



Fast Scintillators to probe Nuclear Structure

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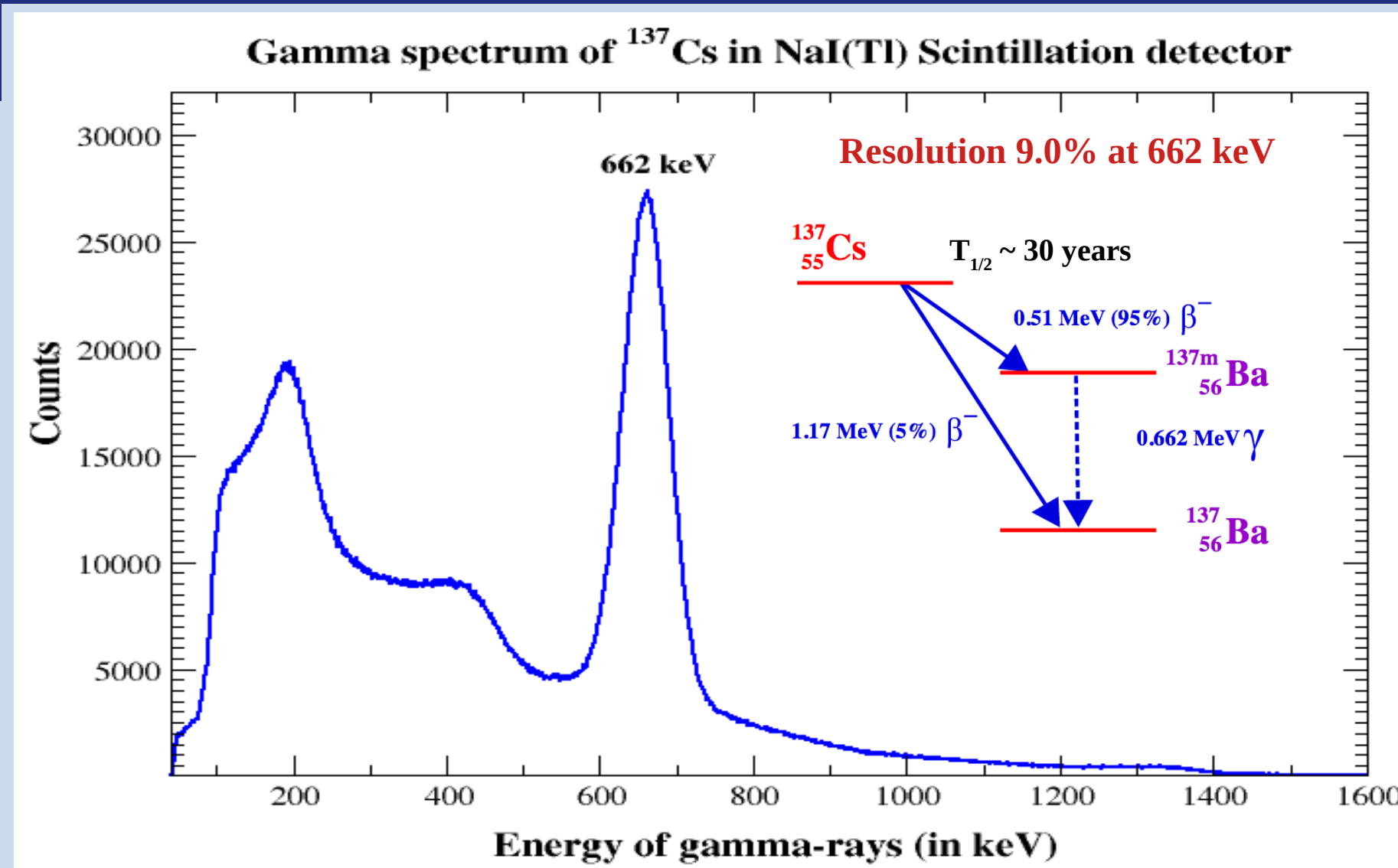
Gamma-ray Spectroscopy

Gamma-ray spectroscopy is the study of Gamma-rays emitted from the nucleus in excited states.

It is a widely used technique for identification of radionuclides by analysis of Gamma-ray energy spectrum produced in a Gamma-ray spectrometer.

