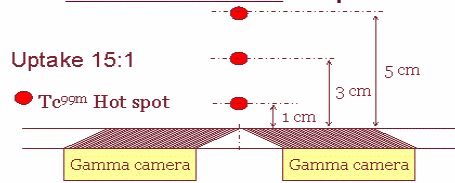


## Preliminary results of slant hole collimator tomography

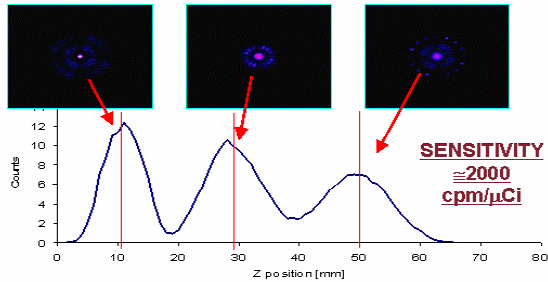
### GEANT4 Simulation setup



Source position	Planar	Axial
@ 1 cm	3.0 mm	7 mm
@ 3 cm	5.7 mm	12 mm
@ 5 cm	7.0 mm	15 mm

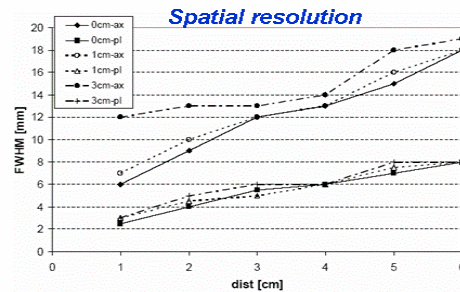
4 slant rotations  
 10 min total acquisition time

### Reconstructed coronal slices:



Z profile of reconstructed volume estimated on the central FoV

BP tomographic reconstruction slices at depth 1,3 and 5 cm



## ECORAD: THE NEW FRONTIER OF 3D IMAGING

Maria Nerina Cinti, PhD

On behalf of ECORAD collaboration

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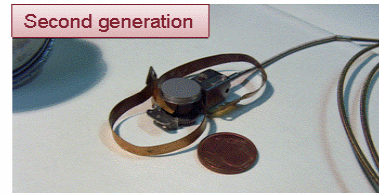
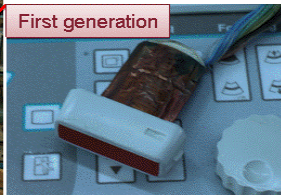
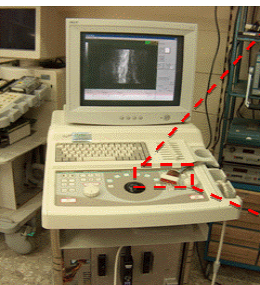
National Responsible : Prof. Roberto Pani

I.N.F.N. Sezione di Roma I

P.le Aldo Moro, 2, 00185 Roma, Italy

✉ roberto.pani@uniroma1.it ☎ +39 06 49918277

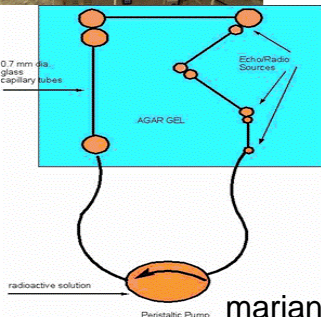
## Ultrasound 3D Console and Probe



The system is arranged to make a C-scan to obtain a 3D US images.

## Ultrasound Phantom

A phantom with radioactive and echogenic elements has been made to the aim to calibrate both US and gamma detector simultaneously in real time.



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## What is Ecorad ?

❖ The ECORAD experiment aims to develop a dual compact camera for acquiring ultrasound (US) and scintigraphic images and represents the first diagnostic imager integrating an US probe with a Gamma camera with very high spatial resolution.

❖ **Application field:** Core biopsy - Lymph node scintigraphy - Breast scintigraphy - Intraoperative probe

❖ It will allow to get both morphological and functional information on the same device. A volumetric image containing the fusion information will be provided to the user

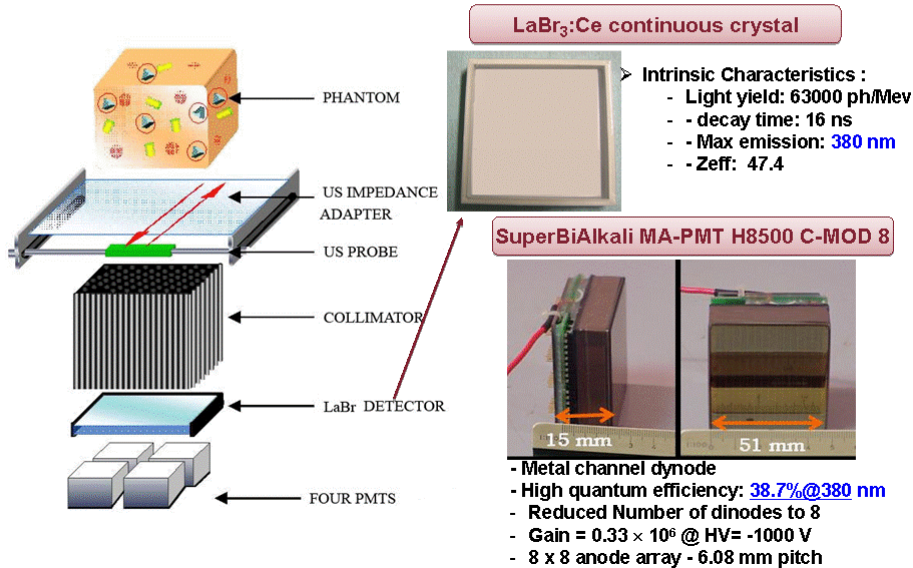
❖ A development of a fully 3D detector can improve axial spatial resolution of the volume image removing distortions introduced by slant collimator.

