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Spectro

a new Module for the

EduGATE Project

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- ***Long is the way of theory,***

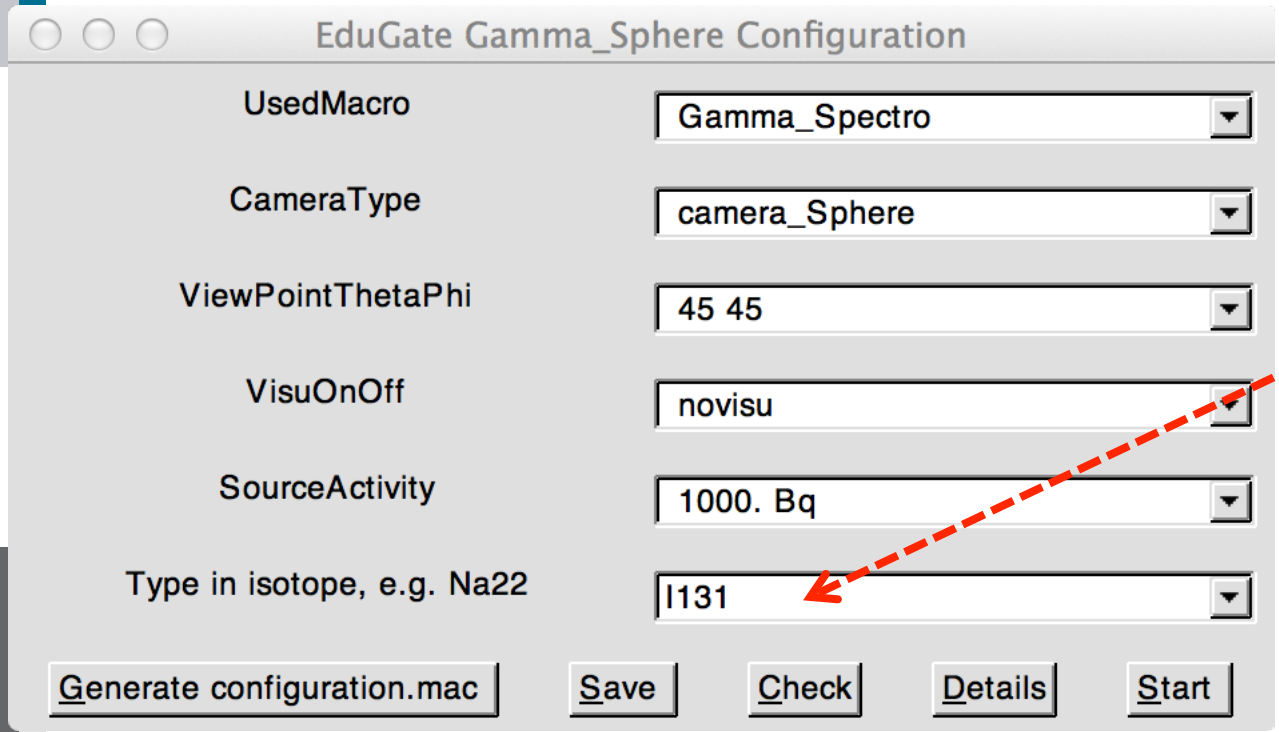
short and effective by examples –

(Lucius Annaeus Seneca (the Younger),
Epistulae morales)

Isotope-Spectrometer:
→ Spectro

Isotope Selection
Data Taken from File →
GEANT4-DataBase:

