
Accessori:      Cuneo: ED10-Y1      Angolo: 0.0      0.3      Delta: 4.00

Compensatore:      Cologna: 0.0      0.5

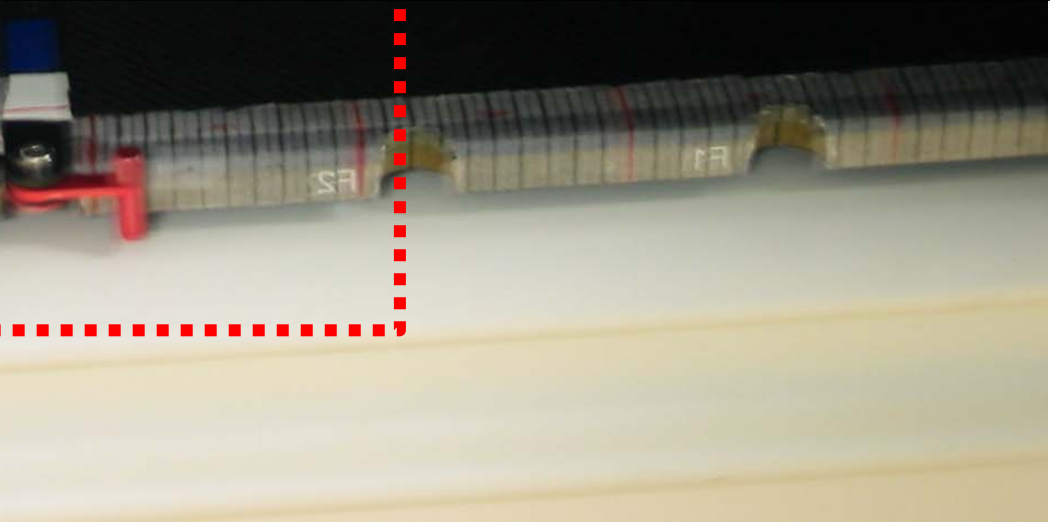
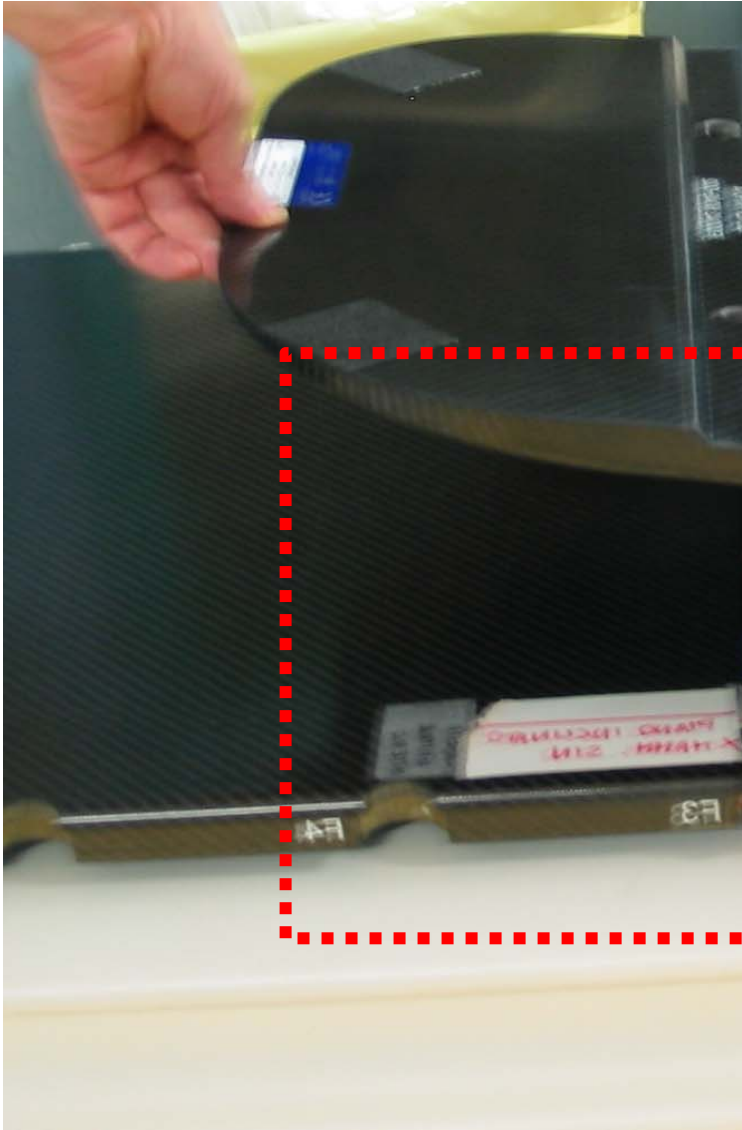
Blocco:       EPID      SID: 0.0

Bolus:       MLC

**Campo trattamento sarà modificato**







# Simulatore Acuity Asti

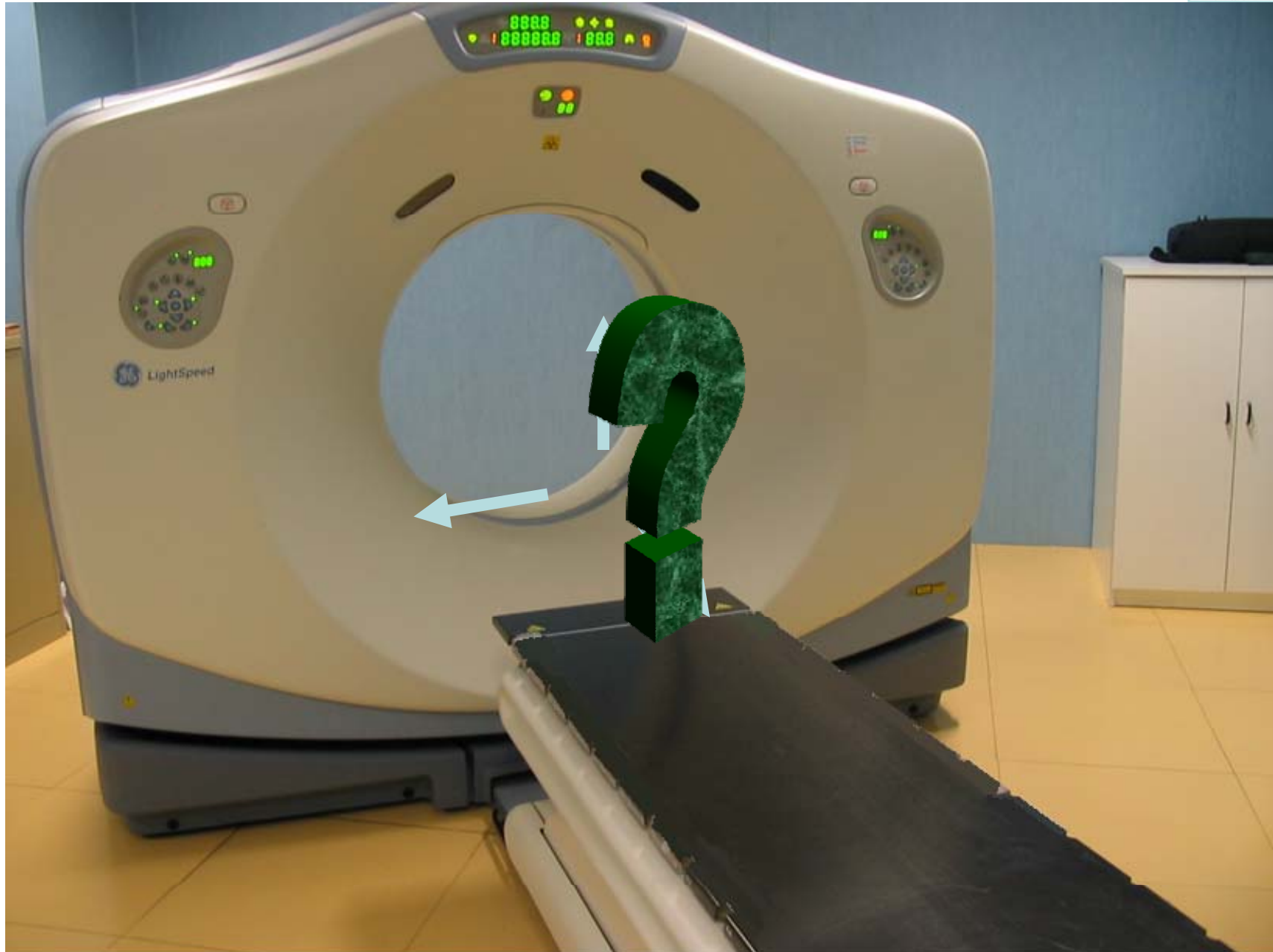


Couch		Current	Target	Collimator	
Vrt		-9.8		Rtn	0.0
Lng		+161.5		Blade	
Lat		+0.2		X	16.7
Rtn		+0.2		Y	16.6
Imager Retracted		Current	Target	X1	-8.4