❖ ECORAD can be used in the future for small animal imaging due to its very high resolution power.

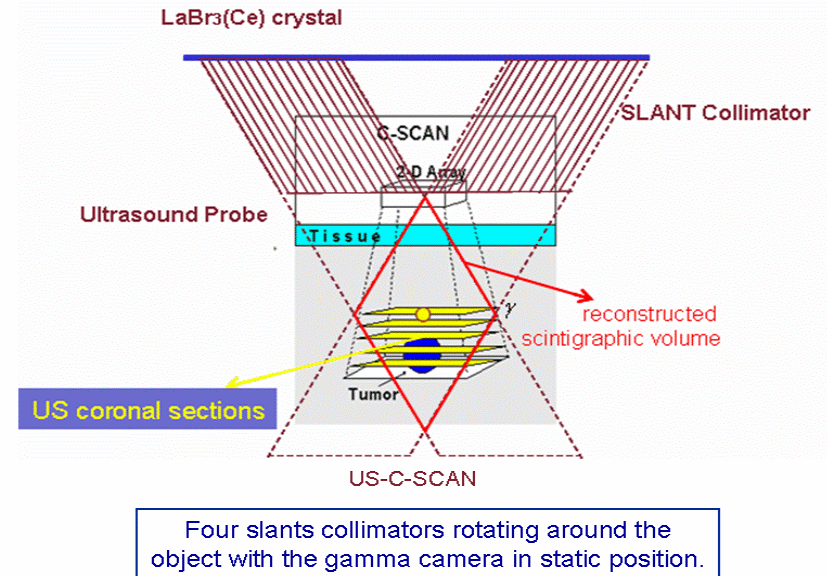
❖ ECORAD can improve clinical sensitivity of any diagnosis where a US imaging is the gold standard and an ancillary technique for many others.

# ECORAD dual modality imager

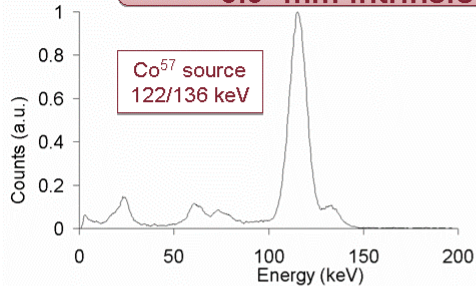
Gamma camera based on  $\text{LaBr}_3:\text{Ce}$  scintillator integrated with US linear transducer



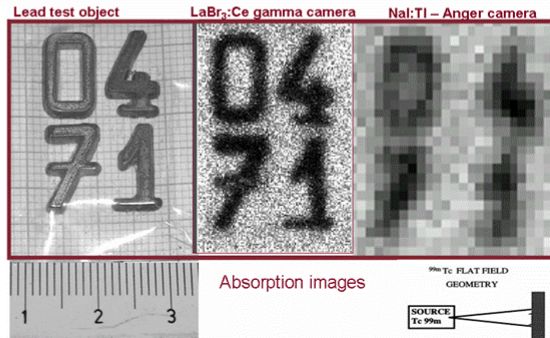
# Images reconstruction geometry gamma and 3D US



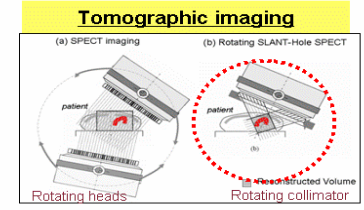
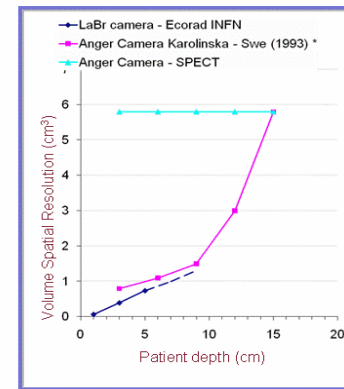
**Gamma detector: 7.4 % energy resolution @ 122 keV**  
**0.9 mm intrinsic spatial resolutionspatial**



**Electronic readout:**  
**64 independent channels**



# LaBr<sub>3</sub>:Ce camera and rotating SLANT parallel hole collimator tomography



**Advantages with respect to Anger SPECT :**

- ✓ The camera is stationary and can be oriented like an US probe producing the reconstruction of the same patient volume
- ✓ It is optimal for detect organs and tissue located less than 10 cm depth

**In addition:**

- ✓ LaBr<sub>3</sub>:Ce gamma camera with submillimeter spatial resolution, can further improve volume spatial resolution up to 30 times at shorter depth with 4-8 times more efficiency
- ✓ The final weight of the camera will be less than 10 kg in contrast to 600 Kg of an Anger camera head

**Standard Anger Camera:**  
**NaI:Tl continuous crystal**  
**Energy resolution 10%**  
**Spatial resolution 3 mm**