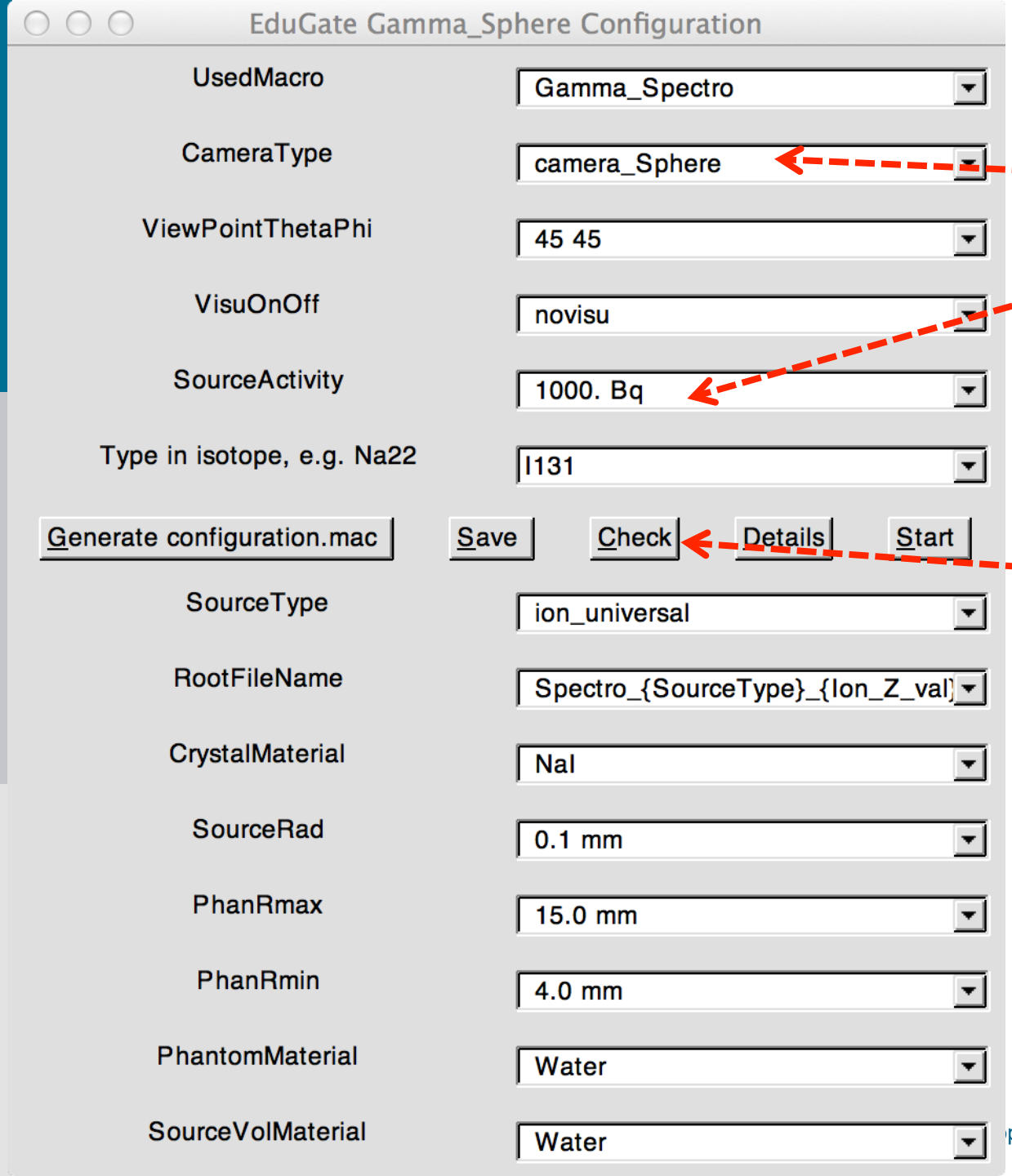
RadioactiveDecay3.3



1) Type Isotope Symbol and Mass Number: (no blanks)
ex: I131 or In111 or Na22

hit the ReturnKey!!

go to next slide



2) select camera type:

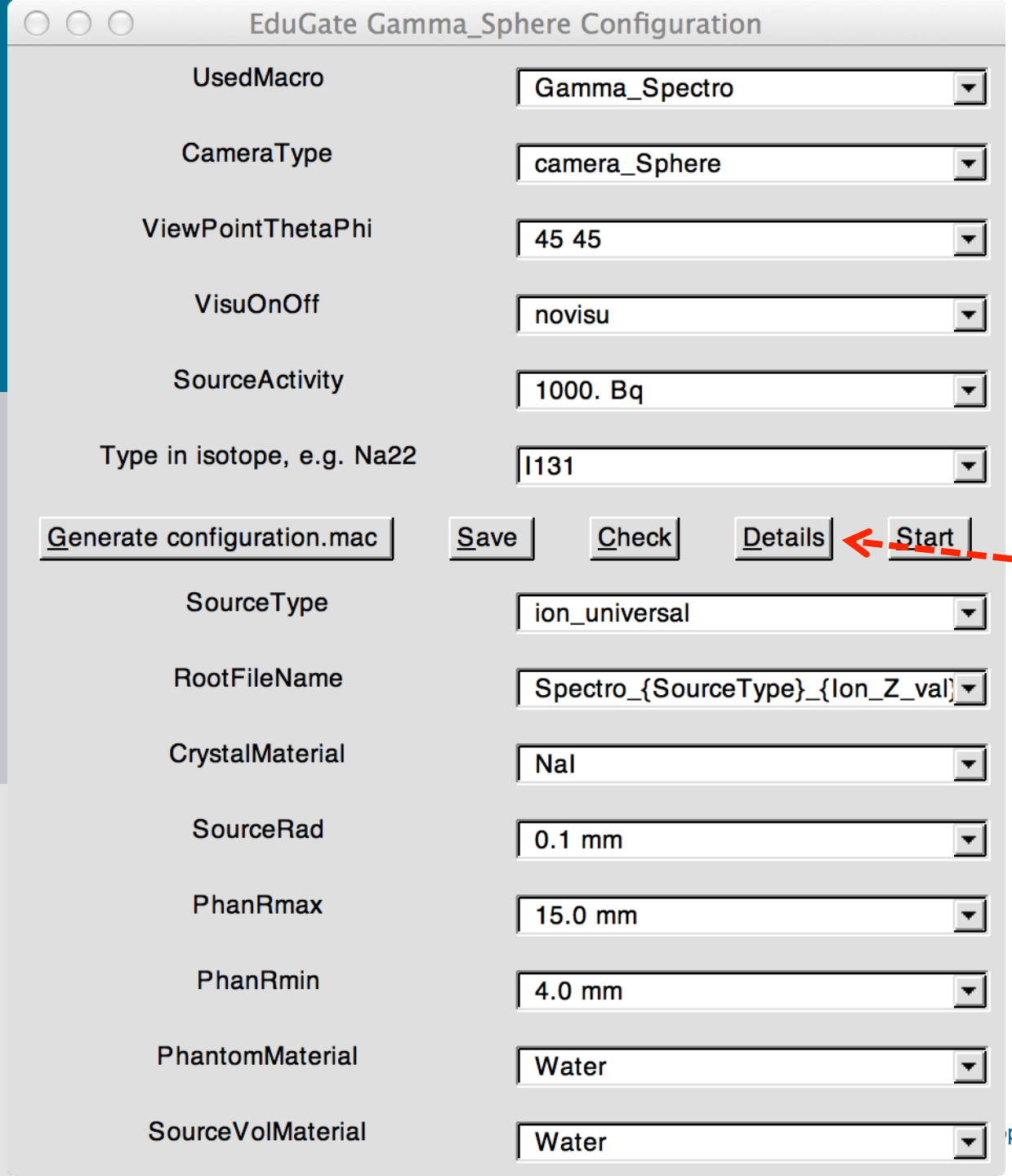
Sphere, 2heads,..

select activity

3) click Check and more items will show up

modify parameter, if required

go to next slide



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4) click Details and some Info is shown in the terminal window