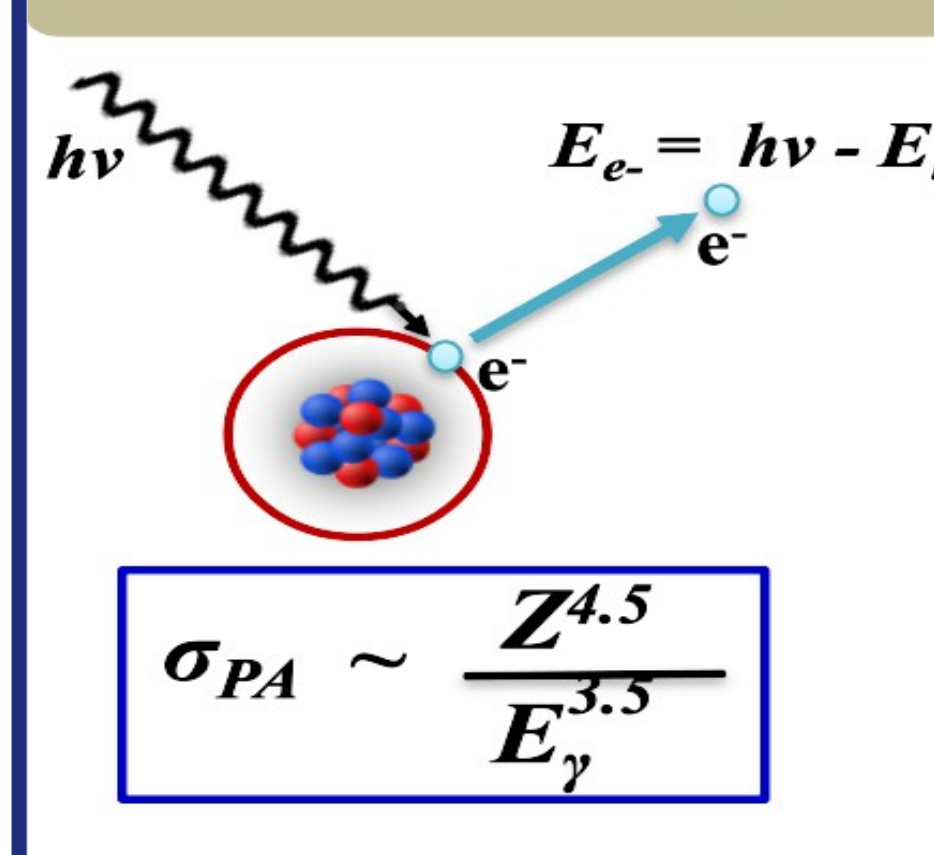
Gamma-ray spectroscopy is a tool for experimental approach to study Nuclear Structure.

This technique is one of its kind from application point of view, which are illustrated as follows: Environmental Radioactivity Monitoring, Health Physics Personnel Monitoring, Reactor Corrosion Monitoring, Nuclear Materials Safeguards and Homeland Security, Forensics and Nuclear Forensics, Materials Testing, Geology and Mineralogy, Nuclear Medicine and Radiopharmaceuticals, Industrial Process Monitoring, Naturally Occurring Radioactive Materials.

