

Evaluation of a Combined Array-Planar Crystal for Gamma-ray Scintillation Imagers

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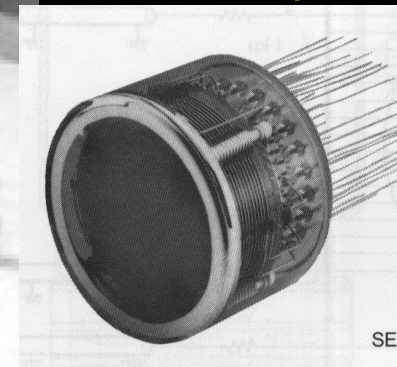
Hamamatsu PSPMT Family (crossed wire anode)

R6970 (8 inch)



R3292 (5 inch)

R2486 (3 inch)

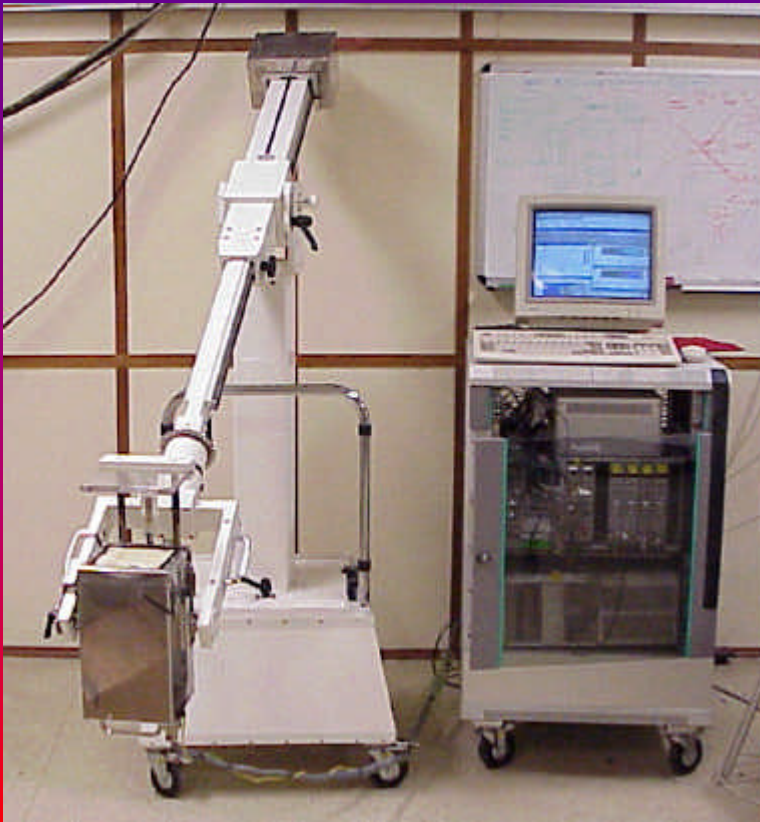


R5900 (1 inch)

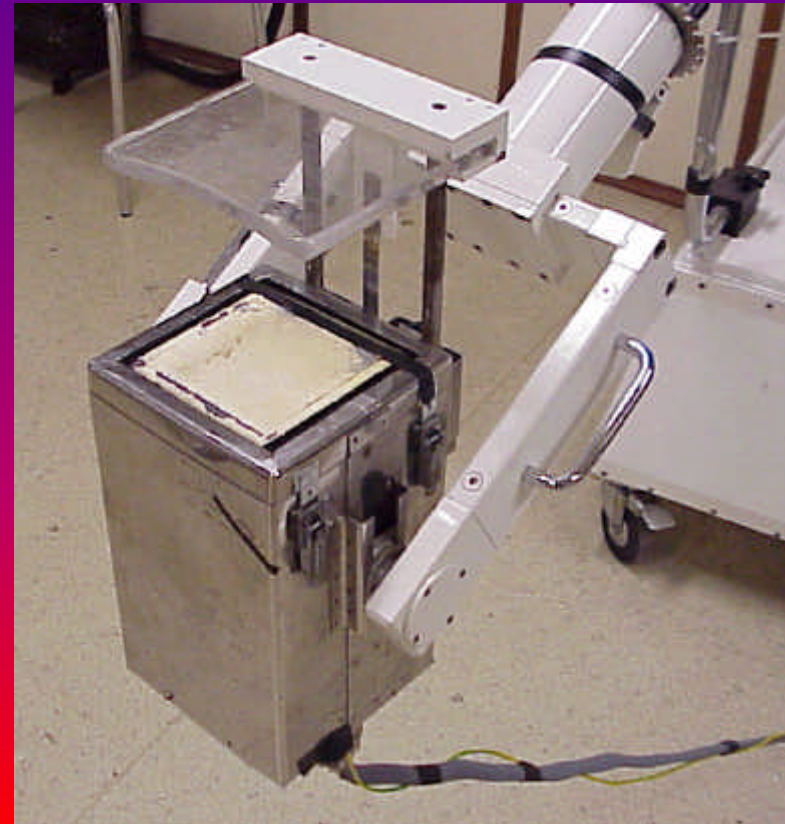
SPEM Single Photon Emission Mammography

A new scintigraphic technique based upon a small FOV dedicated gamma camera

The main advantages of this detection system with respect to Anger camera are the compactness and the light weight



SPEM detection system

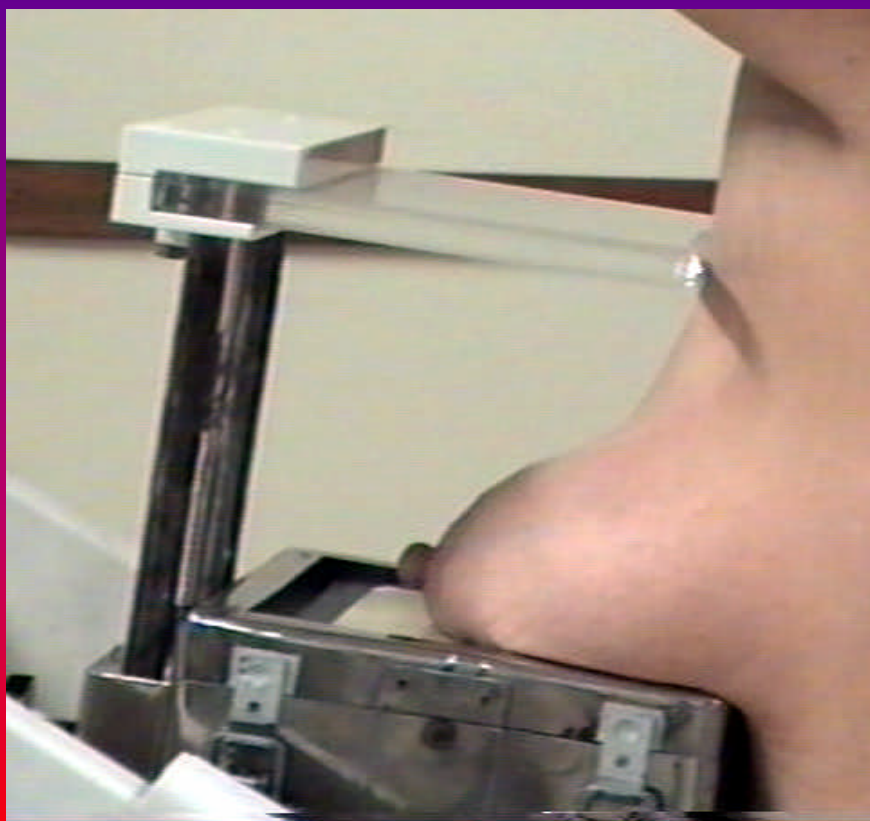


SPEM detection head

SPEM Single Photon Emission Mammography

SPEM detection system allows to perform scintigraphic breast projection as Rx mammography