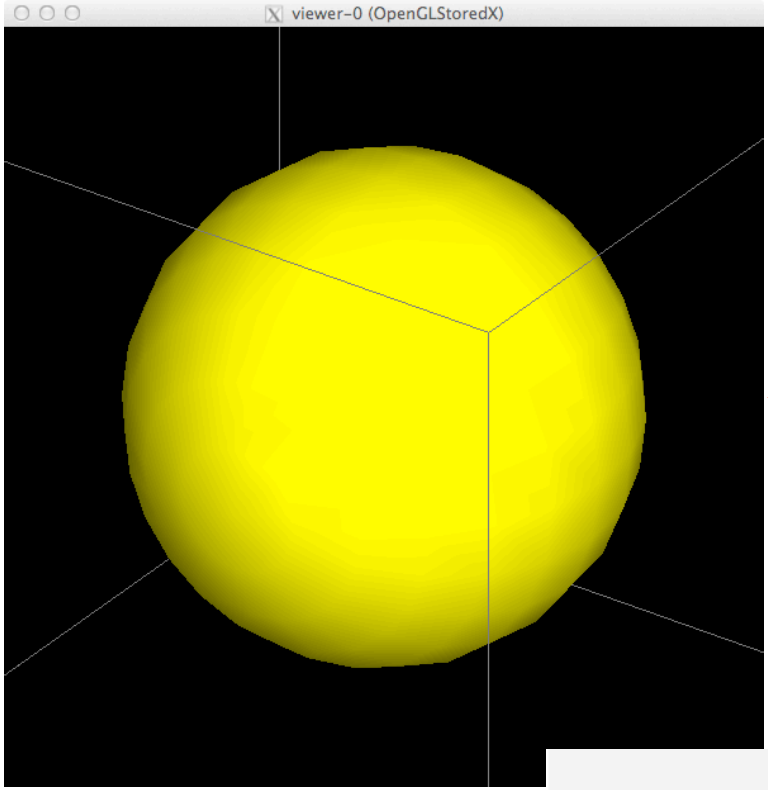
go to next slide

```
Processing GenerateGateConfiguration.C+( "Spectro.txt" )...
root [1] RadioactiveDecay3.3/z11.a22
#  22NA (2.6019 y)
#  Excitation   Halflife Mode       Daughter Ex  Intensity       Q
#
# File sanitized by Vanderbilt Decay-o-matic
# $Id: repair_decay_files.py,v 1.20 2006/04/24 14:53:36 marcus Exp $
# Fri Oct  6 15:26:18 2006
#
P       0.0000   8.2110e+07
W [VU repair system] Deleted zero-probability event: MshellEC
                    BetaPlus       0.0000   9.0500e-01
                    KshellEC       0.0000   8.7710e-02
                    LshellEC       0.0000   7.2590e-03
                    BetaPlus       0.0000   5.6000e-02    2842.2000
                    BetaPlus    1274.5700   9.0500e+01    1567.6300
                    KshellEC    1274.5700   8.7760e+00    1567.6300
                    LshellEC    1274.5700   7.2630e-01    1567.6300
/control/alias CameraType  camera_2heads
/control/alias ViewPointThetaPhi  45 45
/control/alias VisuOnOff  novisu
/control/alias SourceActivity  100 Bq
/control/alias SourceType ion_Na22
/control/alias Ion_A_val 22
/control/alias Ion_Z_val 11
/control/alias SourceType  ion_universal
/control/alias RootFileName  Spectro_{SourceType}_{Ion_Z_val}_{Ion_A_v
/control/alias CrystalMaterial  NaI
/control/alias SourceRad  0.1 mm
/control/alias PhanRmax  15.0 mm
/control/alias PhanRmin  4.0 mm
/control/alias PhantomMaterial  Water
/control/alias SourceVolMaterial  Water
End of Configuration
```