Mode	Collimator	Gain
Exp Full Res	Current: 0.0, Target: 0.0	Current: 0.0, Target: 0.0
Imager Retracted	Current: 16.7, Target: 16.6	Current: 9.9, Target: 9.7
	Current: -8.4, Target: -8.3	Current: -5.0, Target: -4.9
	Current: -8.1, Target: -8.1	Current: -4.6, Target: -4.6
	Current: -8.5, Target: -8.5	Current: -4.1, Target: -4.1

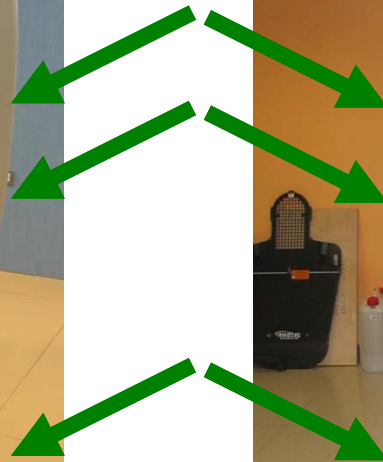
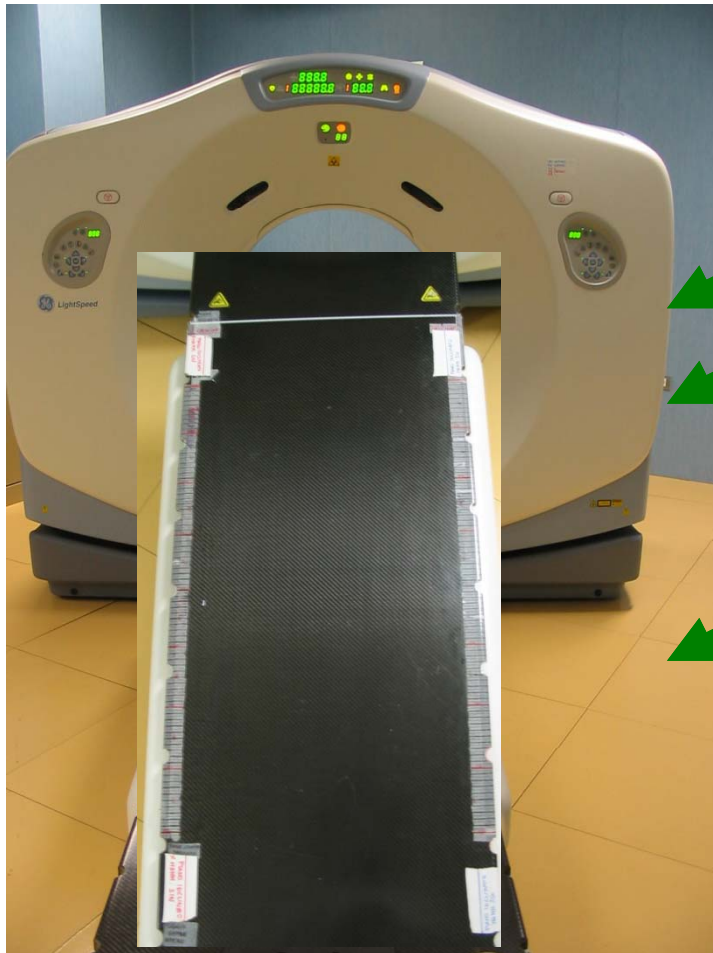