Uncompressed Breast



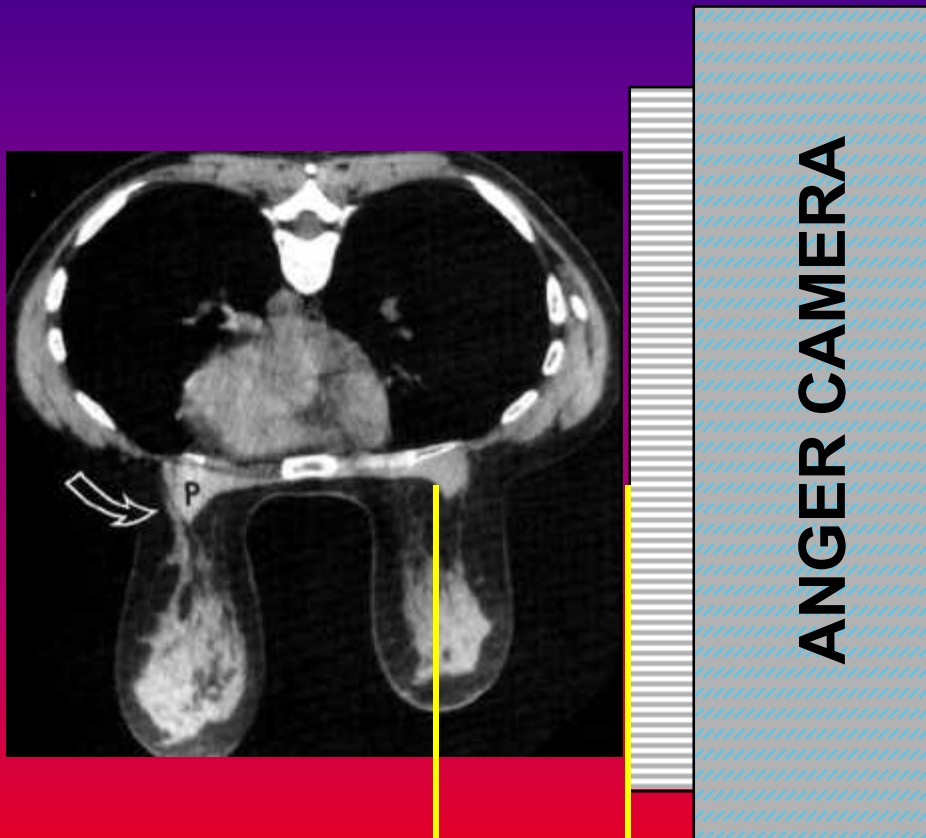
Compressed Breast



Cranio Caudal projection

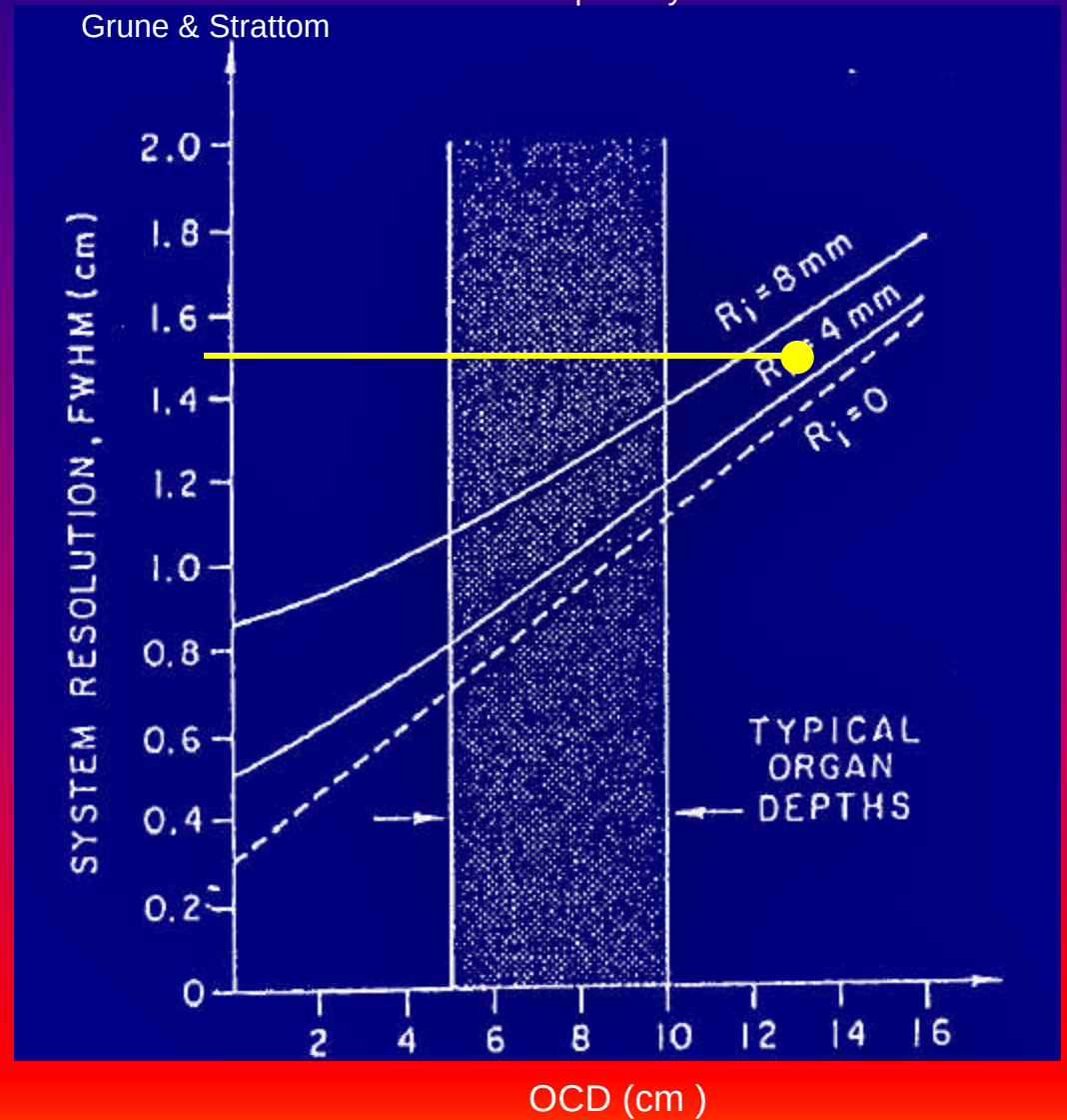
Spatial resolution in PSM

From: J.A.Sorenson and M.E.Phelps "Physics in Nuclear Medicine"
Grune & Stratton

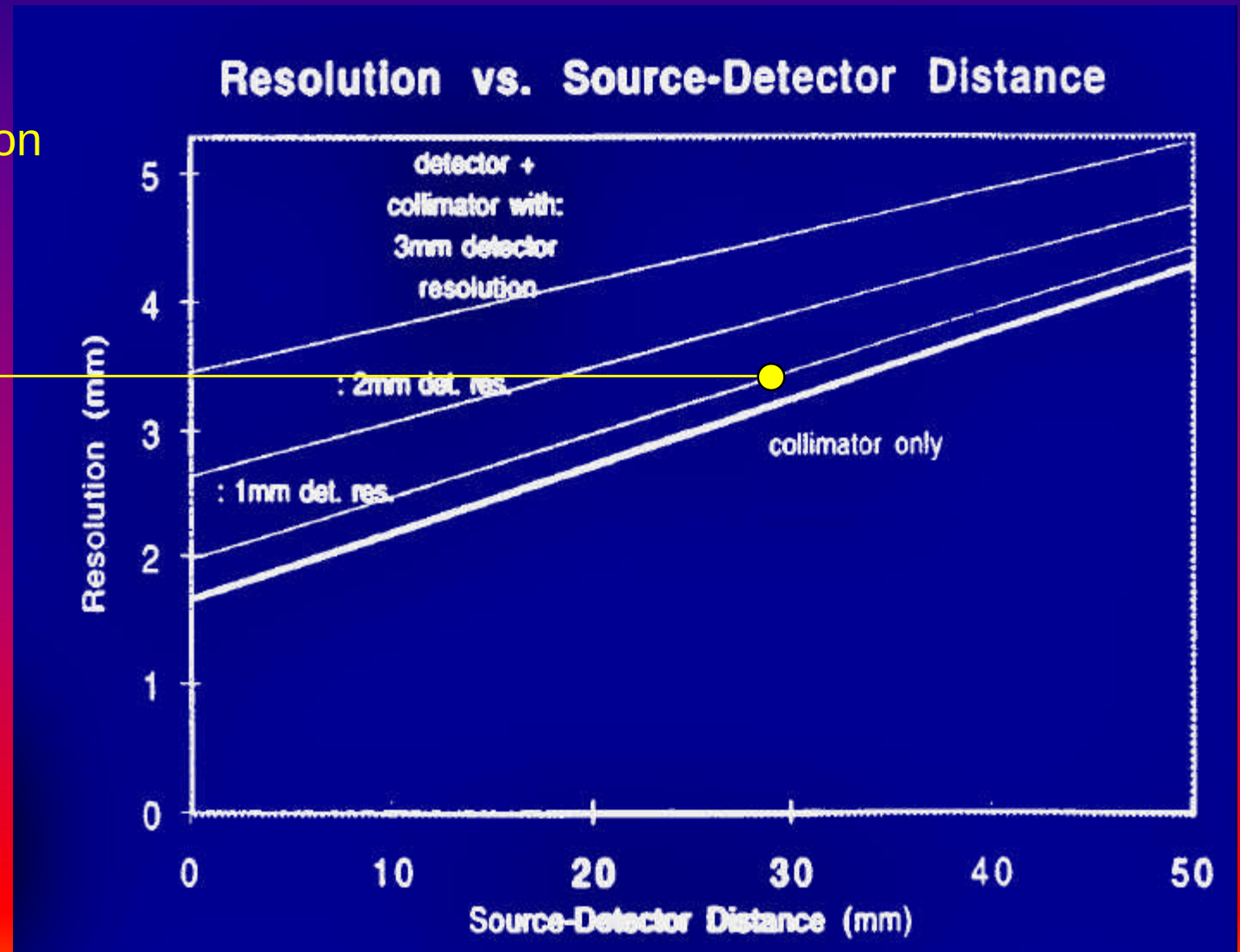
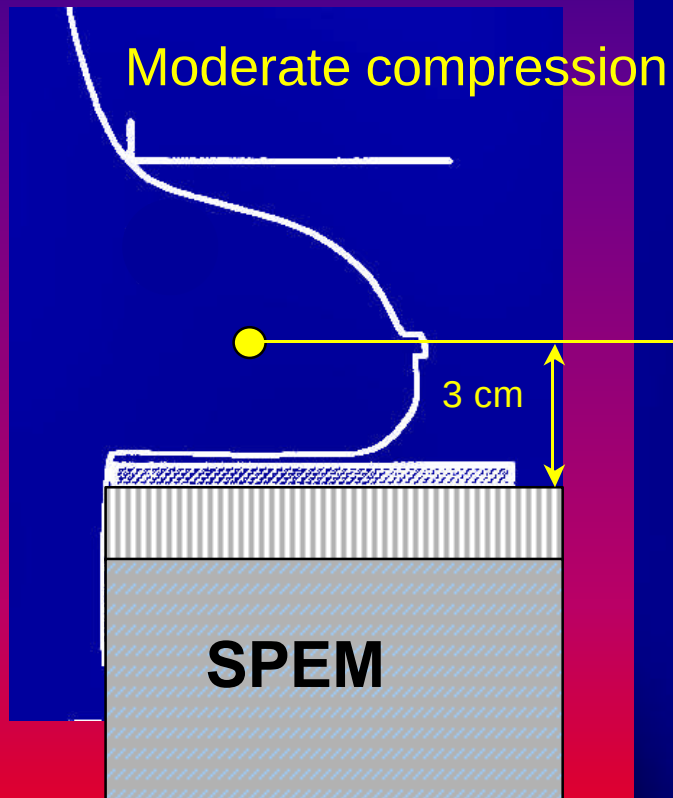


10 -15 cm

Object – collimator distance



Spatial resolution in SPEM



PSM (Prone Scinti Mammography) by using commercially available Gamma Camera

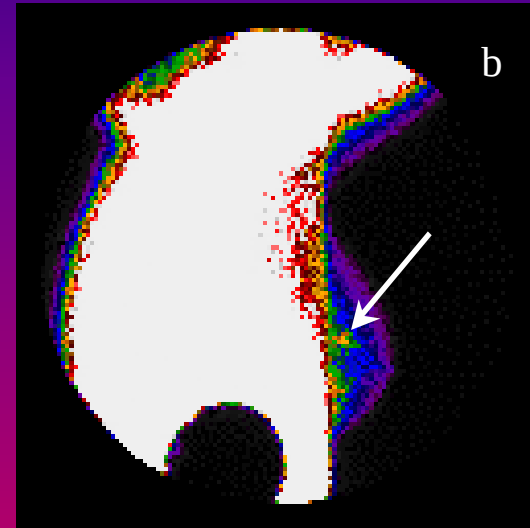
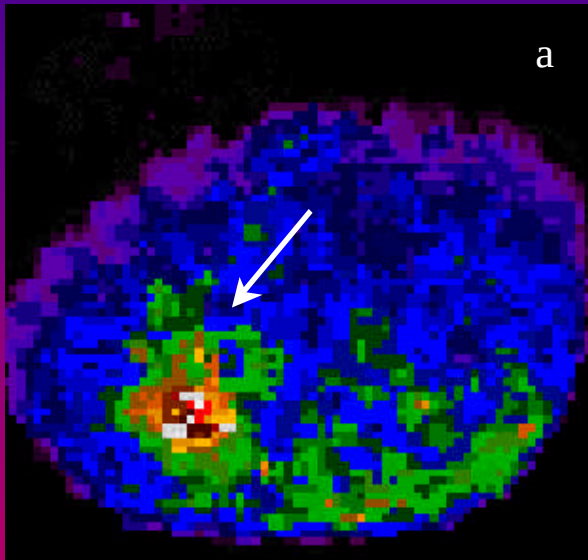
Proper positioning in PSM



Prone scintimammography is the only useful view allowed for a patient

SPEM Single Photon Emission Mammography

^{99m}Tc Sestamibi scintimammography: Right Breast Carcinoma 13 mm sized

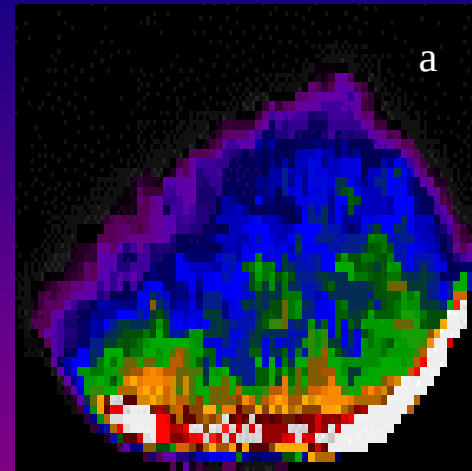


a: SPEM Camera scan clearly shows the lesion as an inhomogeneous area of increase uptake of tracer (arrow)