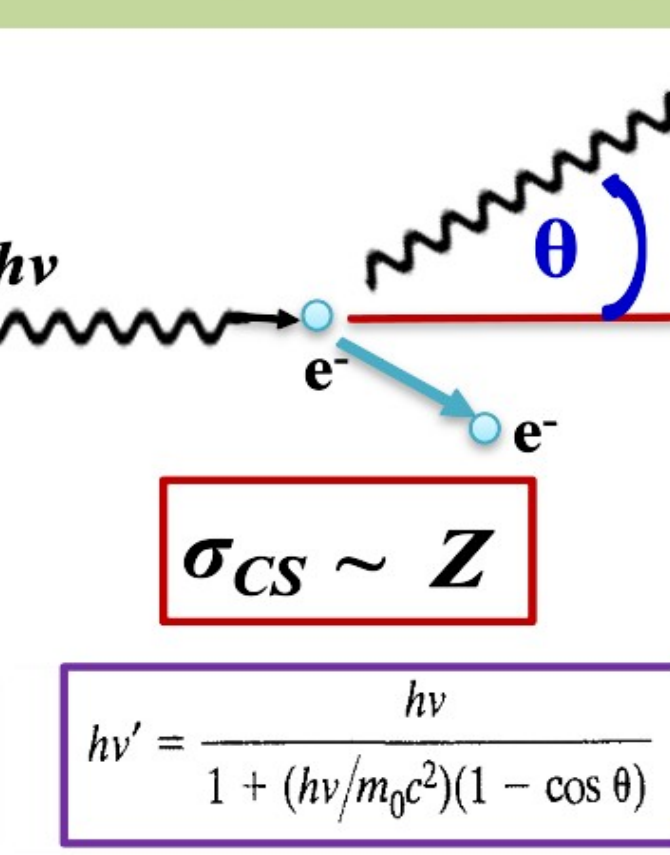


Interaction of Gamma-rays with matter

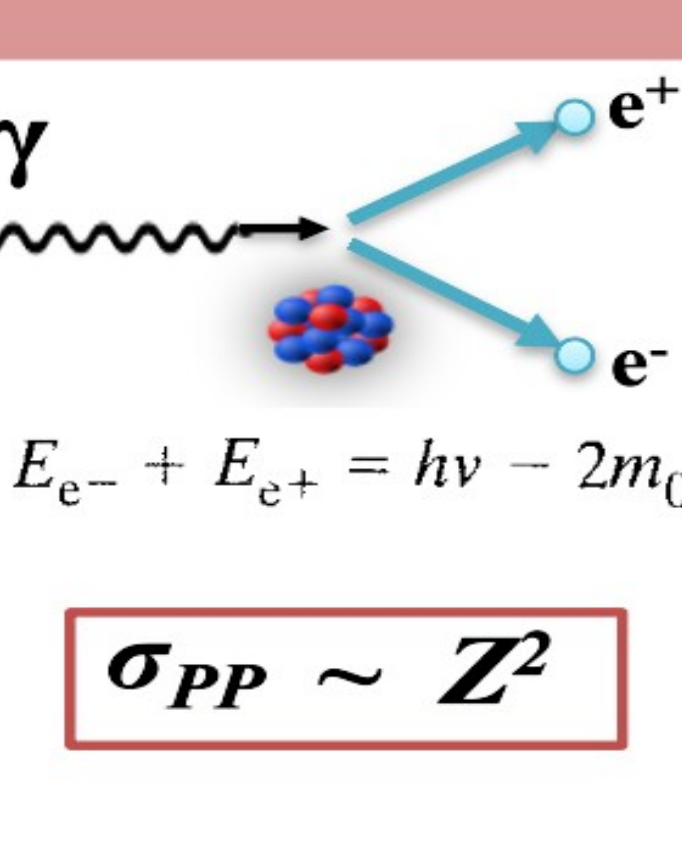
Photoelectric Absorption



Compton Scattering