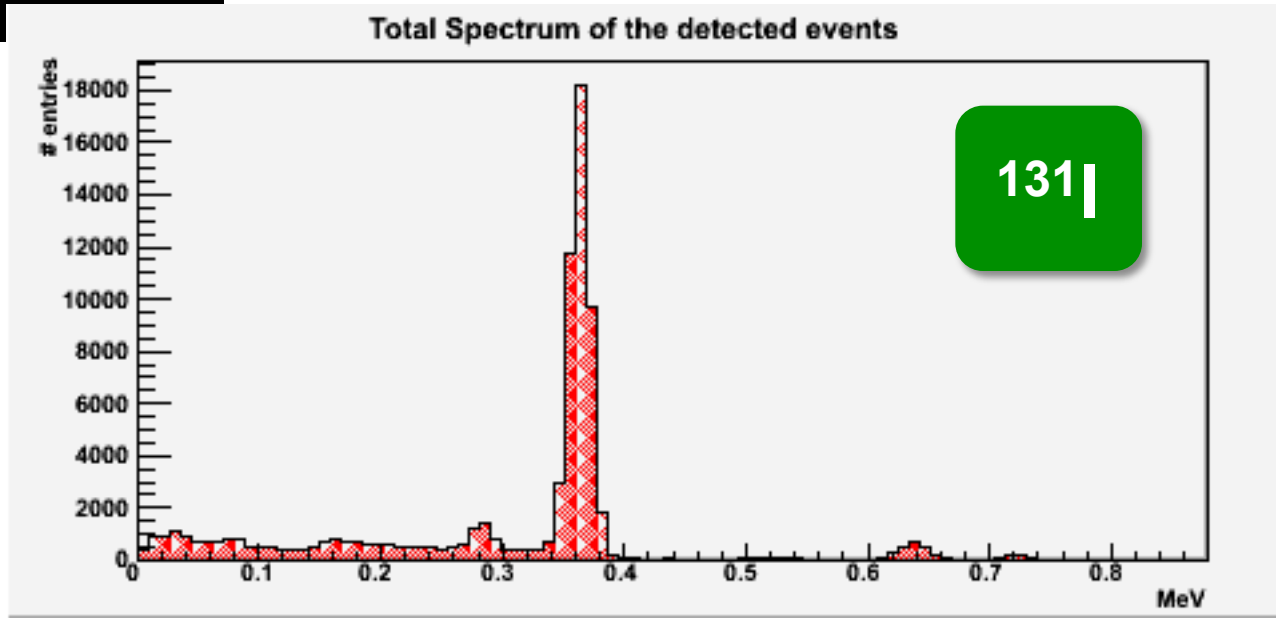
Details
(selected **Isotope** etc.)
are shown
in the terminal window

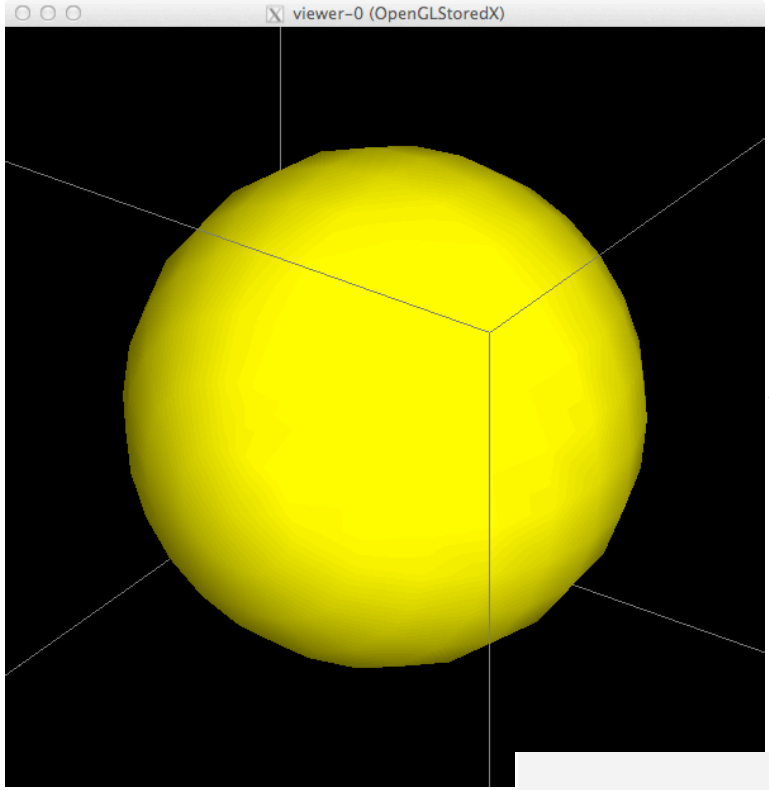
5) click
Generate Configuration
and the selected confuration is shown in the terminal window