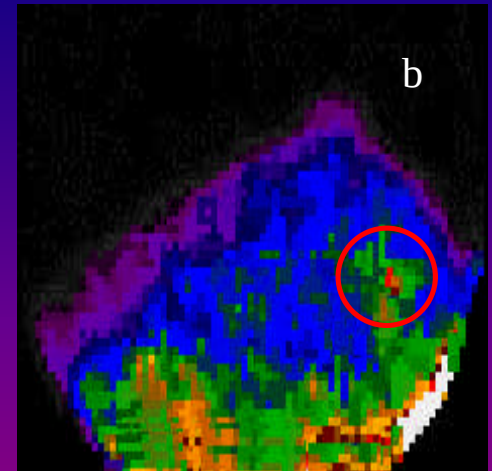
b: The same breast imaged by commercially available Anger Camera showing the lesion as a small hot spot (arrow)

^{99m}Tc Sestamibi Scintimammography

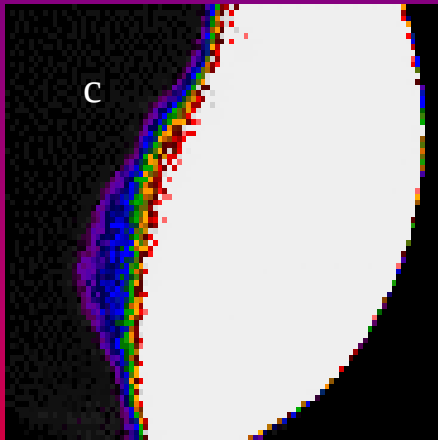
Right Breast Carcinoma 7 mm sized



RCC uncompressed



RCC compressed



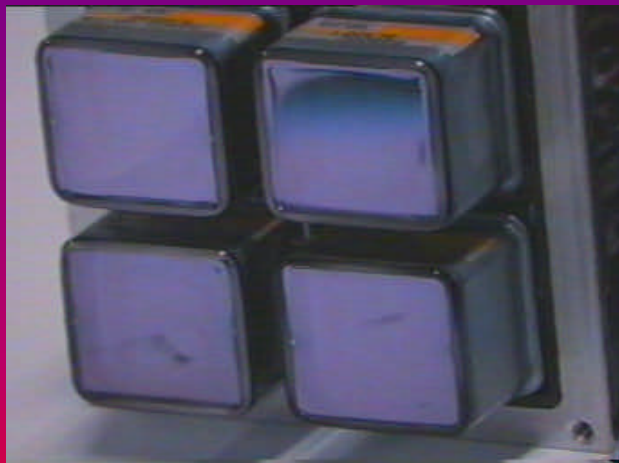
a and **b** SPEM Camera imaging with breast uncompressed (**a**) and mildly compressed: into the red circle the lesion is shown as an area of increased uptake of tracer

c: The same breast imaged by commercially available Anger Camera: no pathological uptake is shown

d: The corresponding X-Ray mammography- the lesion is surrounded by a red circle

*2 x 2 PSPMT Hamamatsu
R 5900-C8*

With flanges



*2 x 2 PSPMT Hamamatsu
R 7600-C8*

Flangeless

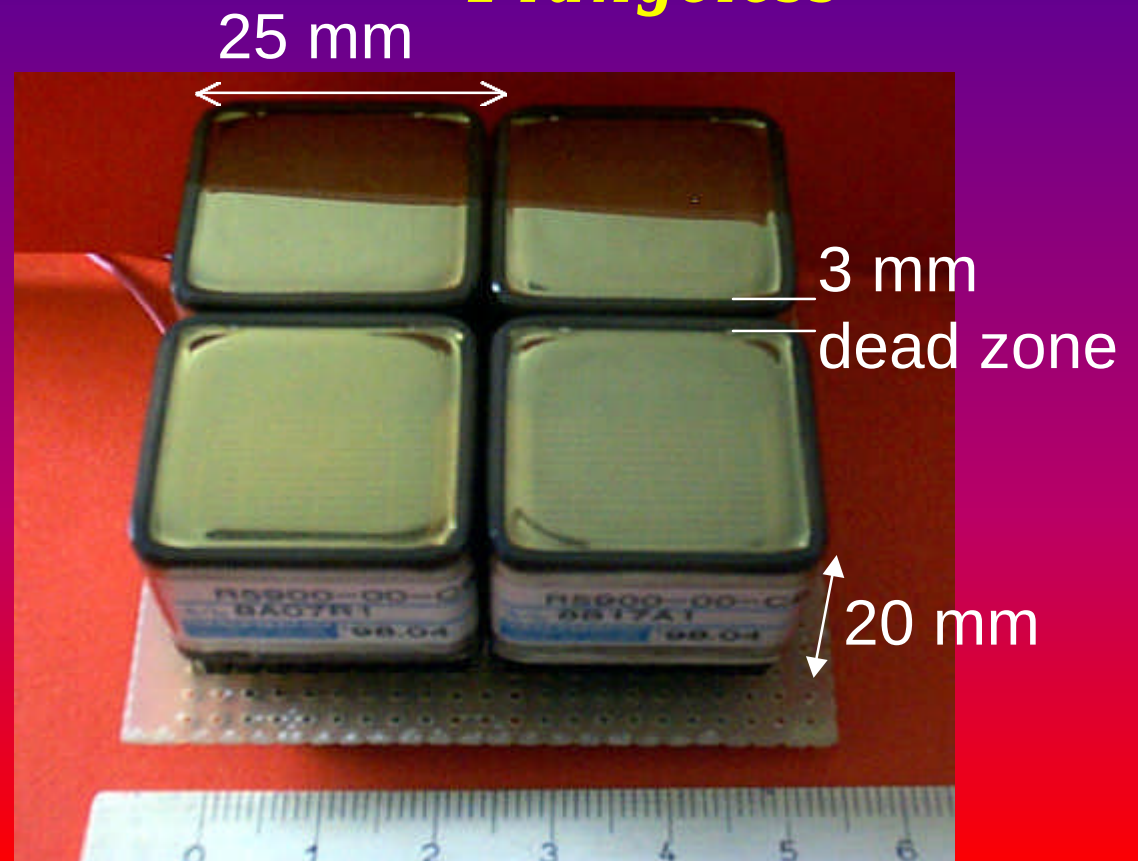
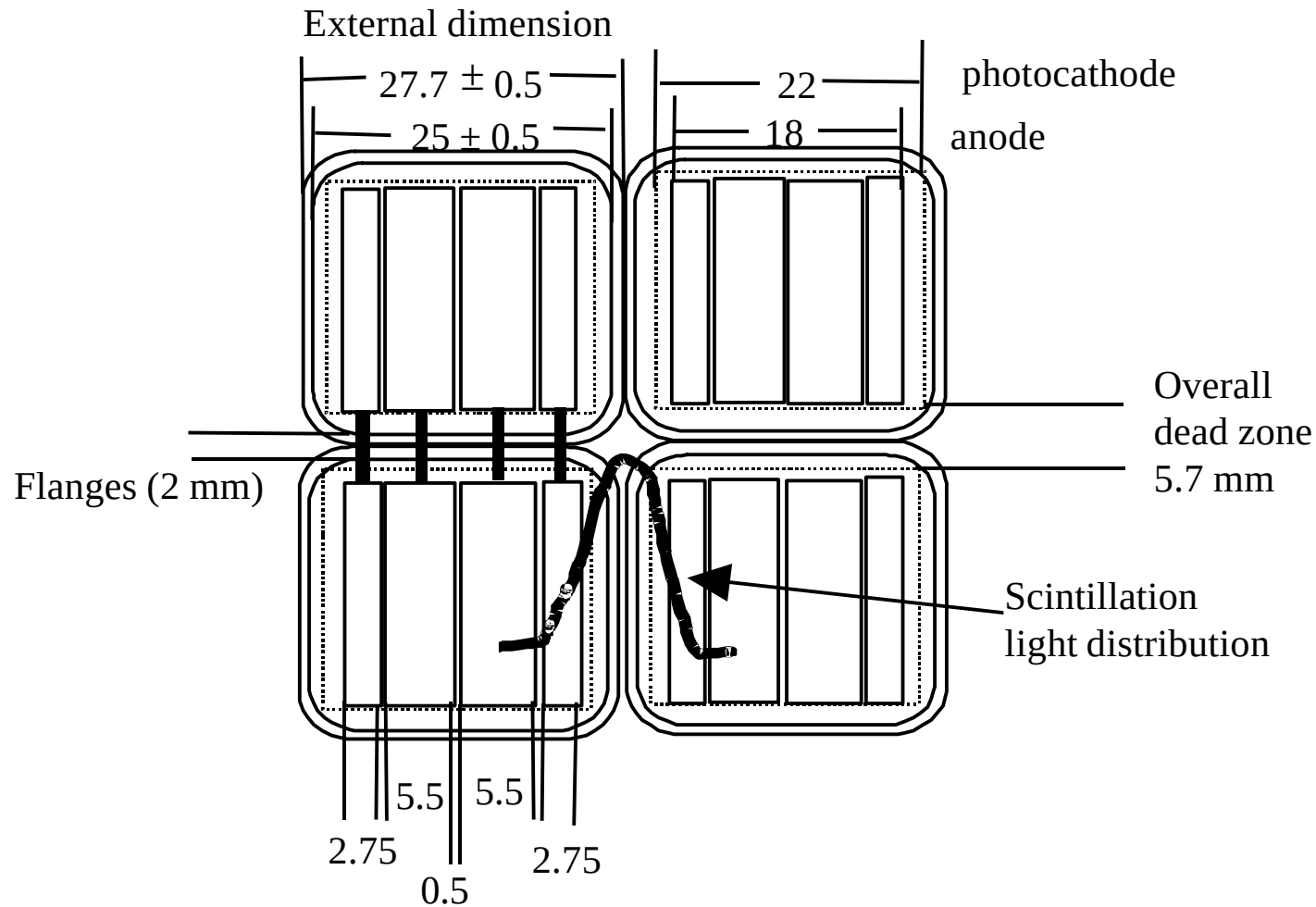
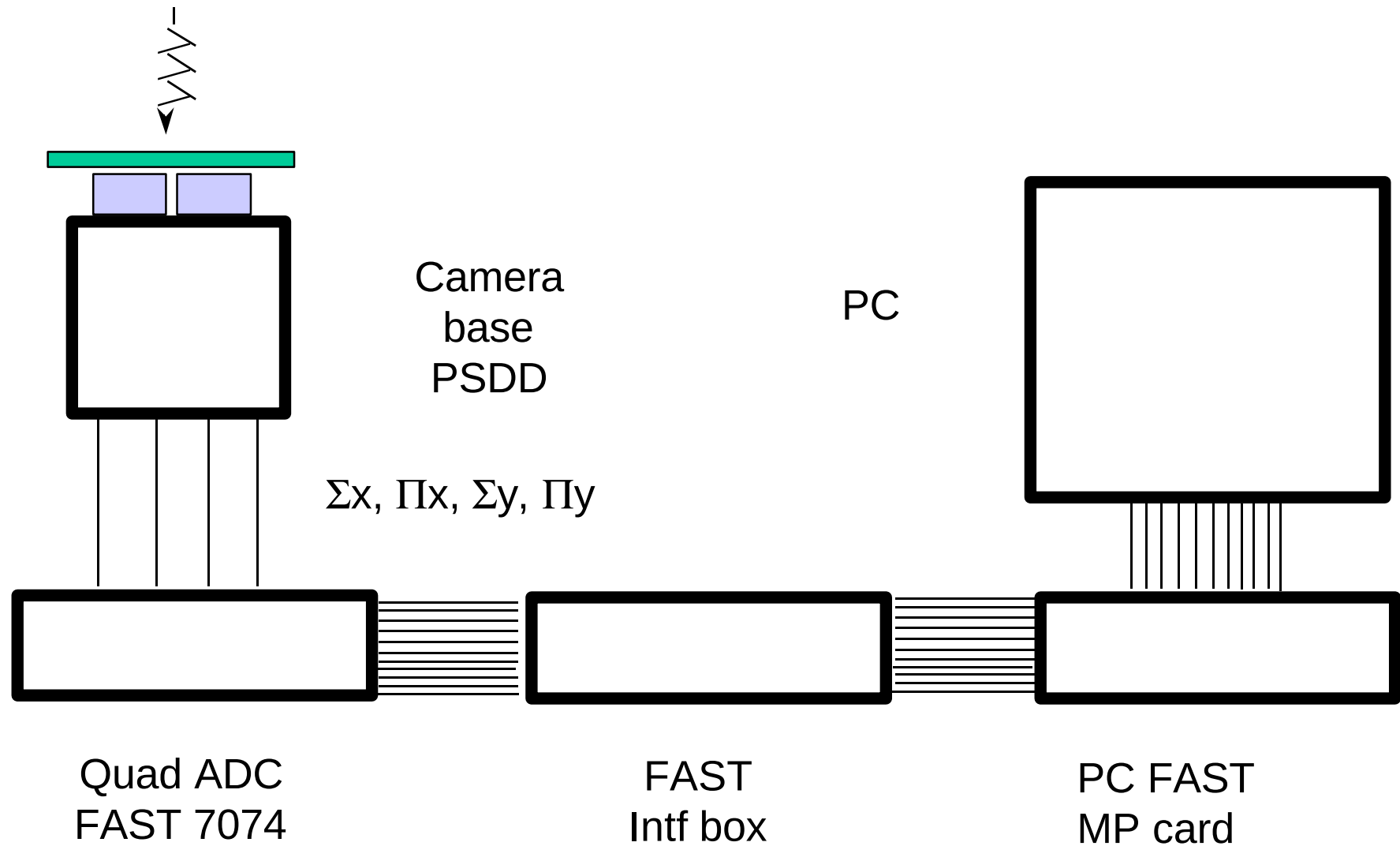