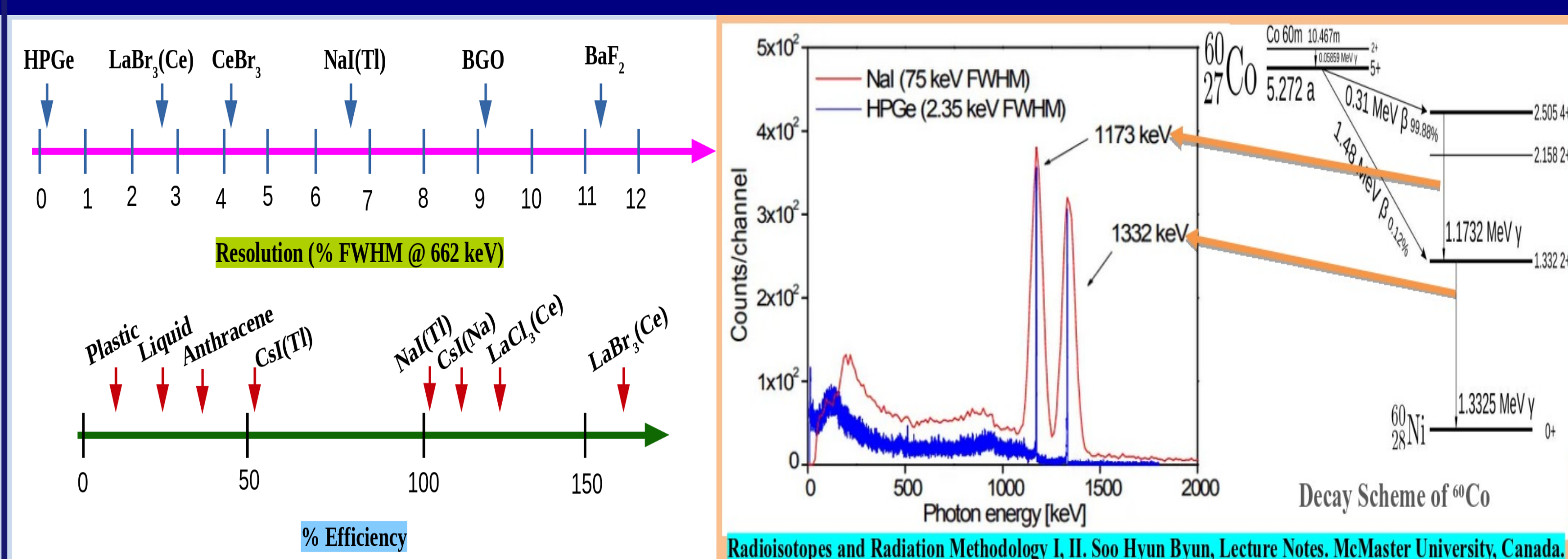
Pair Production



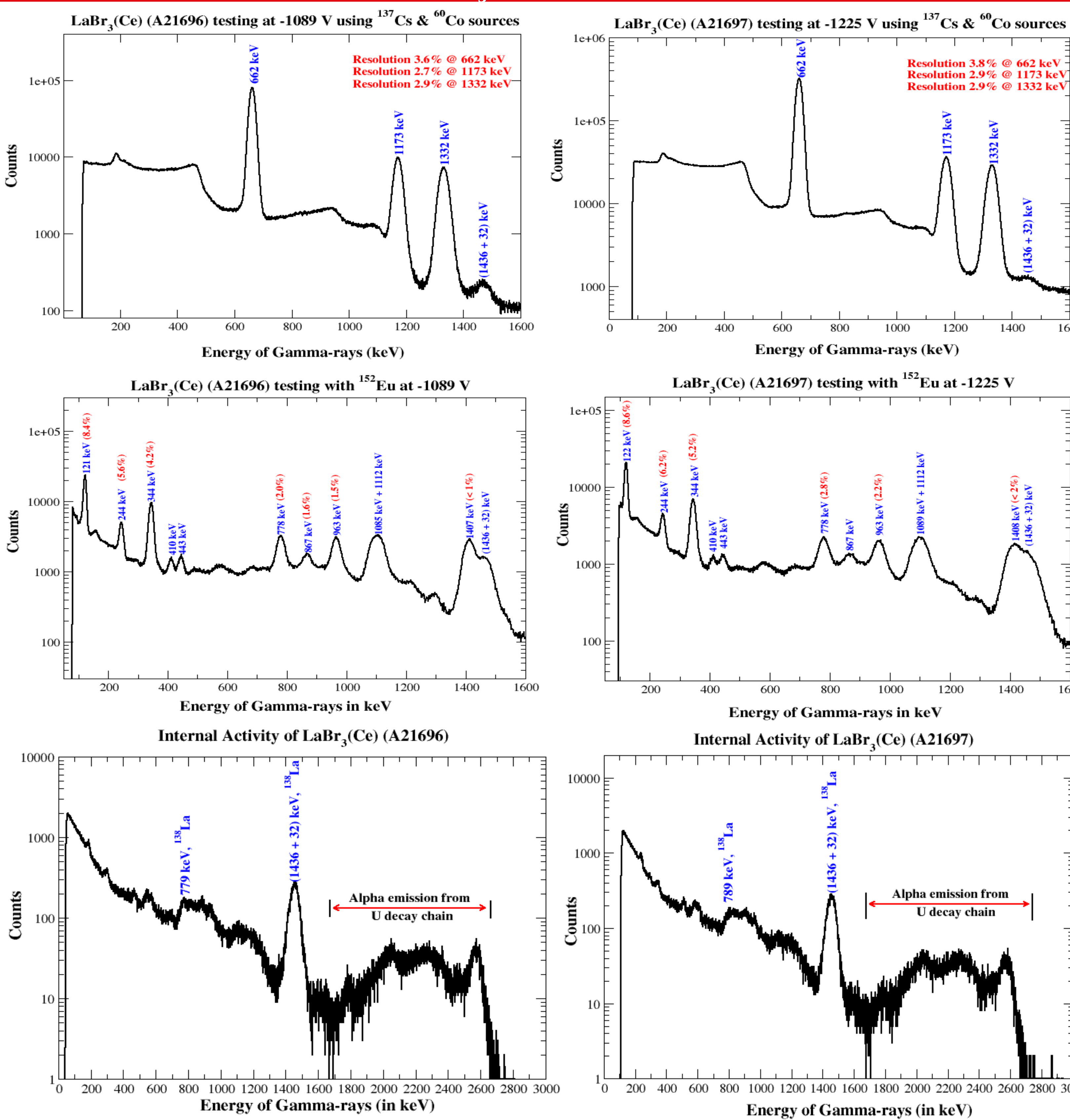
Detectors available in Radiation Detectors & Spectroscopy Laboratory