6) click
Start
to start GATE simulation

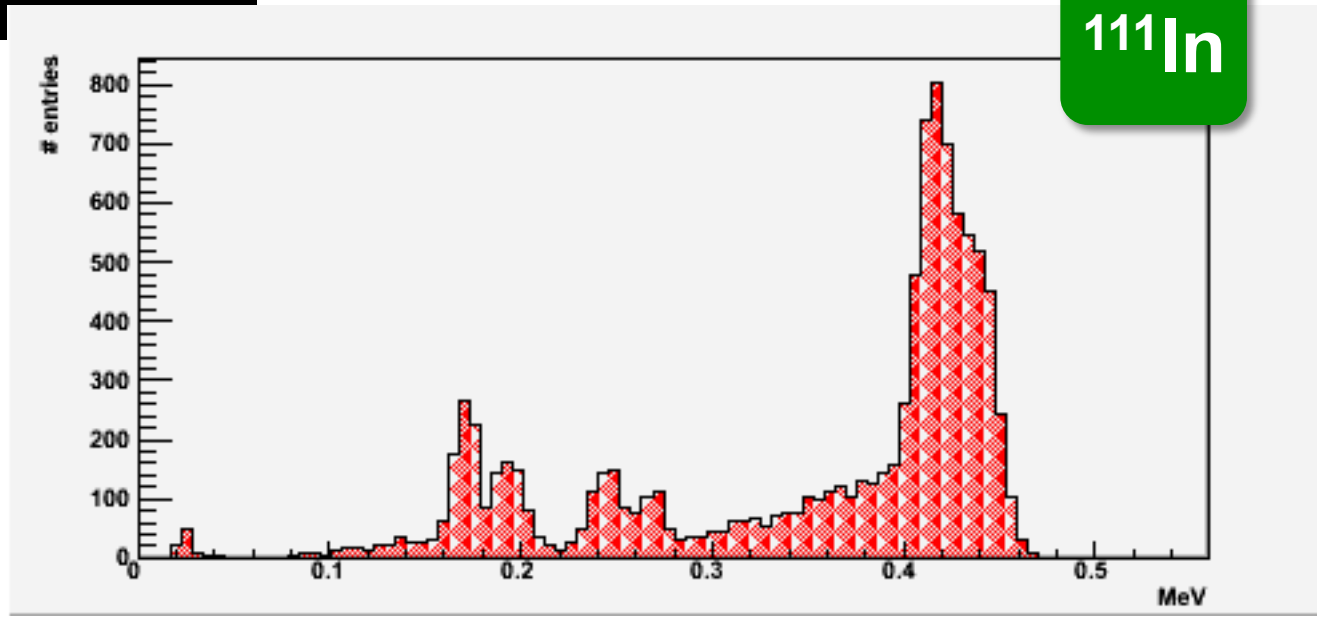


Homogeneous Sphere with Source in the Center

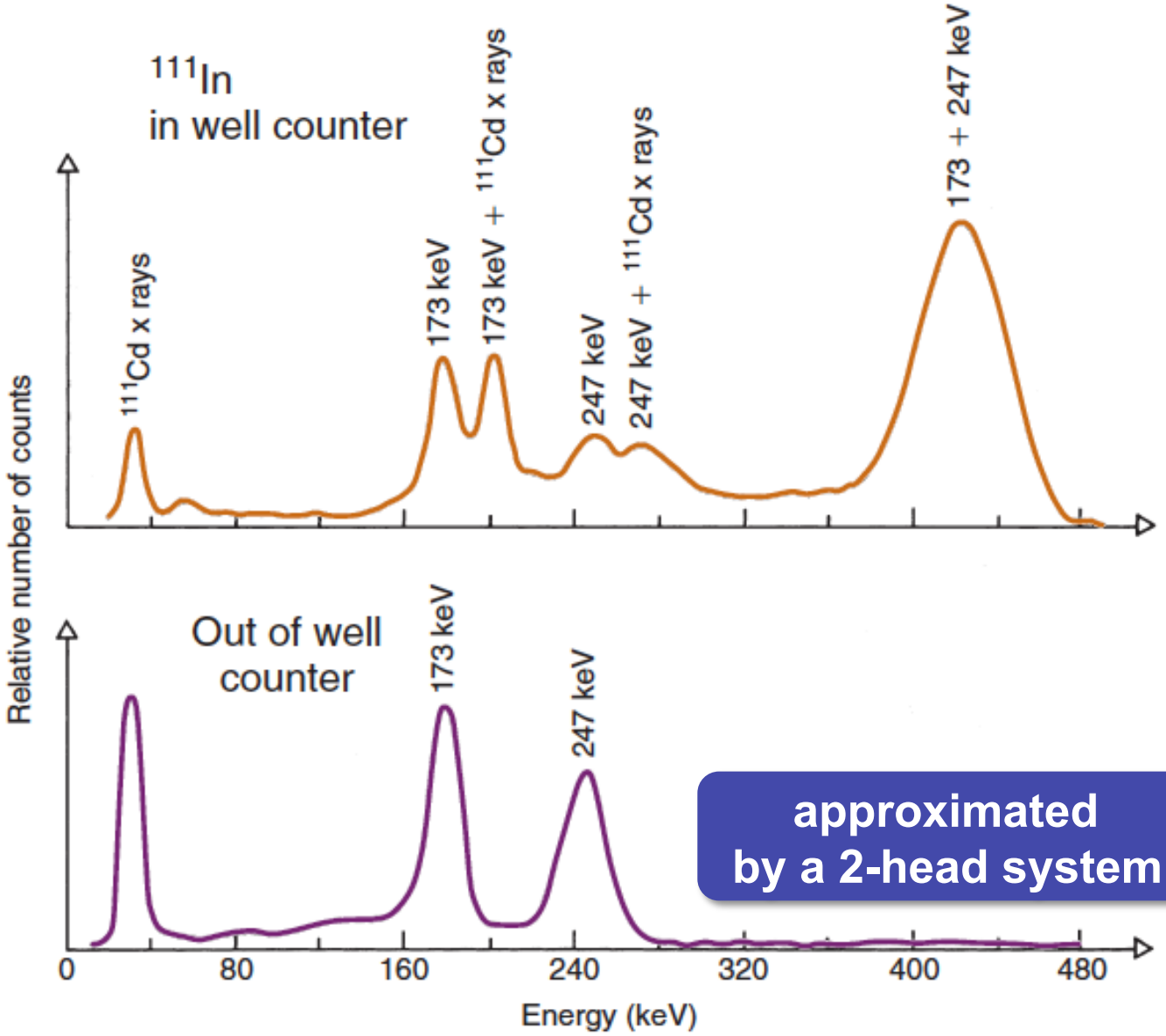




Sphere with ^{111}In



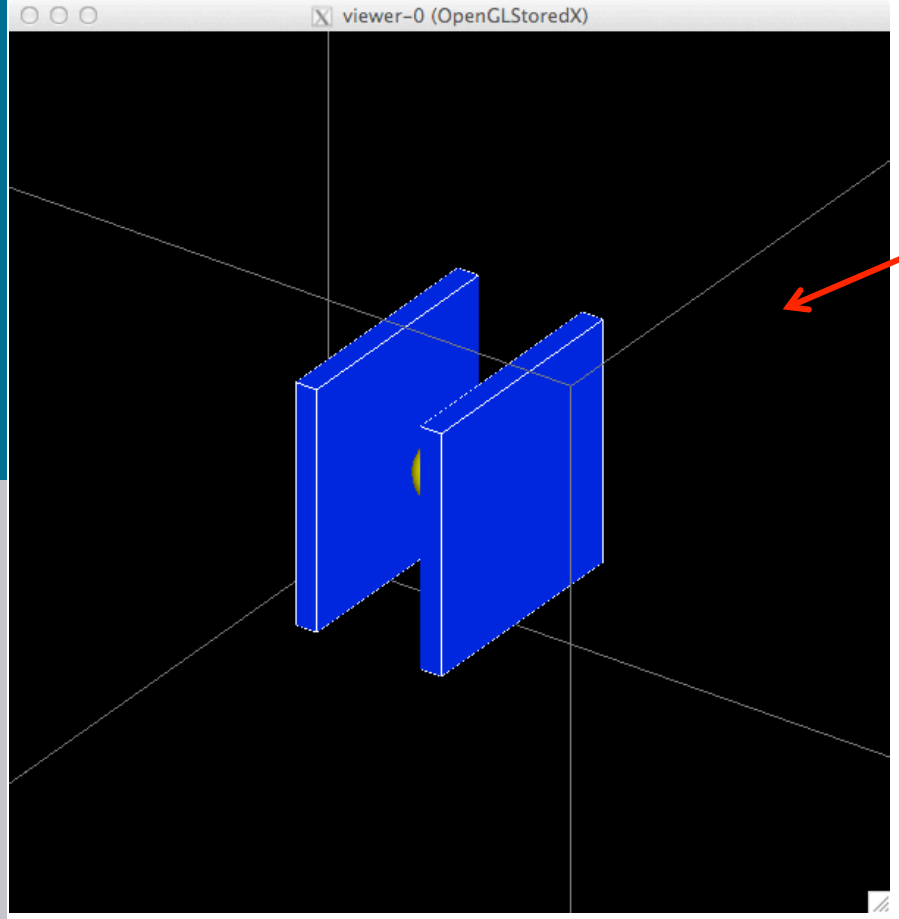
approximated by a Sphere



approximated by a 2-head system