Diagram of Multi-PSPMT camera (All dimensions in mm).



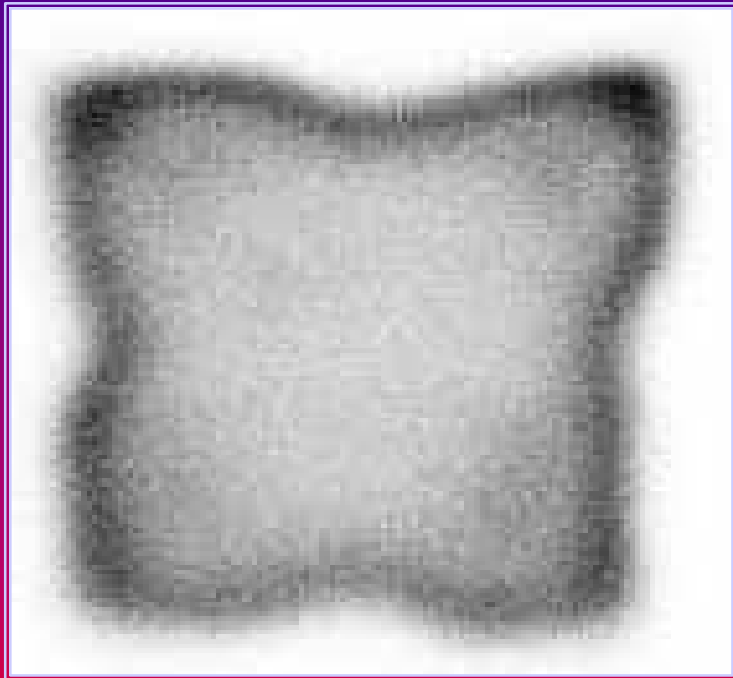
Read-out electronics and acquisition system