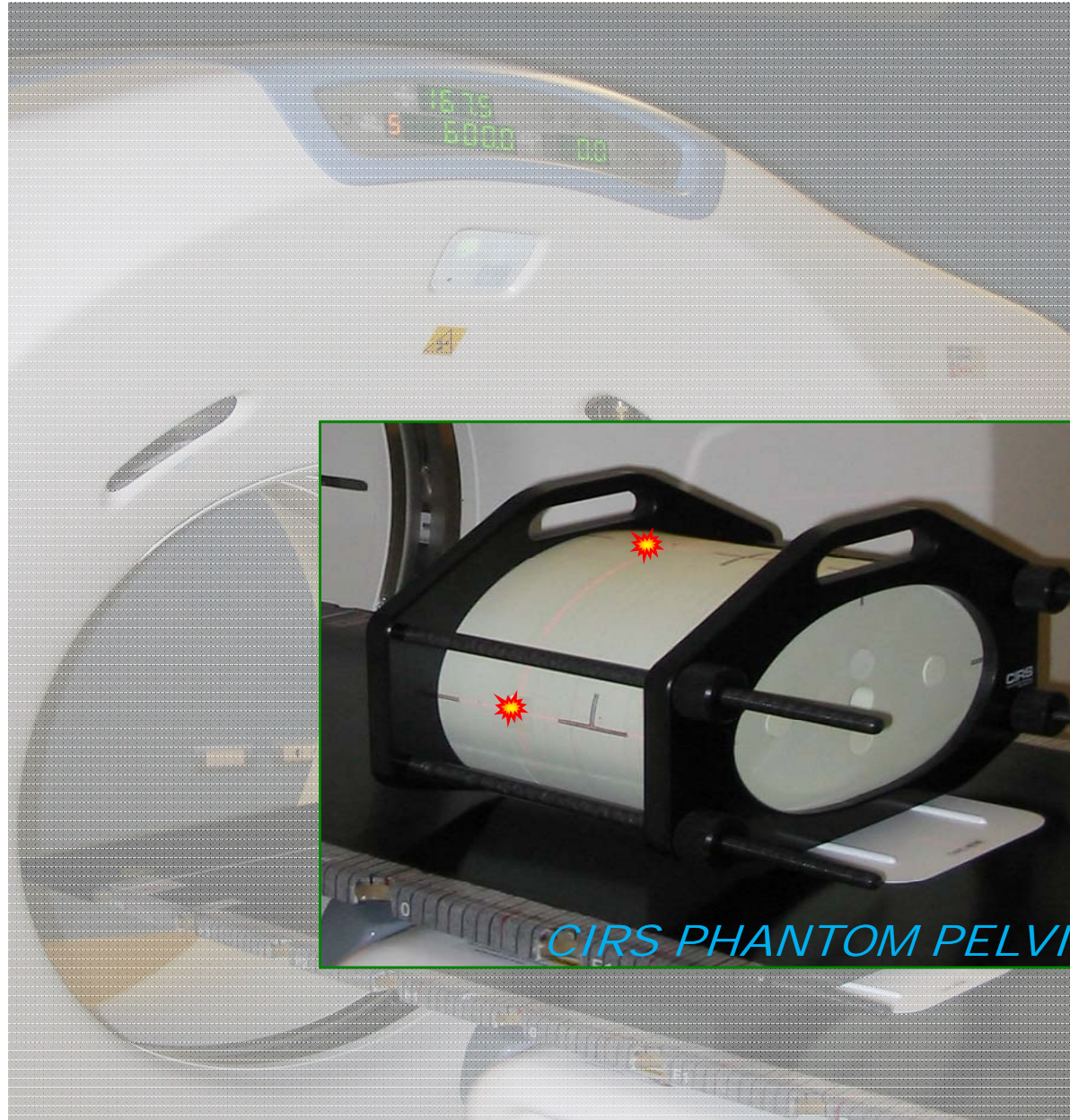


# TC SIMULATORE

# ACCELERATORE







*CIRS PHANTOM PELVIC®*

File Edit View Contour Beam Port Dose Tools Optimize Reports Help

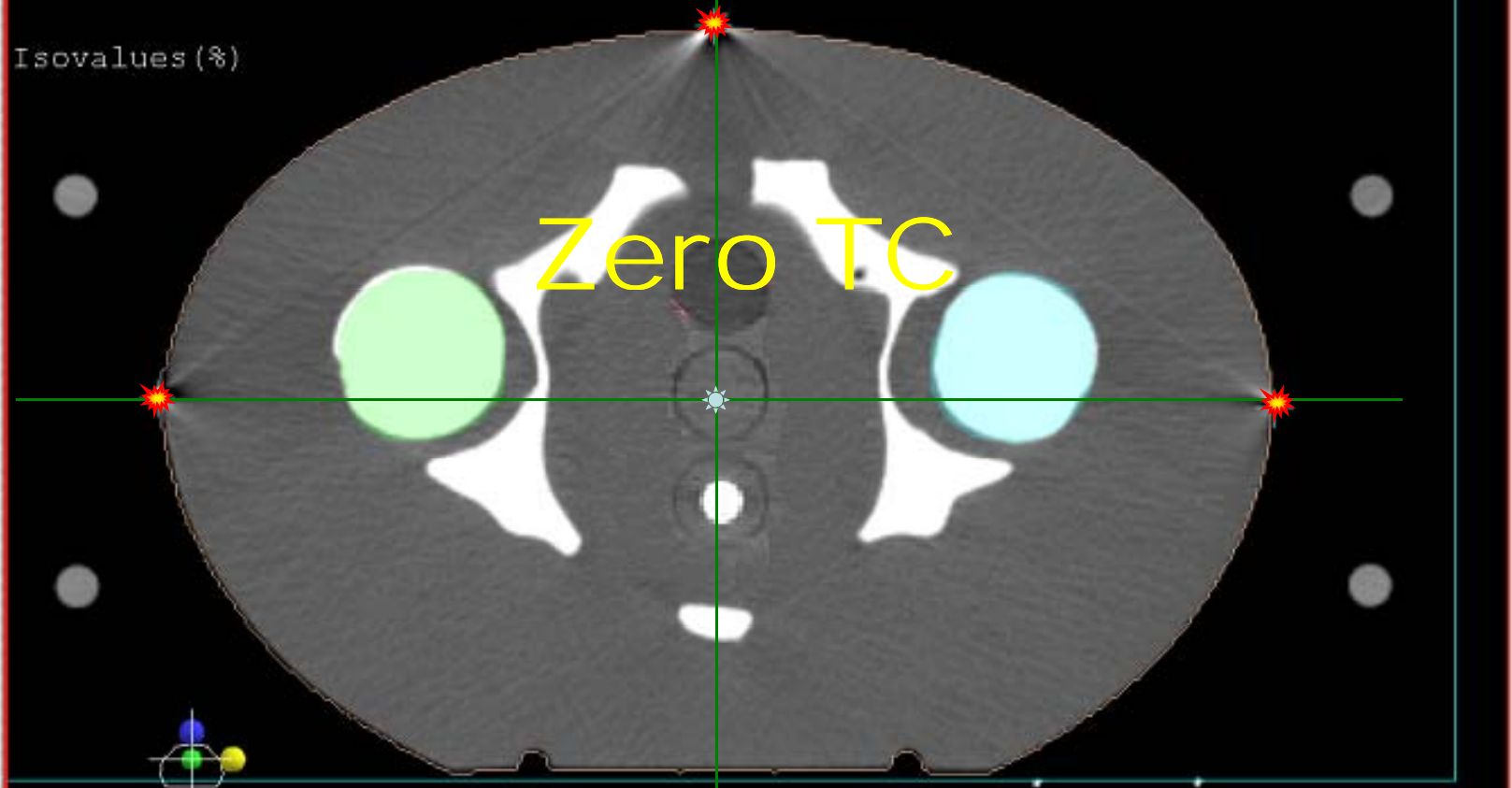
(Save)YOL Custom

Active Beam: [dropdown]

```

Norm: Pnt( 200.3 cGy = 100%)
(X(cm):  0.19, Y(cm):  0.00, Z(cm):  0.06)
ref pnt X(cm):  0.19
          Y(cm):  0.00
          Z(cm):  0.06
          dose(cGy):  200.3
global max(cGy): 206.1
local max(cGy): 202.9
  
```

Isovalues (%)



M L

[sliders]

M 840

L 111

Maximized

T: 0.00 (cm)

Scale-1: 1.32

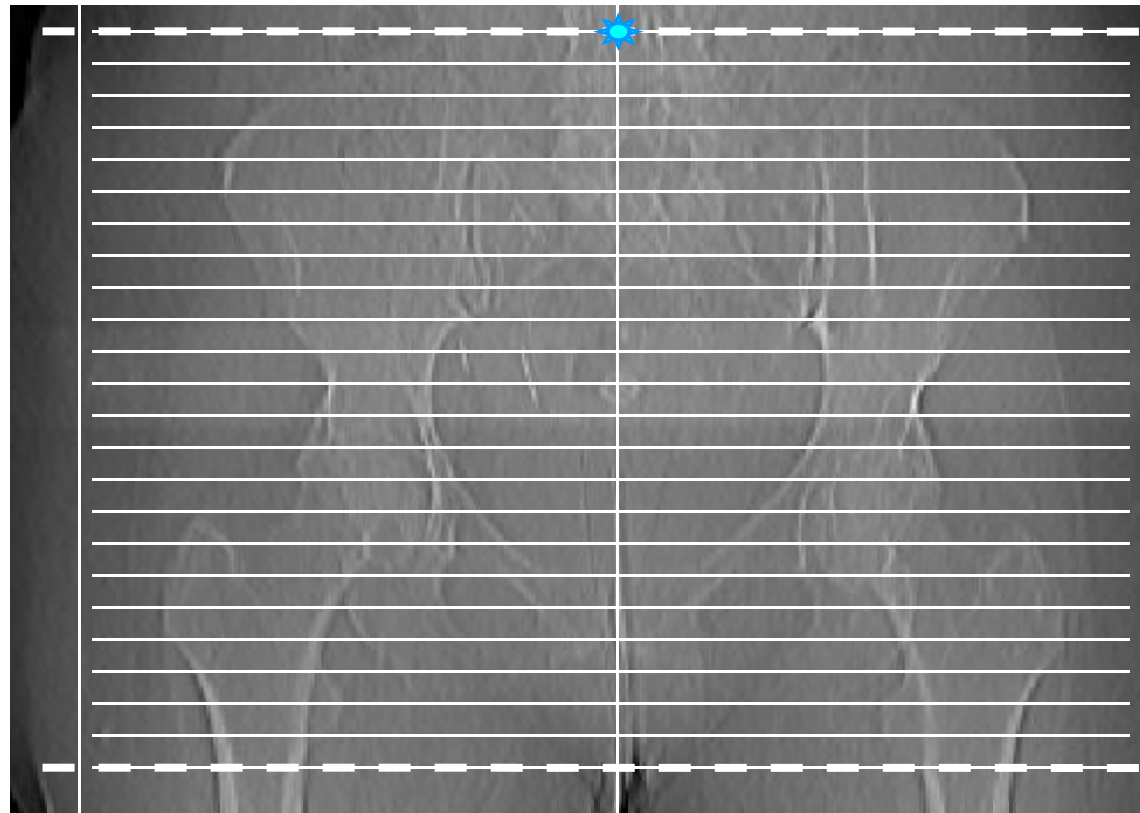


# Scansioni TC

Inizio pacchetto

FOV

*Zero TC*



Slice = 0

Fine pacchetto



FocalSim - [VIRT4, FANTOCCIO, CT1:2]