(Cherry, et al, 2012)

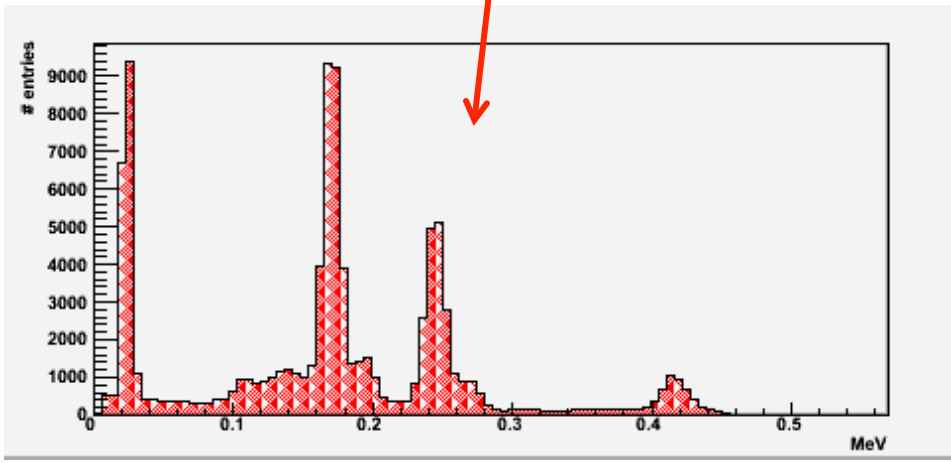
FIGURE 10-7 Pulse-height spectra recorded for ^{111}In with a NaI(Tl) well counter detector. *Top,* Coincidence summing between the x-ray and γ-ray emissions results in additional peaks in the spectrum when the source is inside the