CsI(Na) planar crystal

55 x 55 x 3 mm³

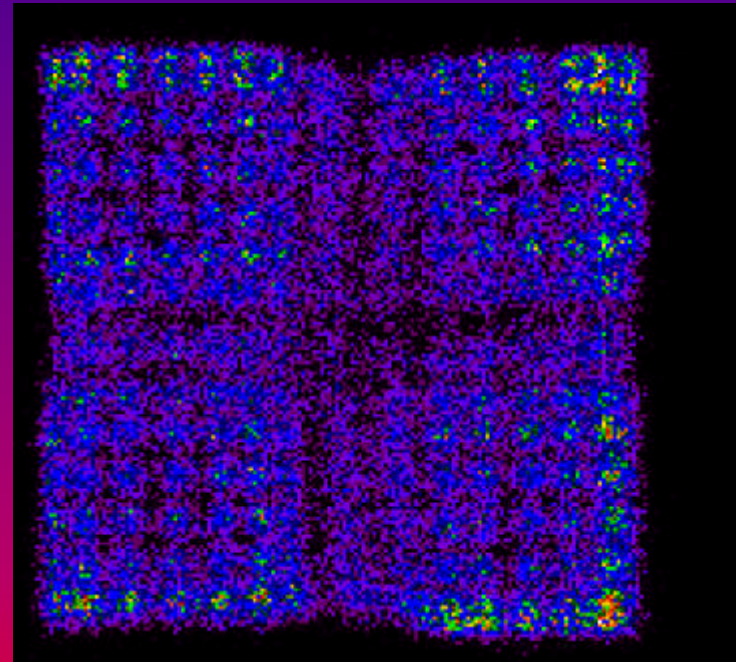
2 mm quartz



CsI(Tl) crystal array

3 x 3 x 3 mm³ pixel size

3 mm quartz

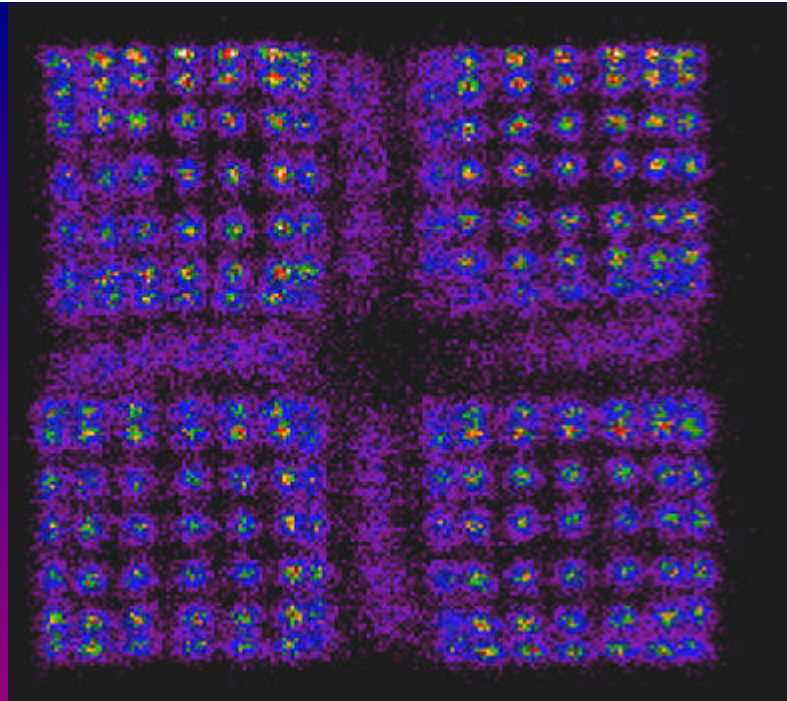


2 x 2 PSPMT Hamamtsu R5900-C8

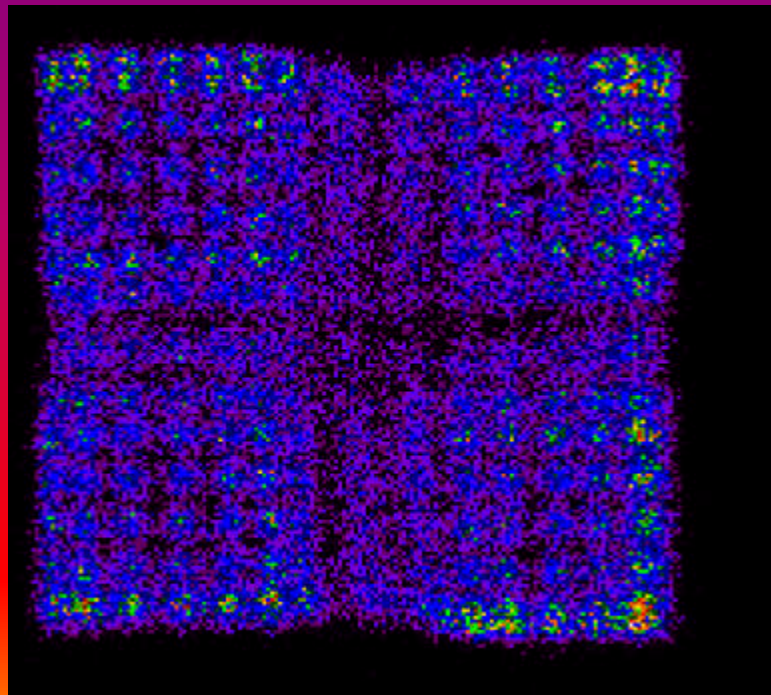
Flood field irradiation

140 keV

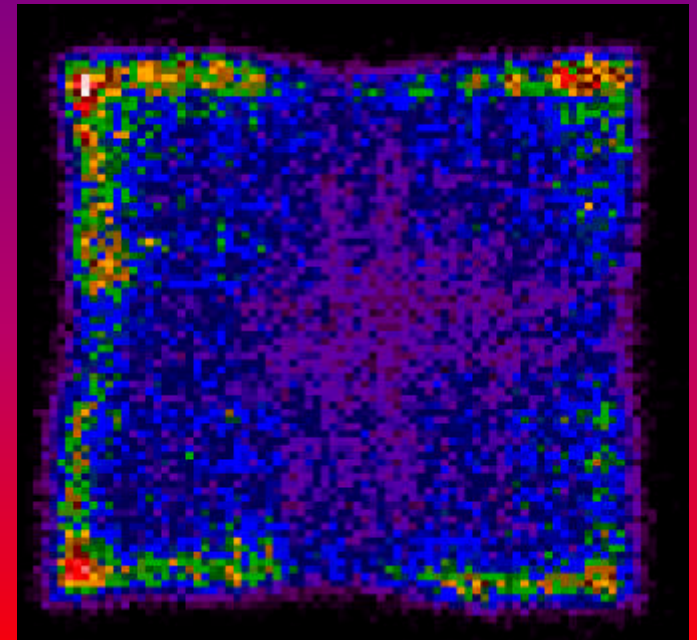
1 mm quartz



3 mm quartz



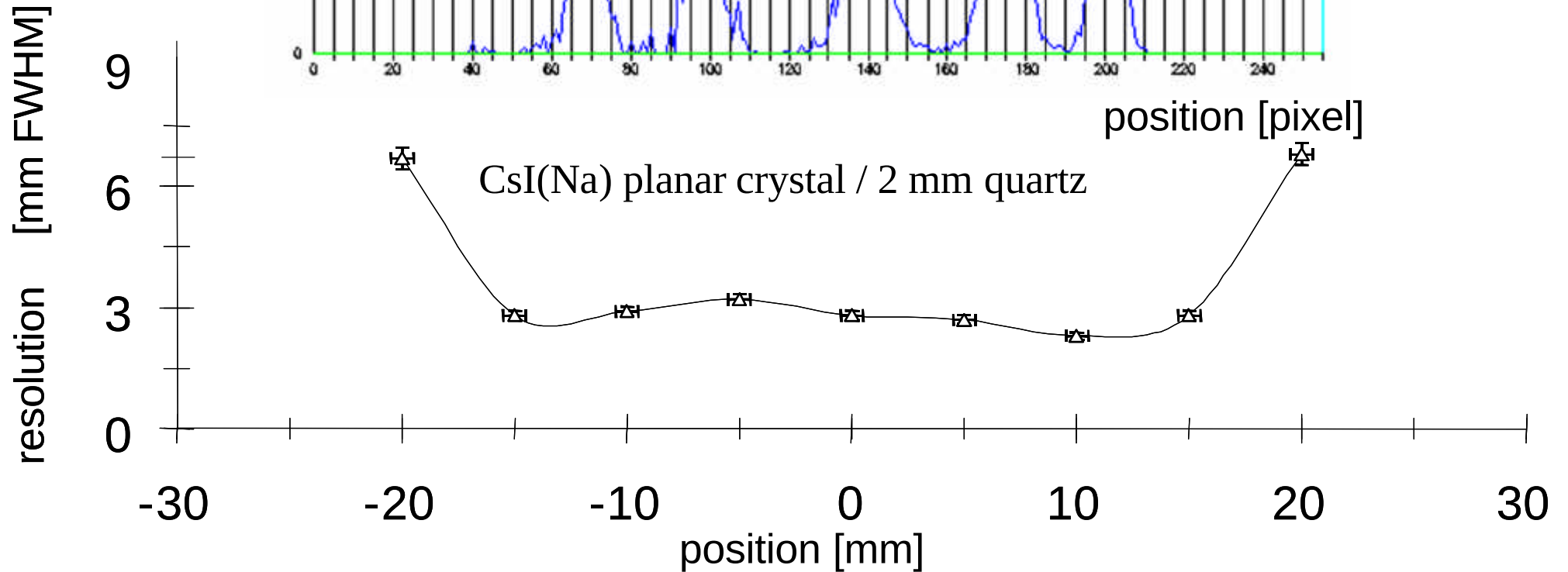
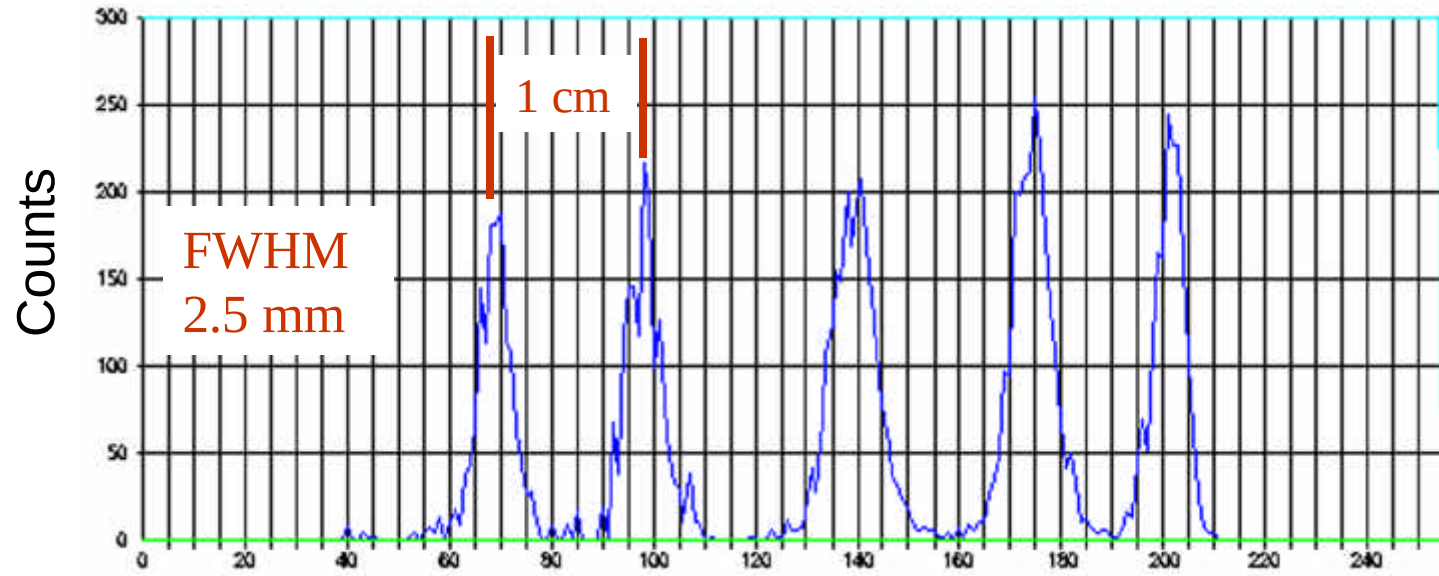
PSPMT R5900-C8
Hamamatsu
CsI(Tl) crystal array
3 x 3 x 3 mm³
Flood field irradiation
140 keV

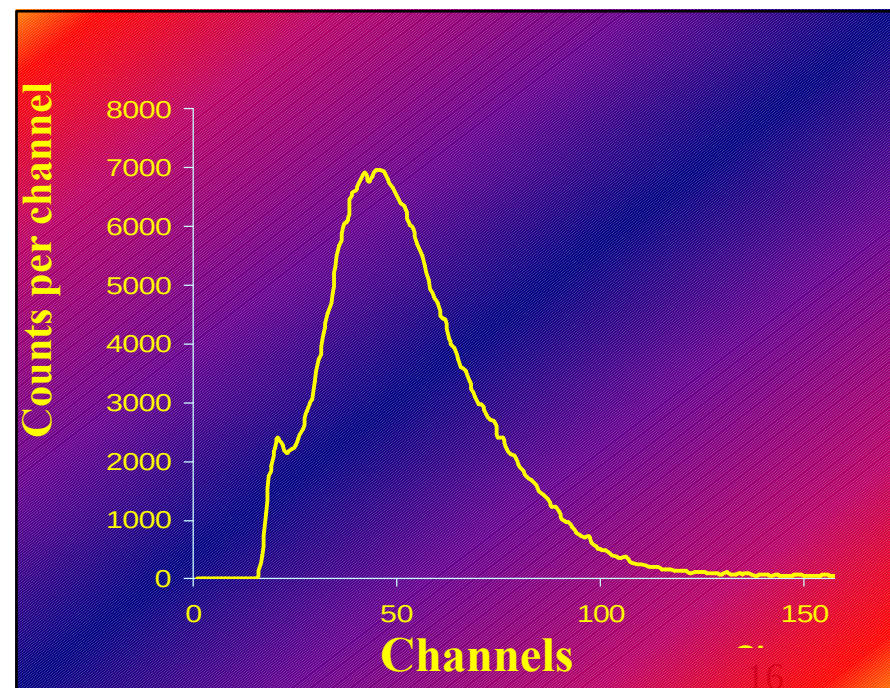
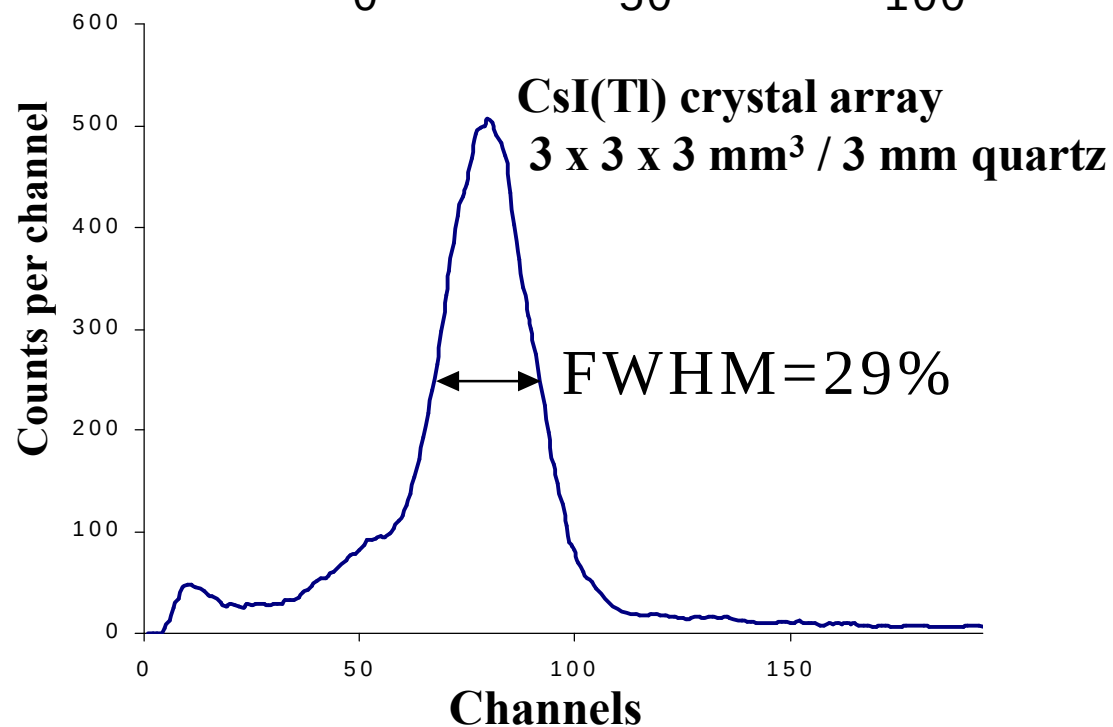
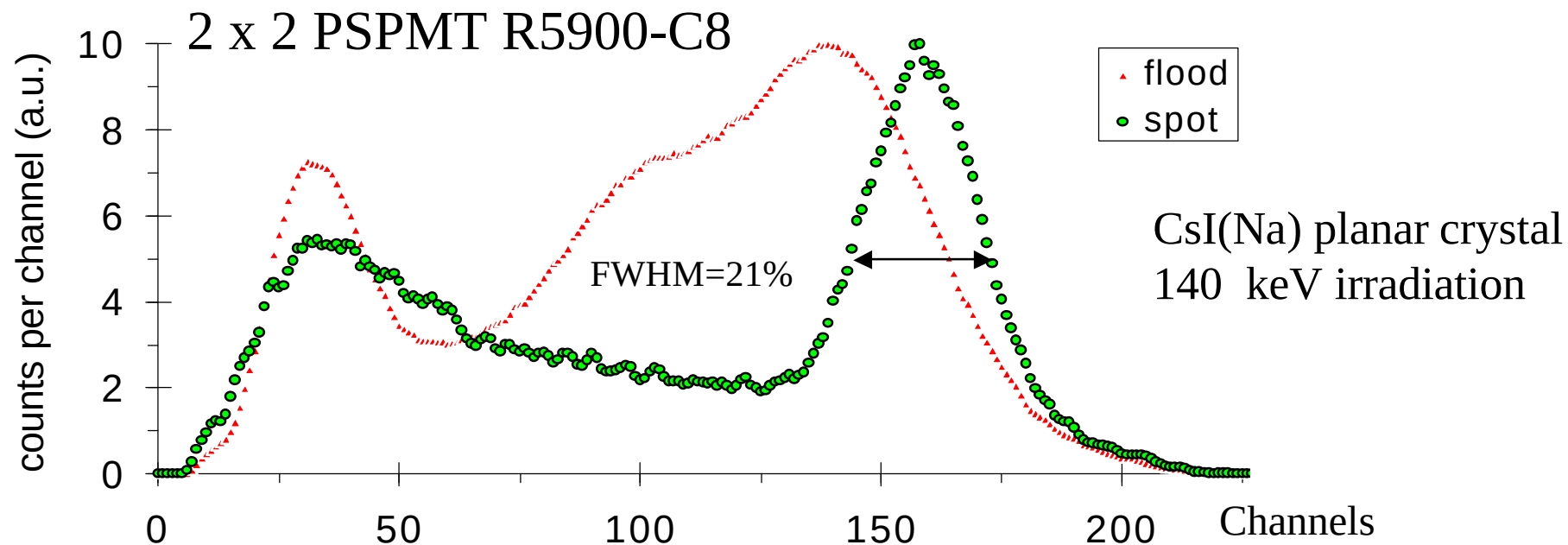