File Edit Activities View Contour Tools Beam Sim Help

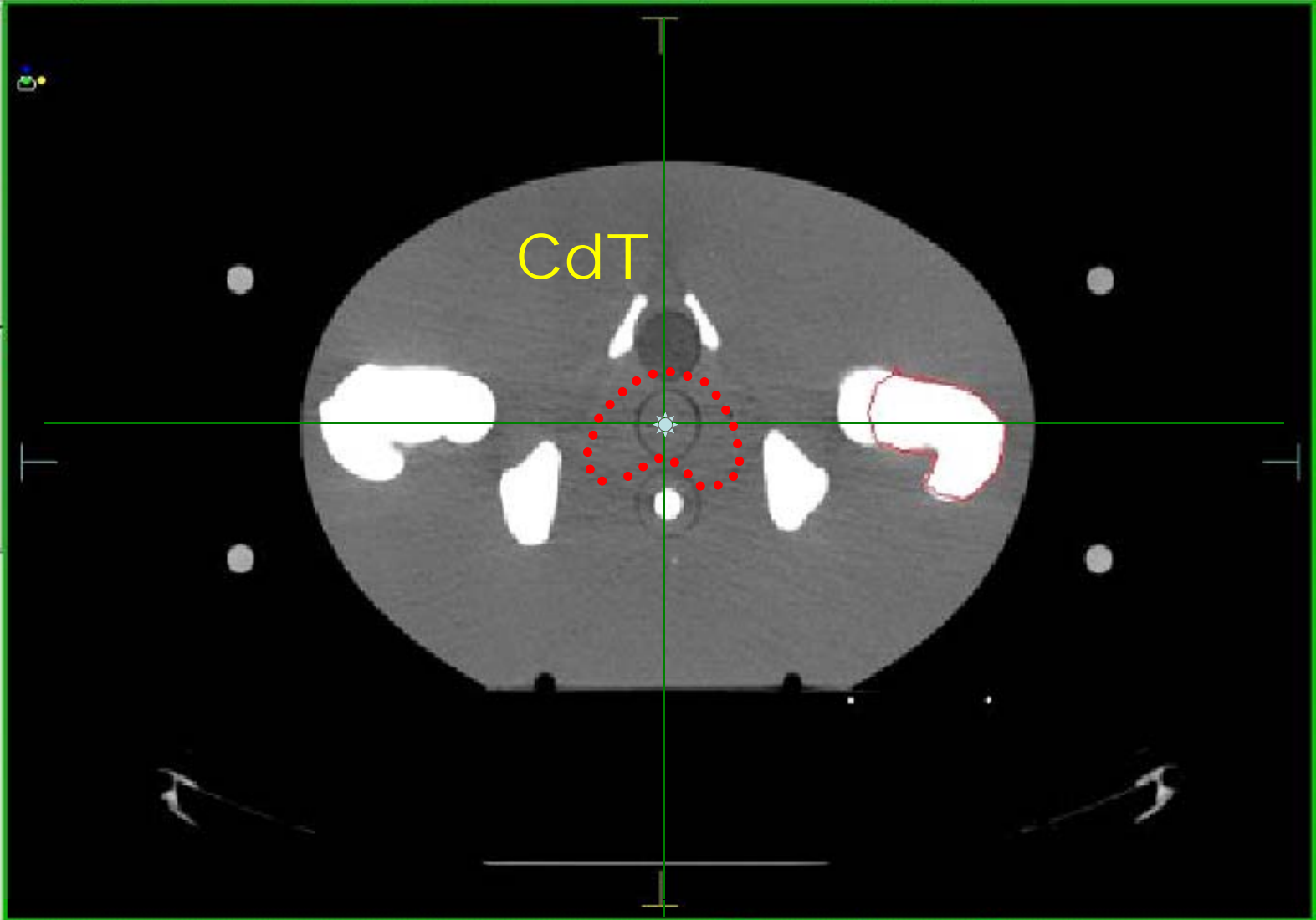
Primary  
CT1  
DefaultPlan

Secondary

Options Load

tumor

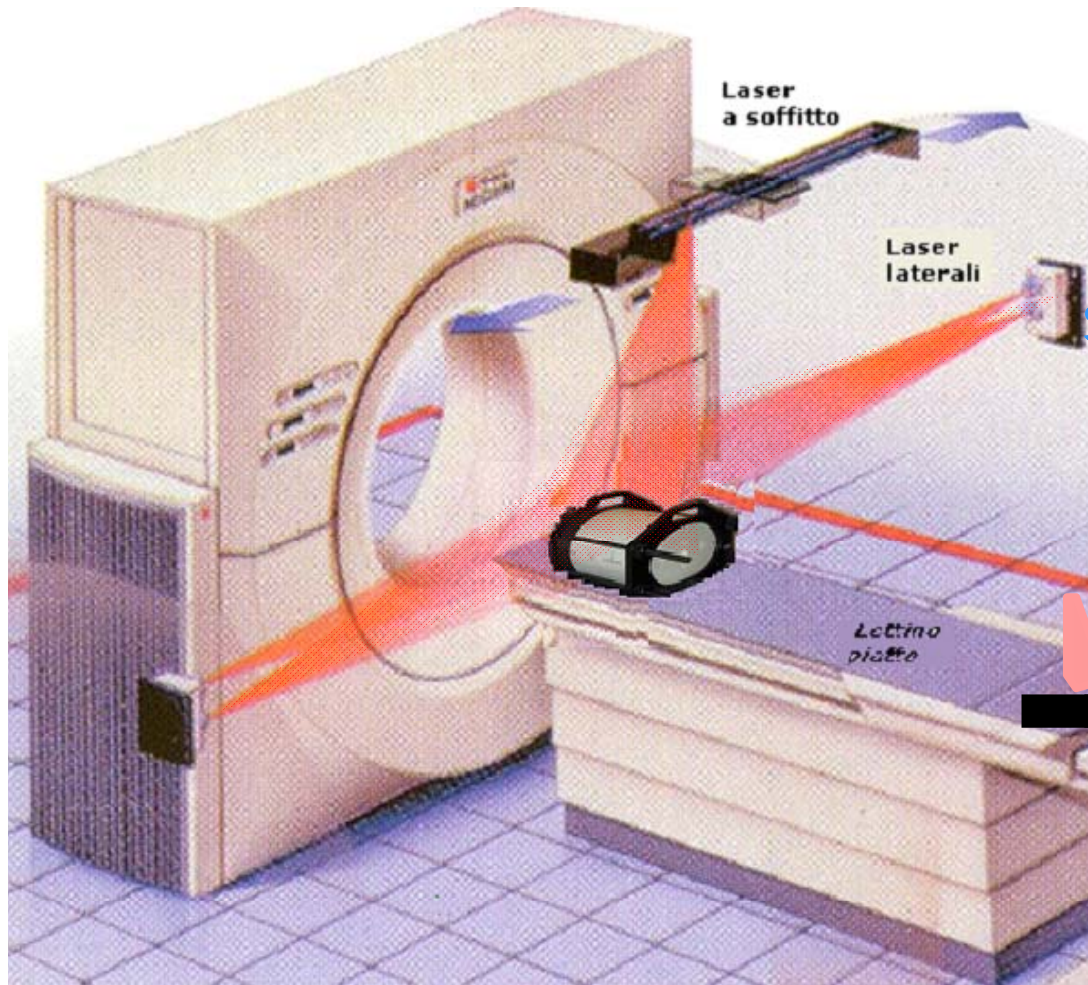
All Off



W/L Affects: Primary Studyset W: 600 L: 40 SoftTissue  Slice Mode -8.00 0.00 0.10 cm

Ready CT Simulation Activity Autosave OFF Guide Radius: 0.3cm (-> to increase <- to decrease)

Start FocalSim - [VIRT4, FA... 9.59

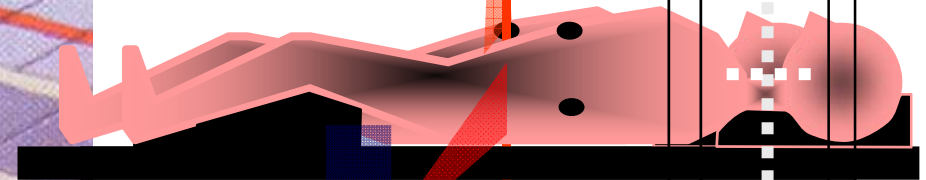


Spostamenti

- X
- Z
- Y

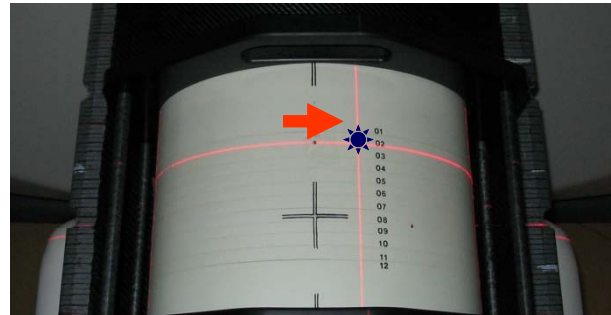
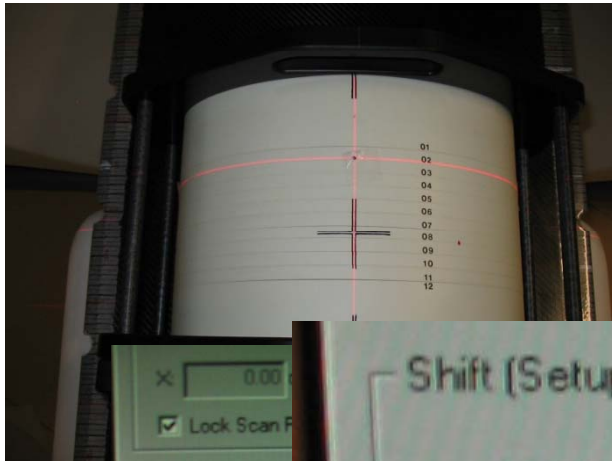
-161

Gantry  
TC



Laser  
Esterni

# Asse X (Laterale lettino)



Shift (Setup Reference - Scan Reference)

X: 97.0 mm Y: 81.3 mm Z: 0.5 mm

Selected Point: X 97.0

Patient orientation when scanned:

Autorun

Shift (Setup Reference - Scan Reference)

X: 97.0 mm Y: 81.3 mm Z: 0.5 mm

Left  Superior  Anterior  
 Right  Inferior  Posterior

Lock Shift

Absolute Coordinates

Note: A patient orientation must be selected.