well. *Bottom,* When the source is outside the well, the probability of coincidence detection decreases and the coincidence peaks disappear.

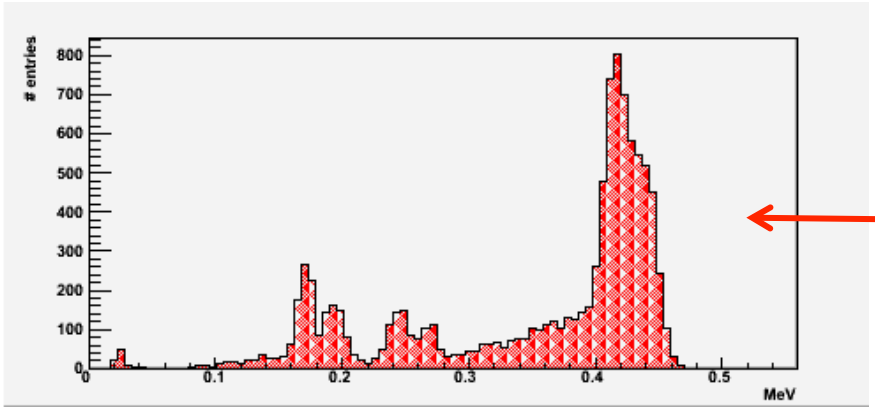


Two Heads with ^{111}In

→

Coincident Gammas Resolved !!





Sphere with ^{111}In
Coincident Gammas
→ Summed Peak !!