5 mm quartz

Multi PSPMT Spatial Resolution

CsI(Tl) crystal array 3x3x3 mm³ / 3 mm quartz

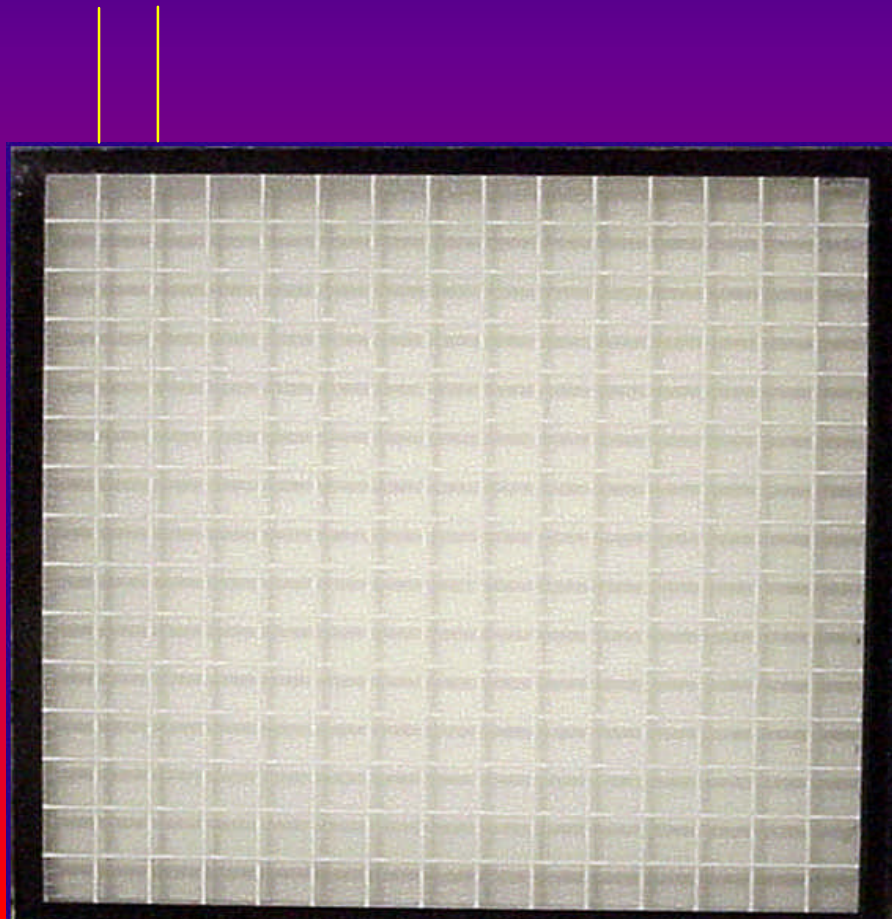




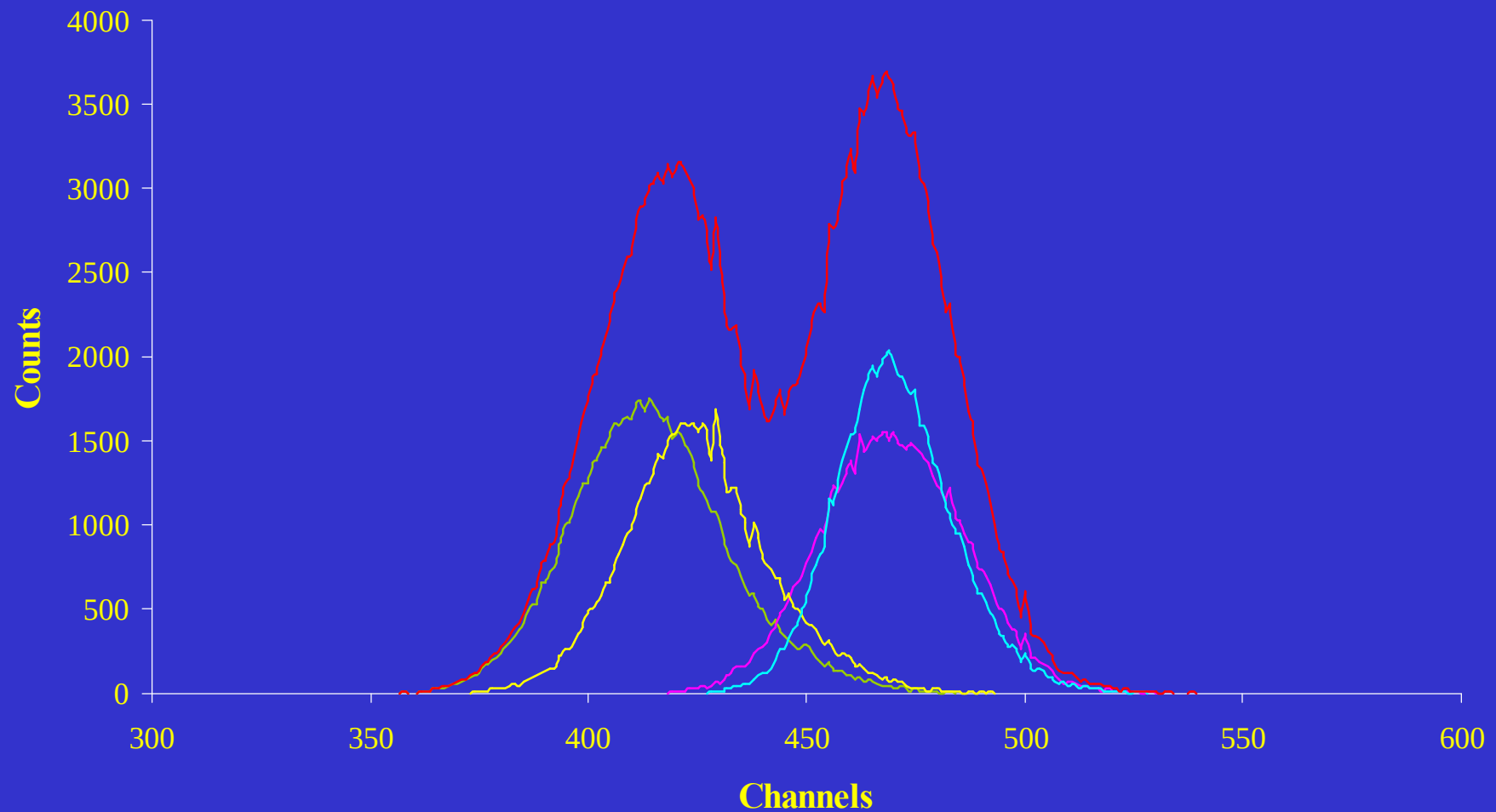
SCHEMA CAPC

COMBINED ARRAY- PLANAR CRYSTAL CsI(Na) CAPC

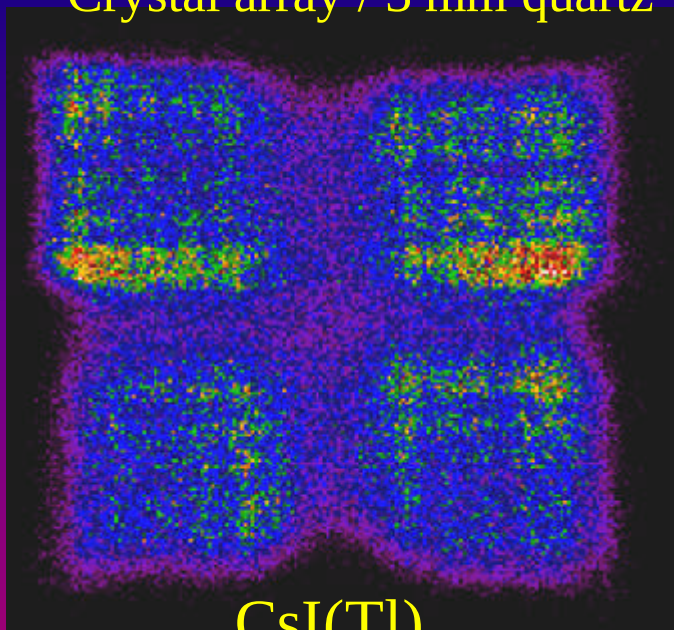
3 x 3 mm² / 0.25 mm dead zone



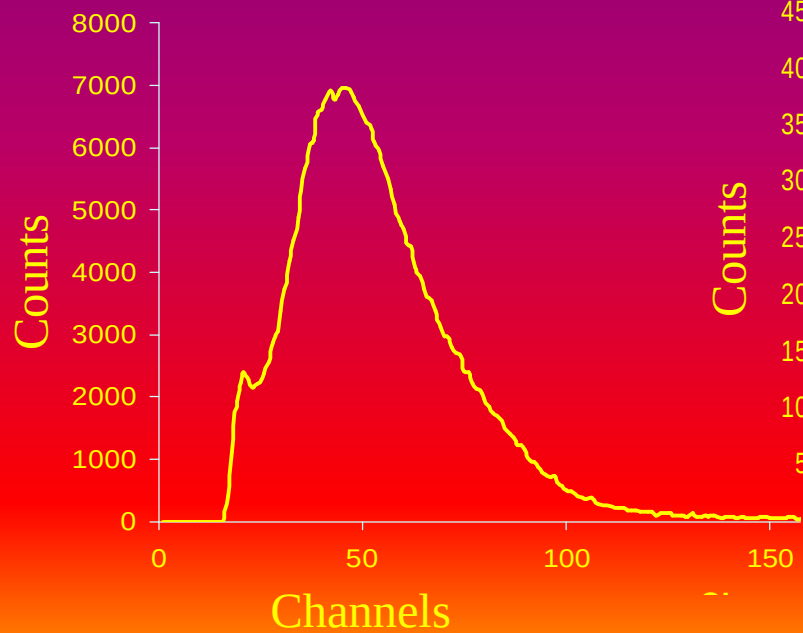
2 x 2 PSPMT Hamamtsu R7600-C8
Individual PSPMT Energy Response from Flood Field
Irradiation at 140 keV