Sagittal Laser: n/a mm  
Table Longitudinal: n/a mm  
Table Height: n/a mm

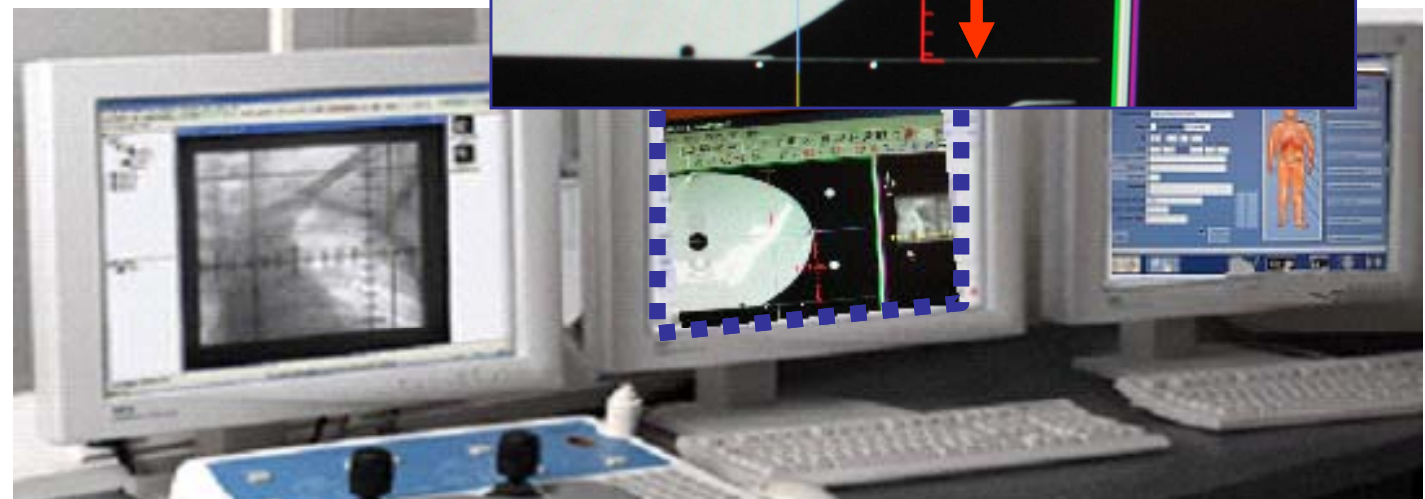
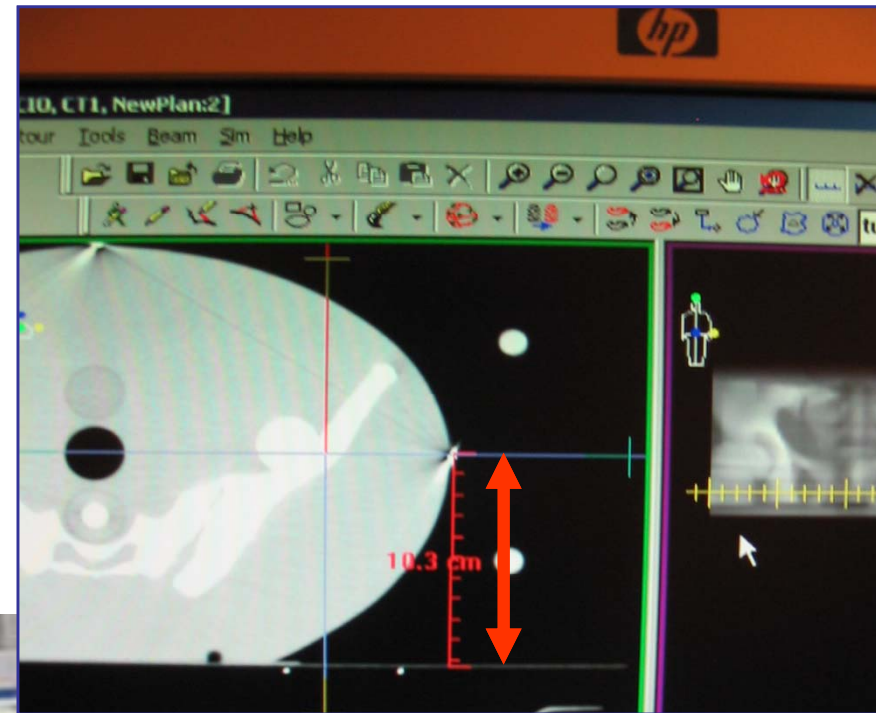
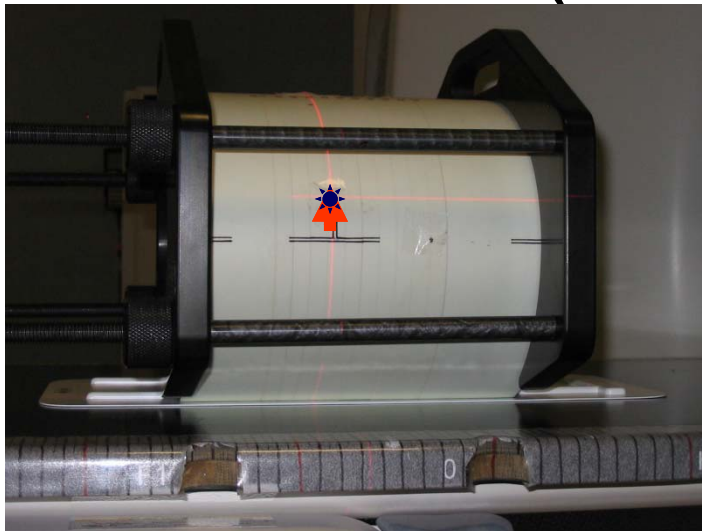
Scan Table Height: 167.0 mm

Print Send to Laser Close

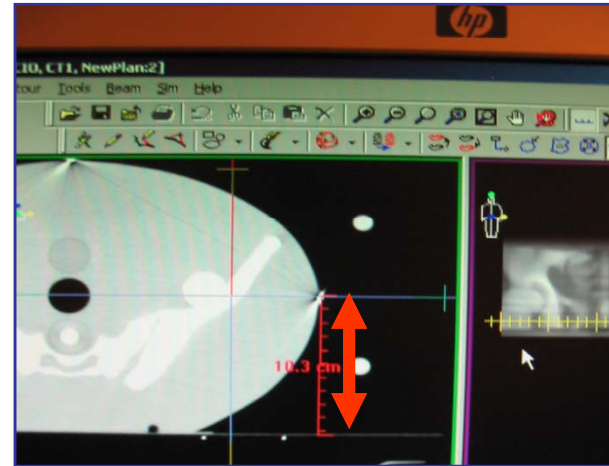
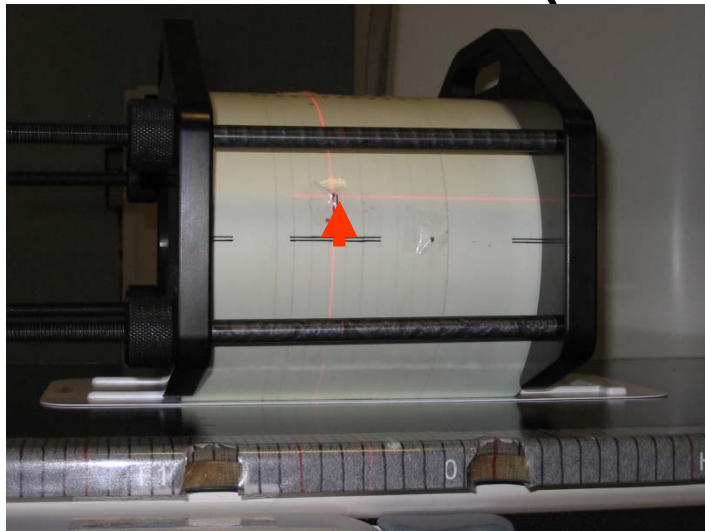