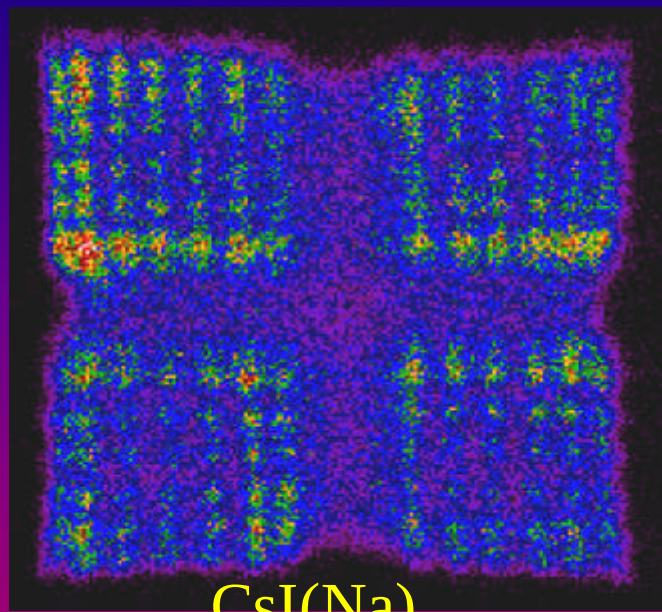
R5900-C8 PSPMT
Crystal array / 3 mm quartz



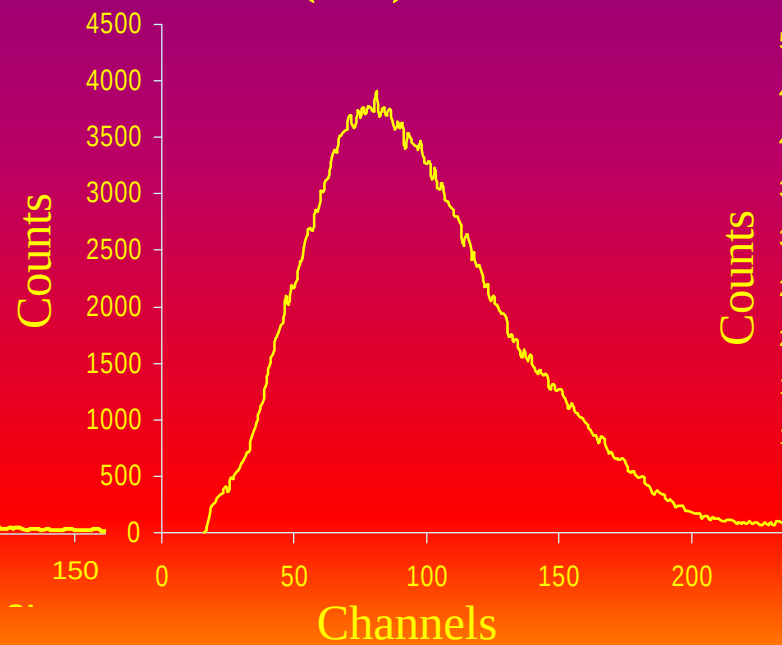
CsI(Tl)



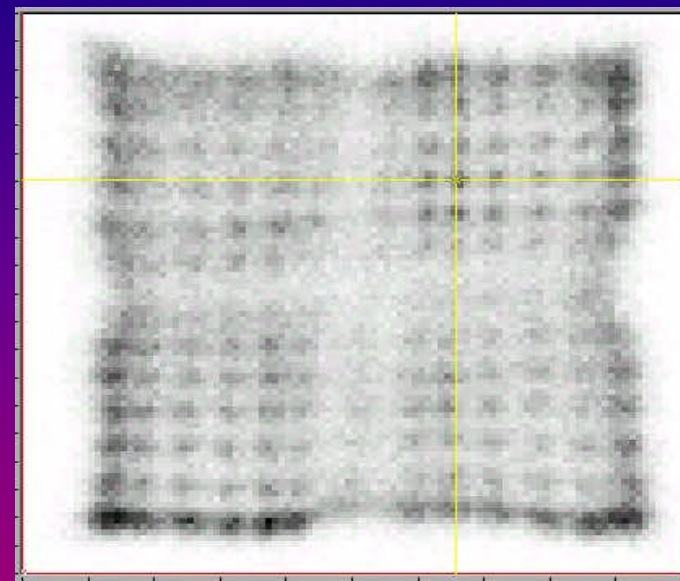
CAPC Flood Field Irradiation
R5900-C8



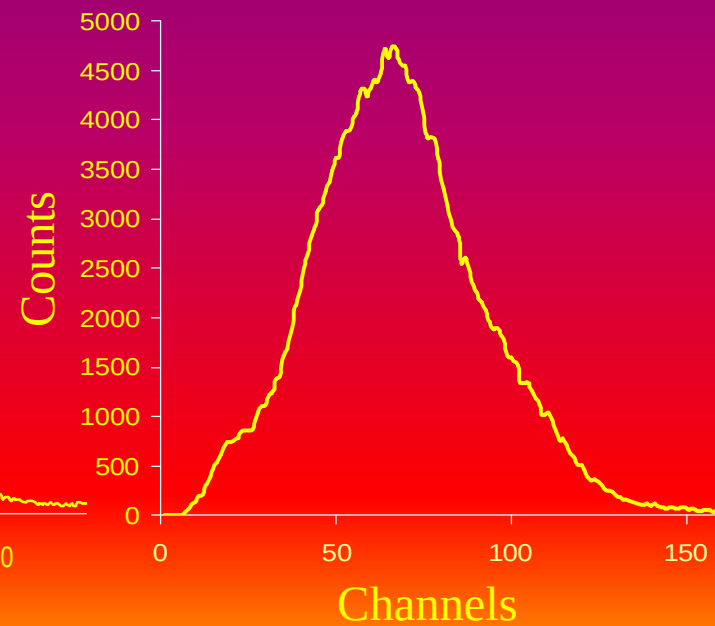
CsI(Na)



R7600-C8

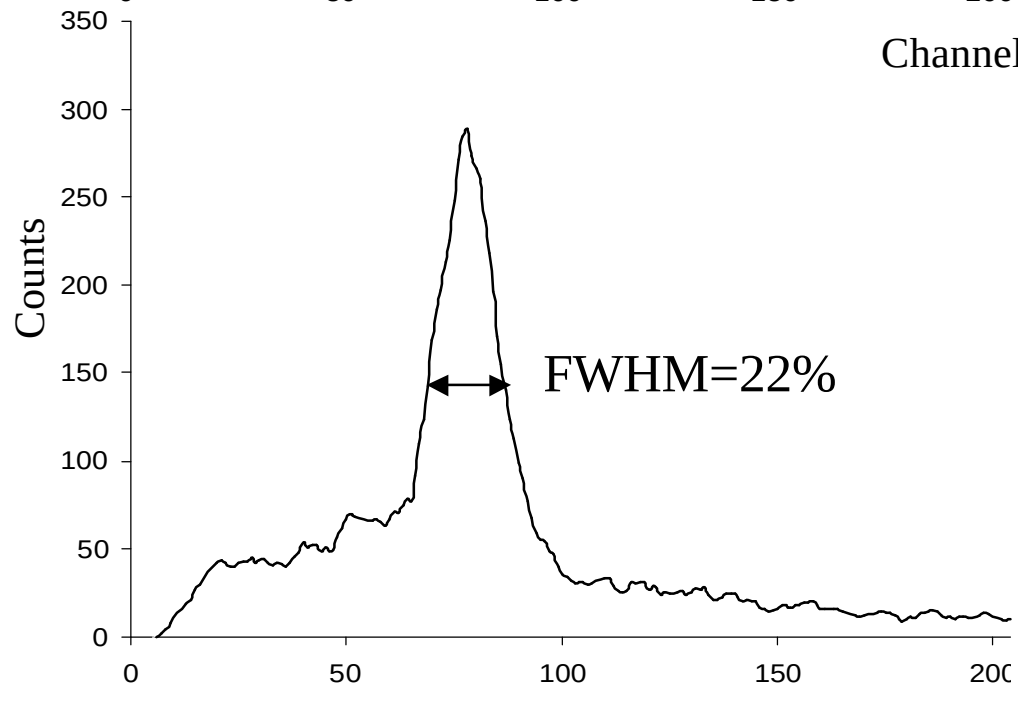
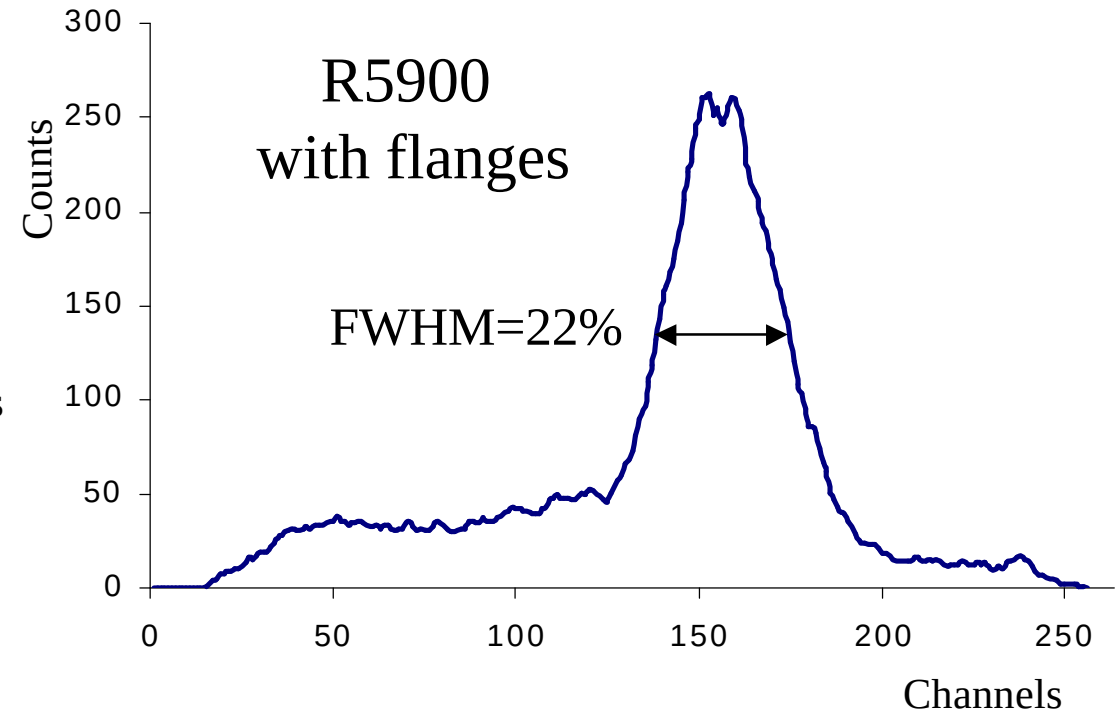
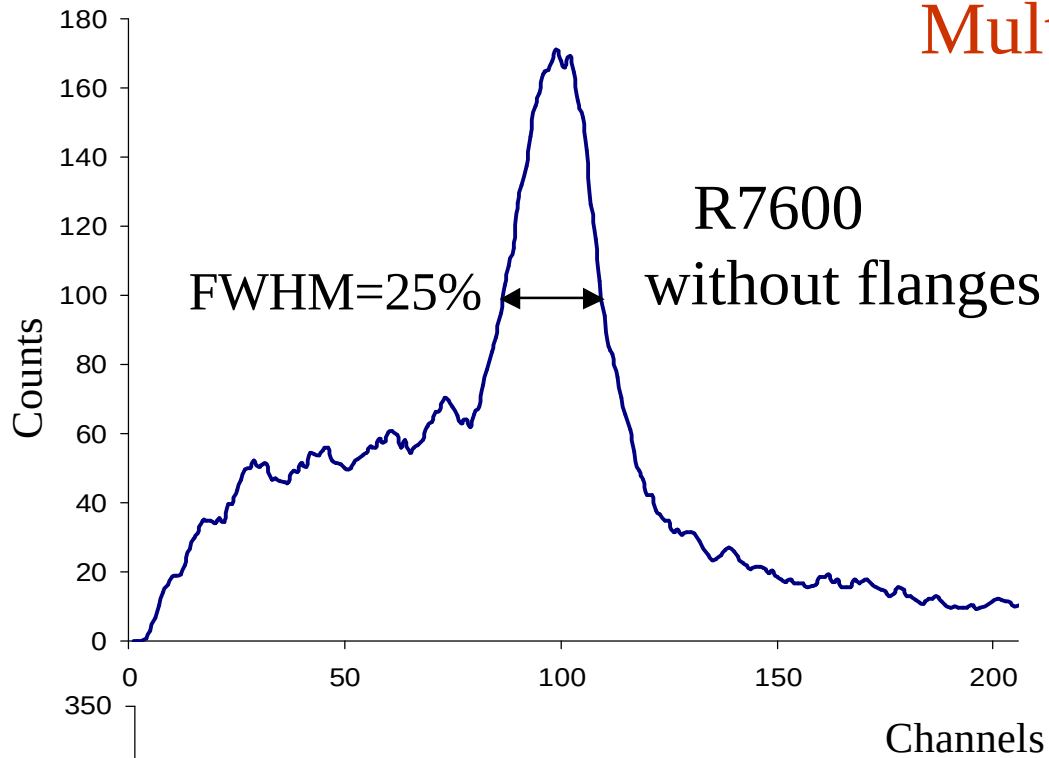