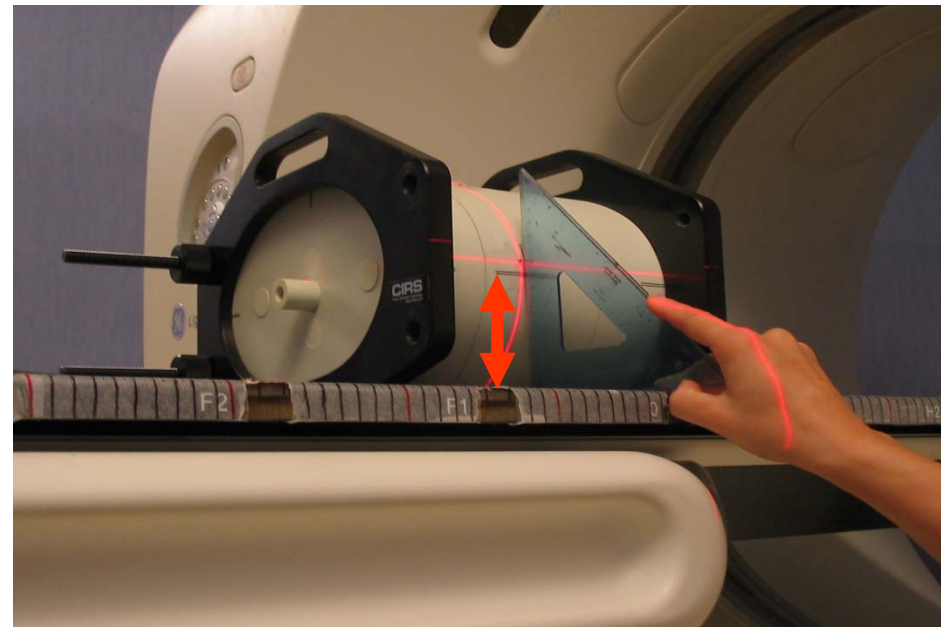
# Asse Z (Verticale lettino)



# Asse Z (Verticale lettino)

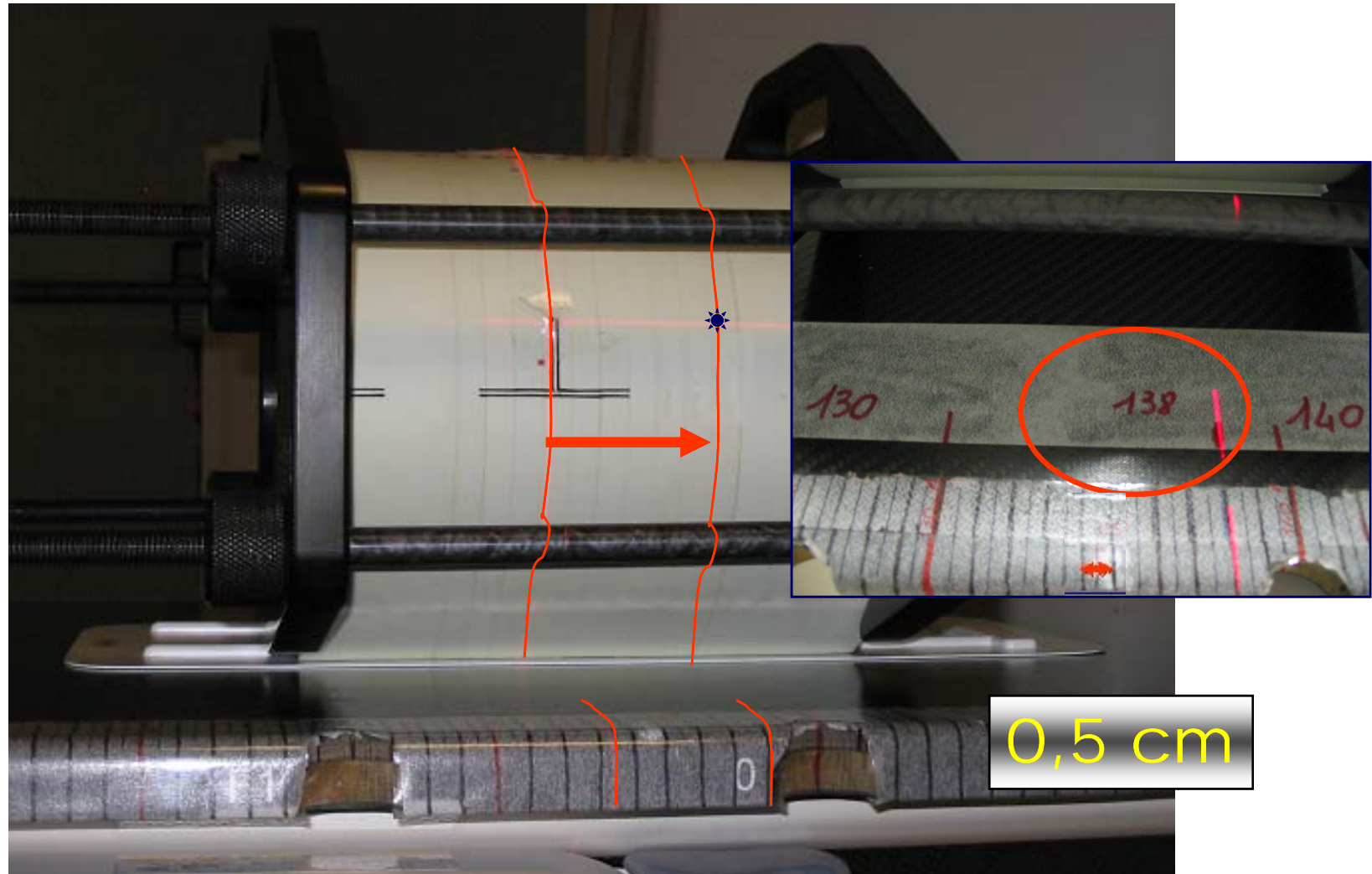


*Verifica*



# Asse Y

## Longitudinale lettino

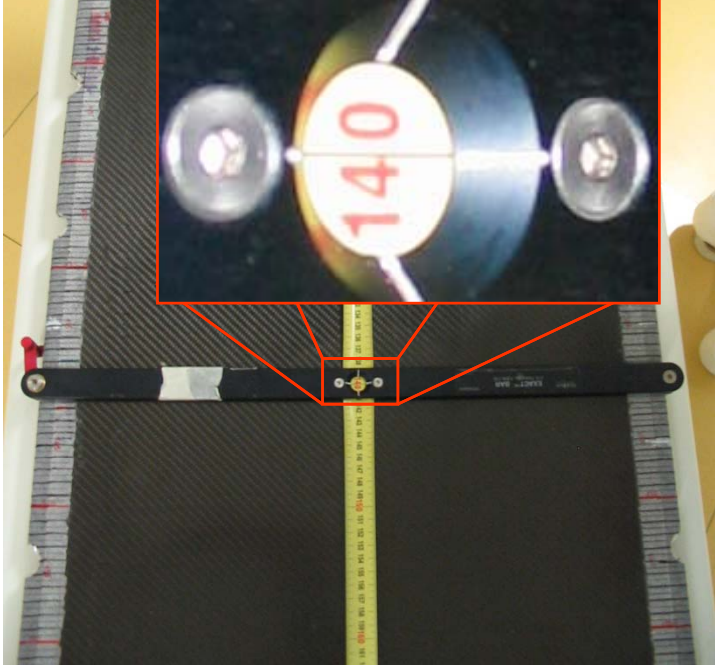
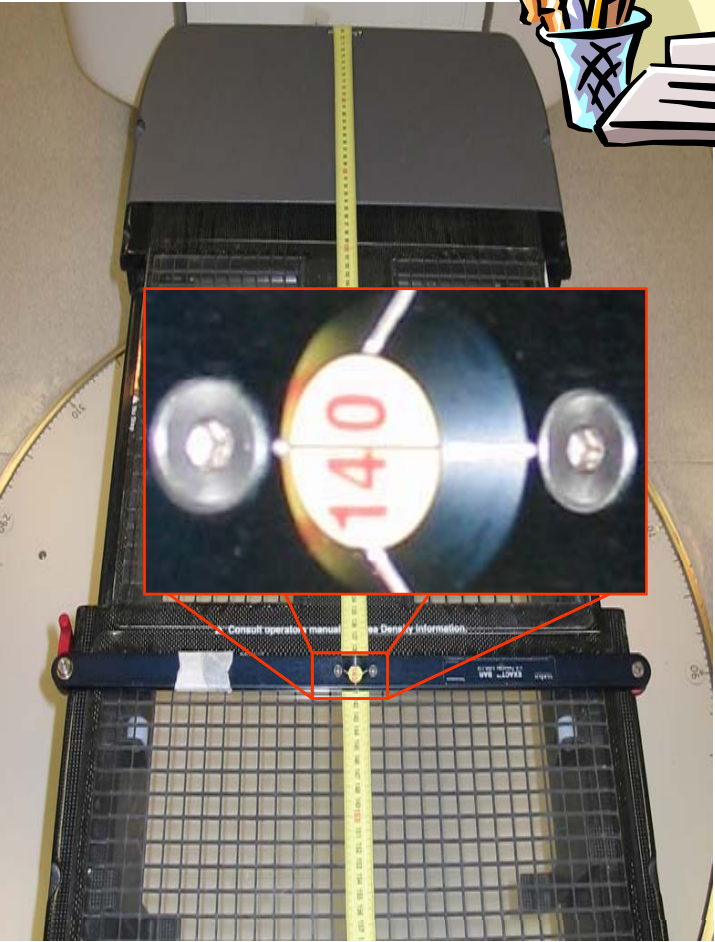




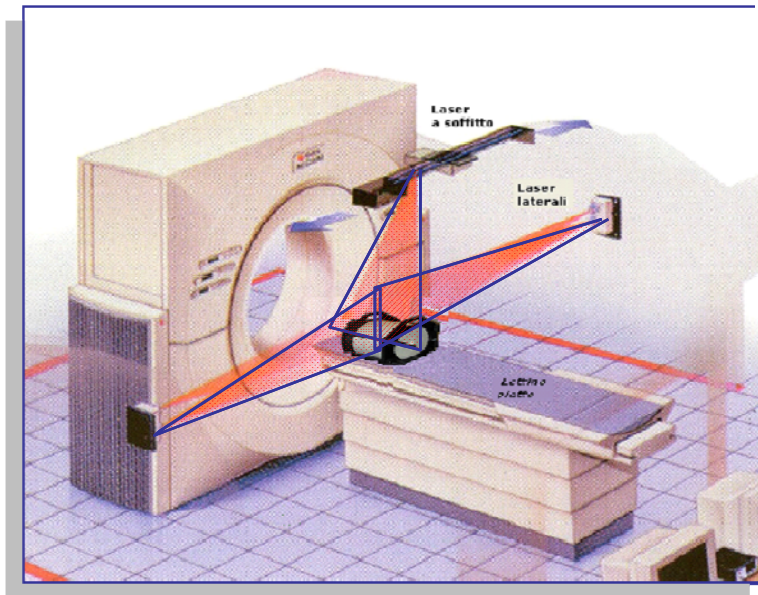
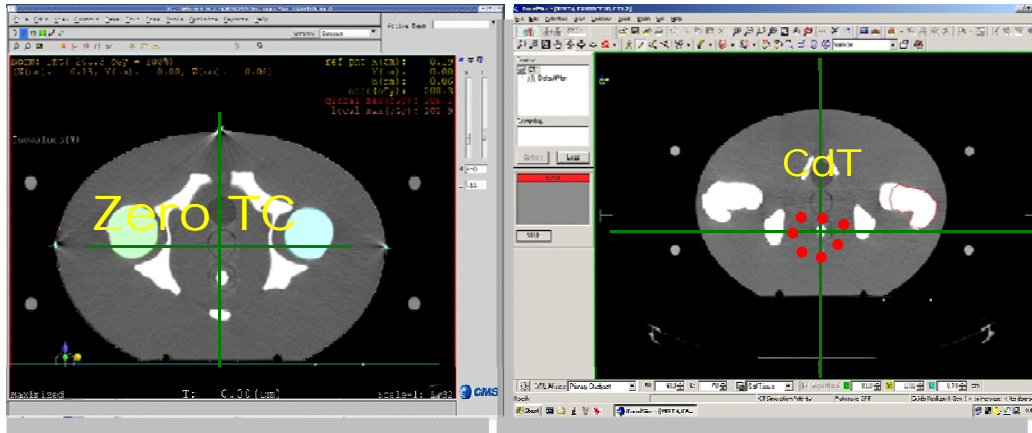
# LINAC



ni: 1/9	Approvato: DN	25/08/2008	Registra
ti: 82.0	Approvato: GG	27/08/2008	Annulla
ti: [ 0]	Ultimo Tratt:	/ /	Autosetup
ti: 1 Photon			Vista campo >
IP:			
Tavolo			
9	Verticale:	-36.9	-36.9
0	Laterale:	0.0	0.0
0	Longitudinale:	140.0	140.0
9	Angolo:	0.0	0.0
9	Colonna:	0.0	0.0



# Rilevati parametri di 10 target simulati



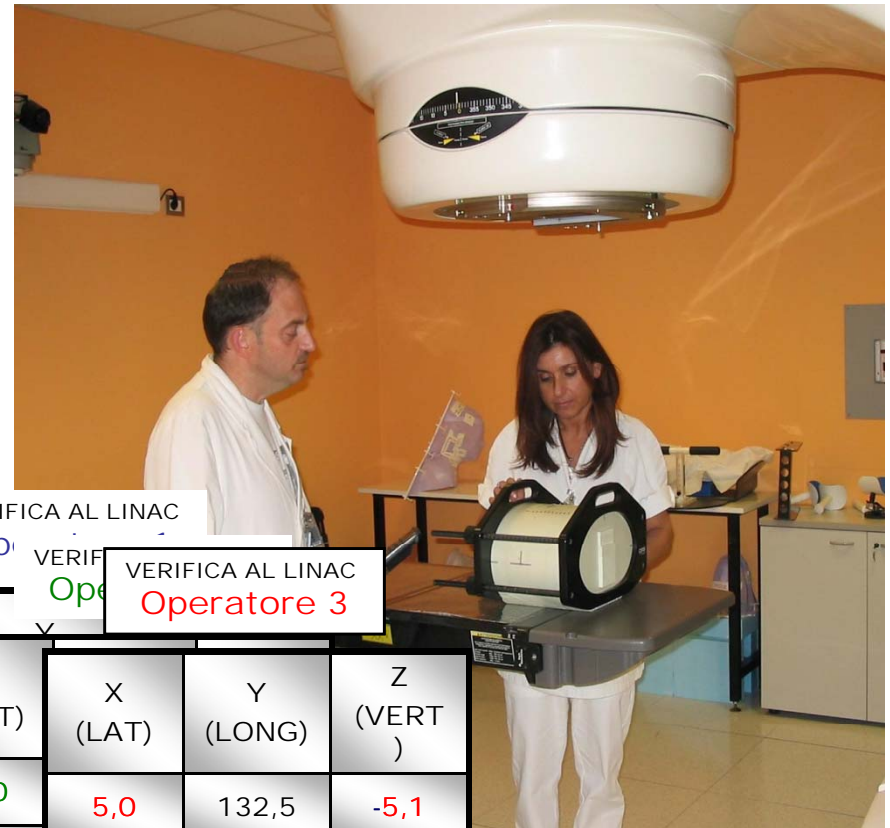
10

Target	X (LAT)	Y (LONG)	Z (VERT)
A	5,2	132,5	-5,4
B	1,1	141,5	-6,5
C	0,5	132,5	-4,5
D	-0,2	159,5	-9,0
E	0,6	152,0	-9,0
F	1,1	143,0	-7,5
G	-4,9	132,5	-6,1
H	0,8	106,5	-13,2
I	0,4	136,0	10,6
L	0,5	156,5	-8,2

# Verifica dei parametri dalla Tc al LINAC

COORDINATE DI 10 TARGET  
SIMULATI

Target	X (LAT)	Y (LONG)	Z (VERT)
A	5,2	132,5	-5,4
B	1,1	141,5	-6,5
C	0,5	132,5	-4,5
D	-0,2	159,5	-9,0
E	0,6	152,0	-9,0
F	1,1	143,0	-7,5
G	-4,9	132,5	-6,1
H	0,8	106,5	-13,2
I	0,4	136,0	10,6
L	0,5	156,5	-8,2