CsI(Na)



Multi PSPMT- CsI(Na) CAPC

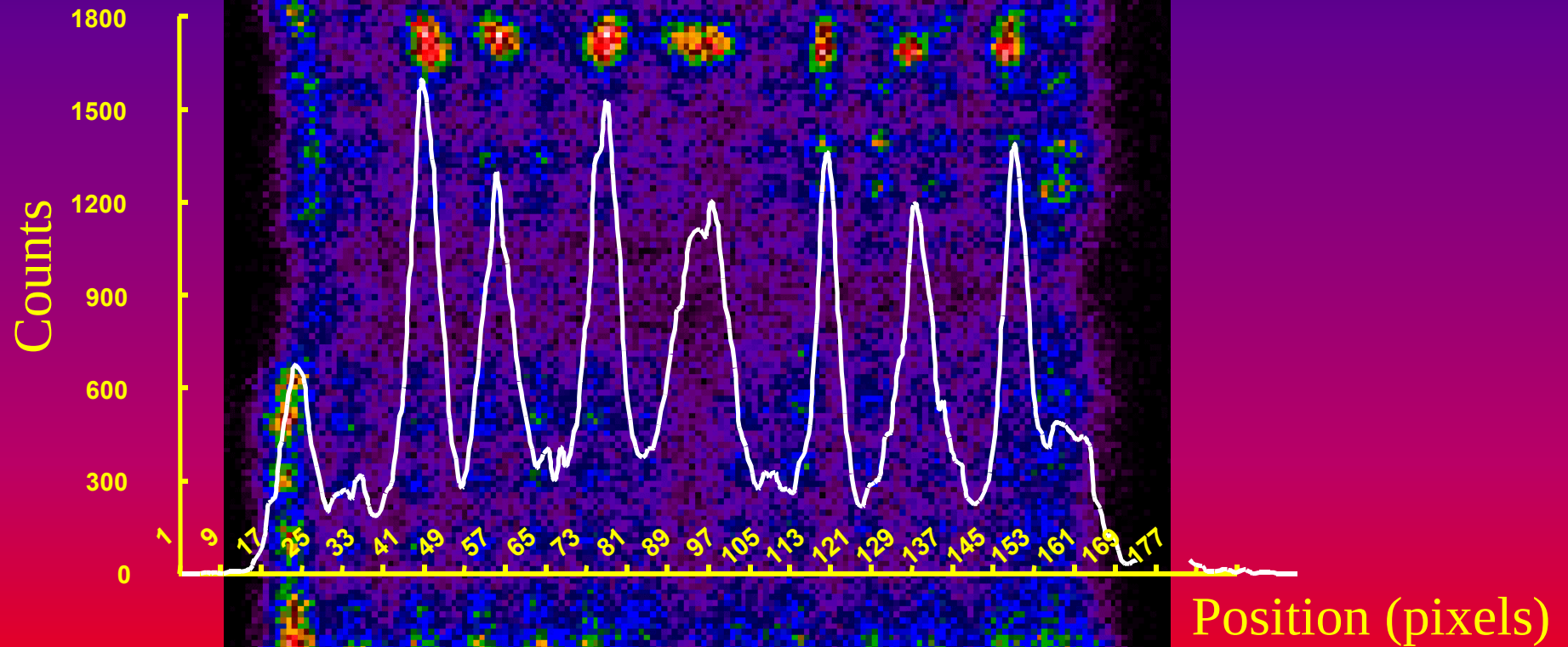
Energy Resolution



140 keV spot irradiation

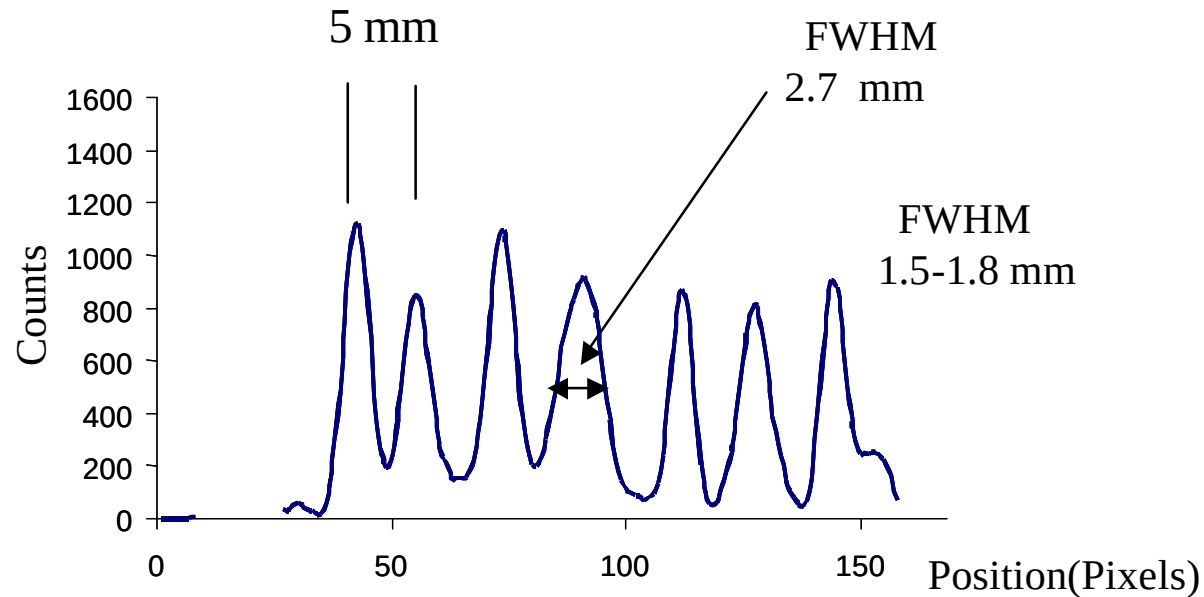
2 x 2 PSPMT Hamamatsu 7600-C8

CAPC CsI(Na) Spot irradiation

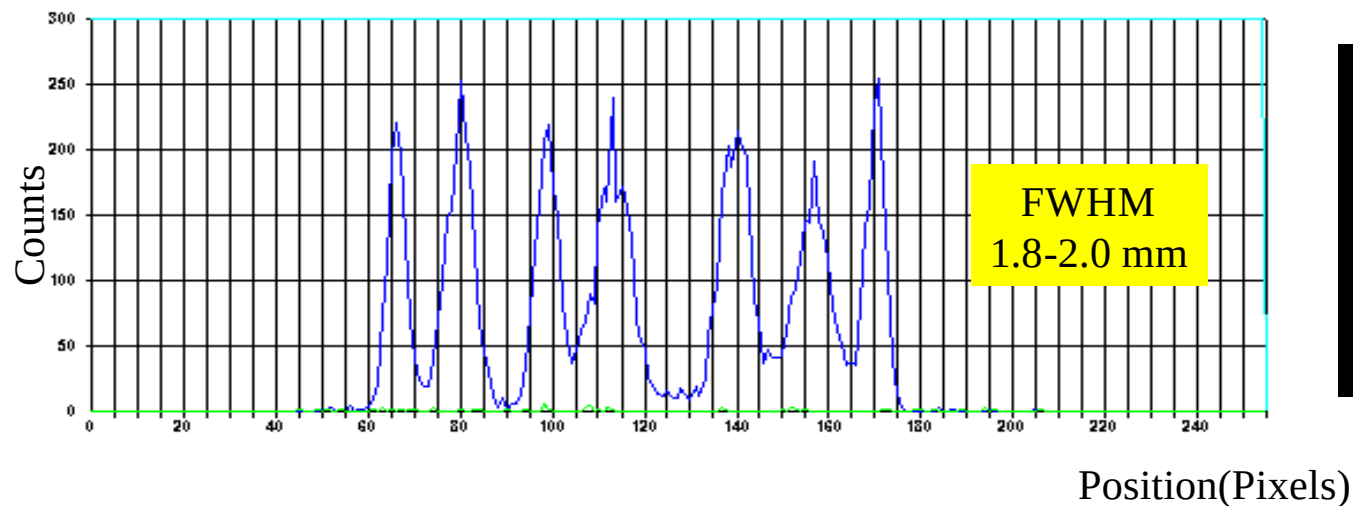


CsI(Na) CAPC

Spatial Resolution – 140 keV spot irradiation



R7600-C8



R5900-C8