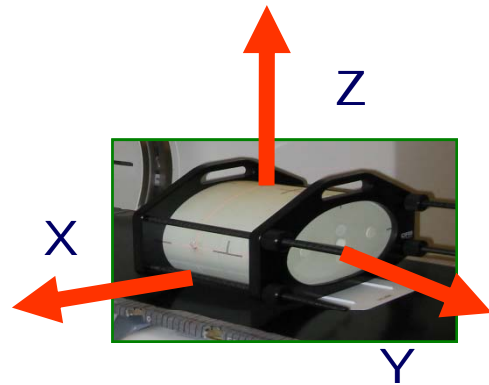


VERIFICA AL LINAC  
Op  
VERIF  
Ope

VERIFICA AL LINAC  
Operatore 3

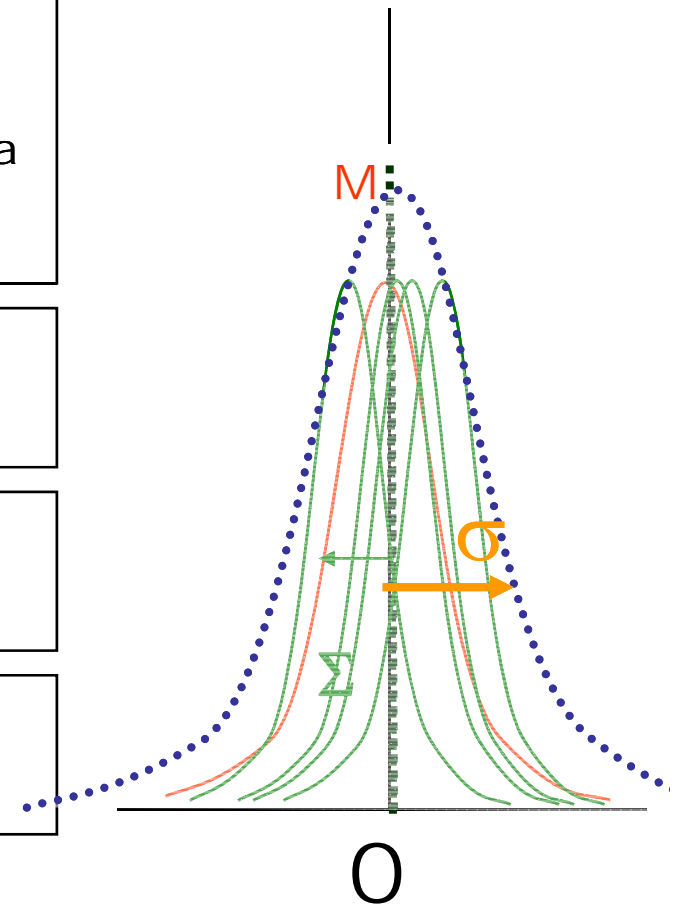
X (LAT)	X (LAT)	Y (LONG)	Z (VERT)
5,0	5,0	132,5	-5,1
1,3	1,3	141,2	-6,5
0,7	0,7	132,5	-4,3
-0,3	-0,3	159,3	-8,6
0,4	0,4	152,0	-8,8
1,4	1,4	143,1	-7,3
-4,6	-4,6	132,7	-6,2
0,5	0,5	106,8	-13,1
0,4	0,4	136,0	10,6
0,3	0,3	156,6	-8,2

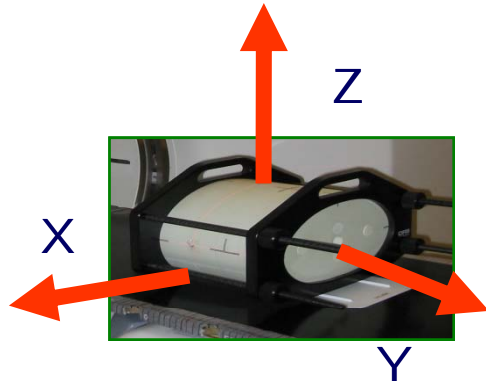




# Risultati

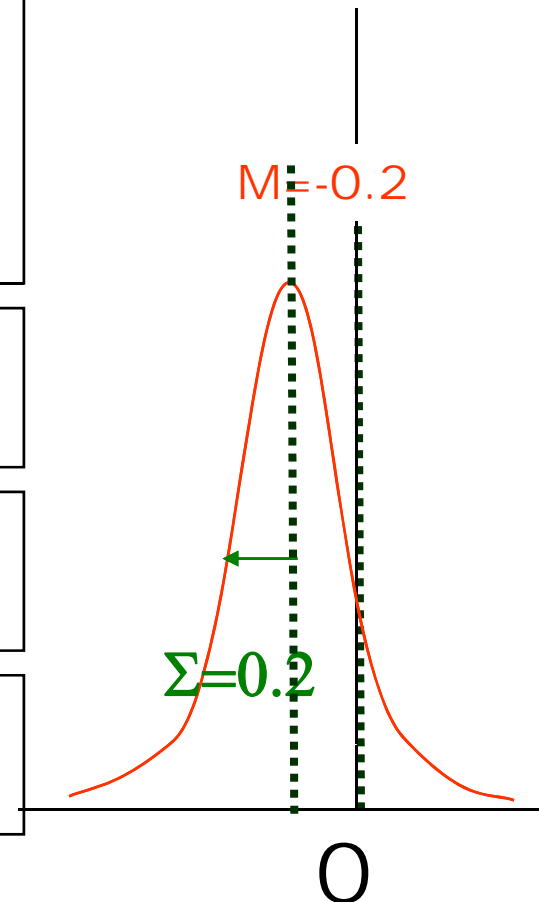
Para- metro	M Media errore sistematico	$\Sigma$ Dev. St. errore sistematico	$\sigma$ Media quadratica errore casuale
Y	-0,2	0,2	0,3
Z	0,0	0,2	0,2
X	0,0	0,2	0,2

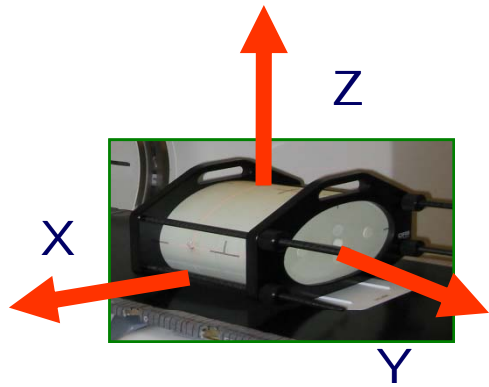




# Risultati

Para- metro	M Media errore sistematico	$\Sigma$ Dev. St. errore sistematico	$\sigma$ Media quadratica errore casuale
Y	-0,2	0,2	0,3
Z	0,0	0,2	0,2
X	0,0	0,2	0,2

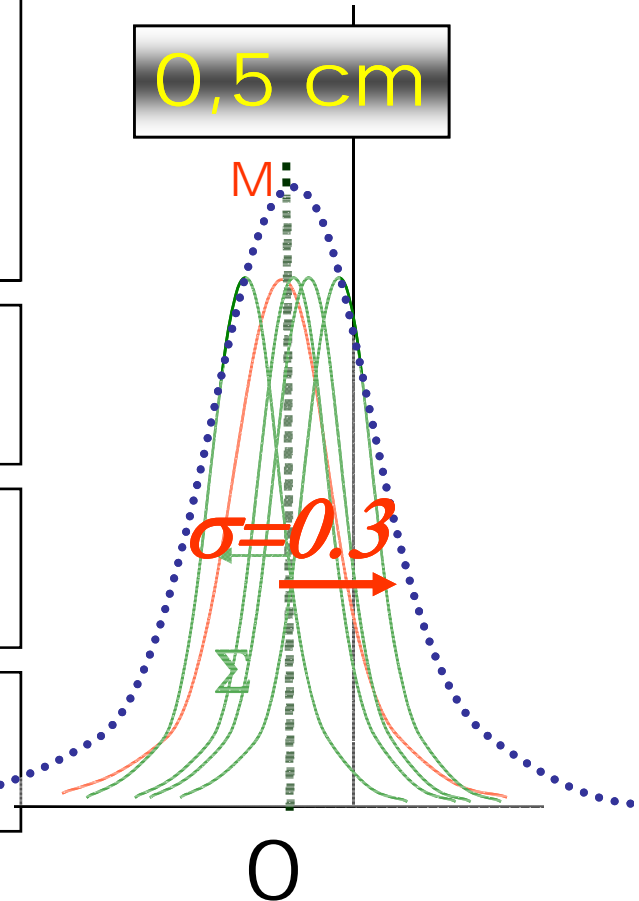




# Ris



Para- metro	M Media errore sistematico	$\Sigma$ Dev. St. errore sistematico	$\sigma$ Media quadratica errore casuale
Y	-0,2	0,2	0,3
Z	0,0	0,2	0,2
X	0,0	0,2	0,2





# Conclusioni

- I risultati conseguiti ci fanno ritenere il sistema adottato affidabile .
- Al momento l'impiego routinario della simulazione virtuale è limitato ai casi di palliazione in attesa di uno studio di verifica clinica su un campione di casi radicali.





**GRAZIE!**