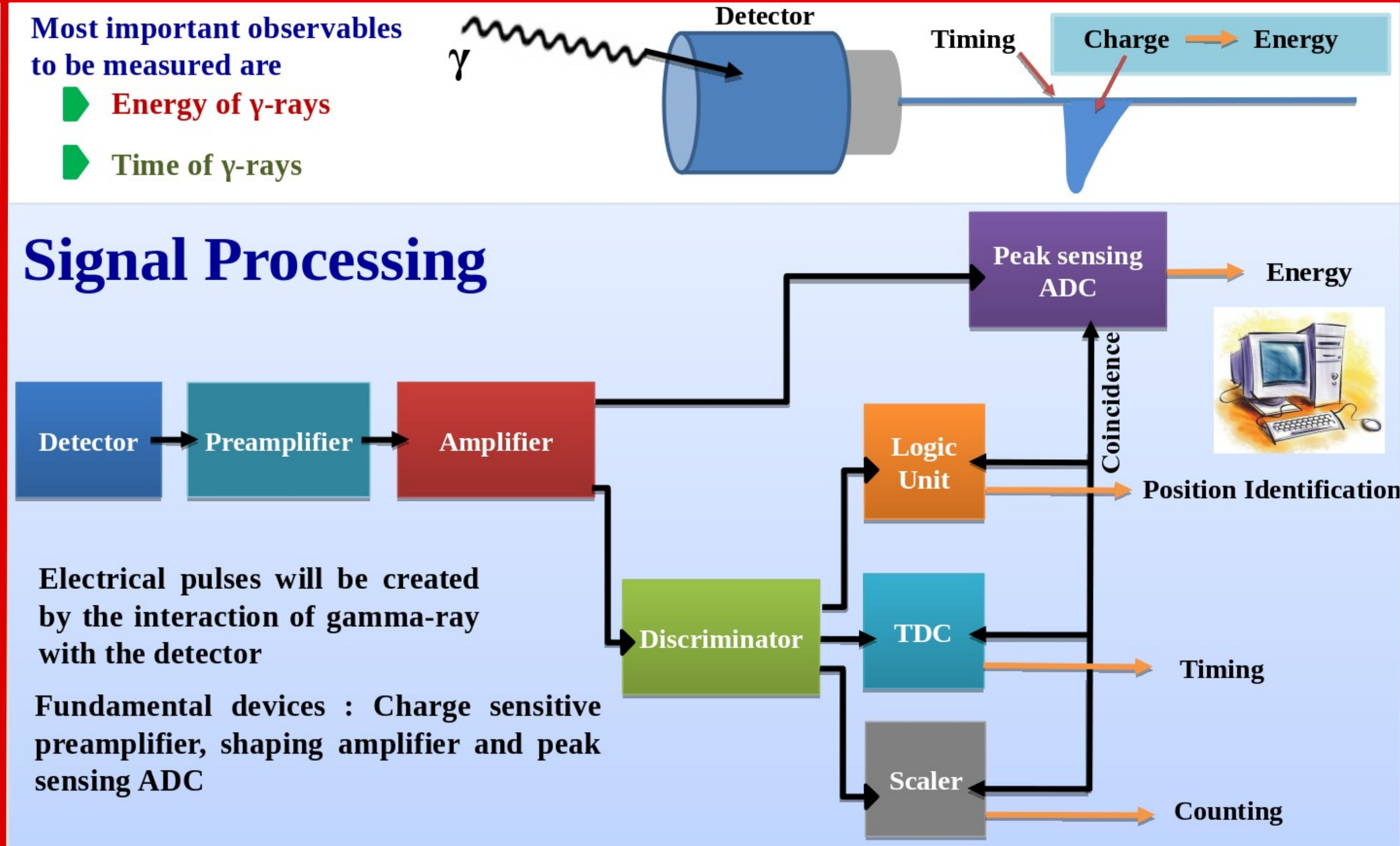
Relative comparison of resolution & efficiency of detectors



Testing of two new LaBr3(Ce) detectors in RDS Laboratory

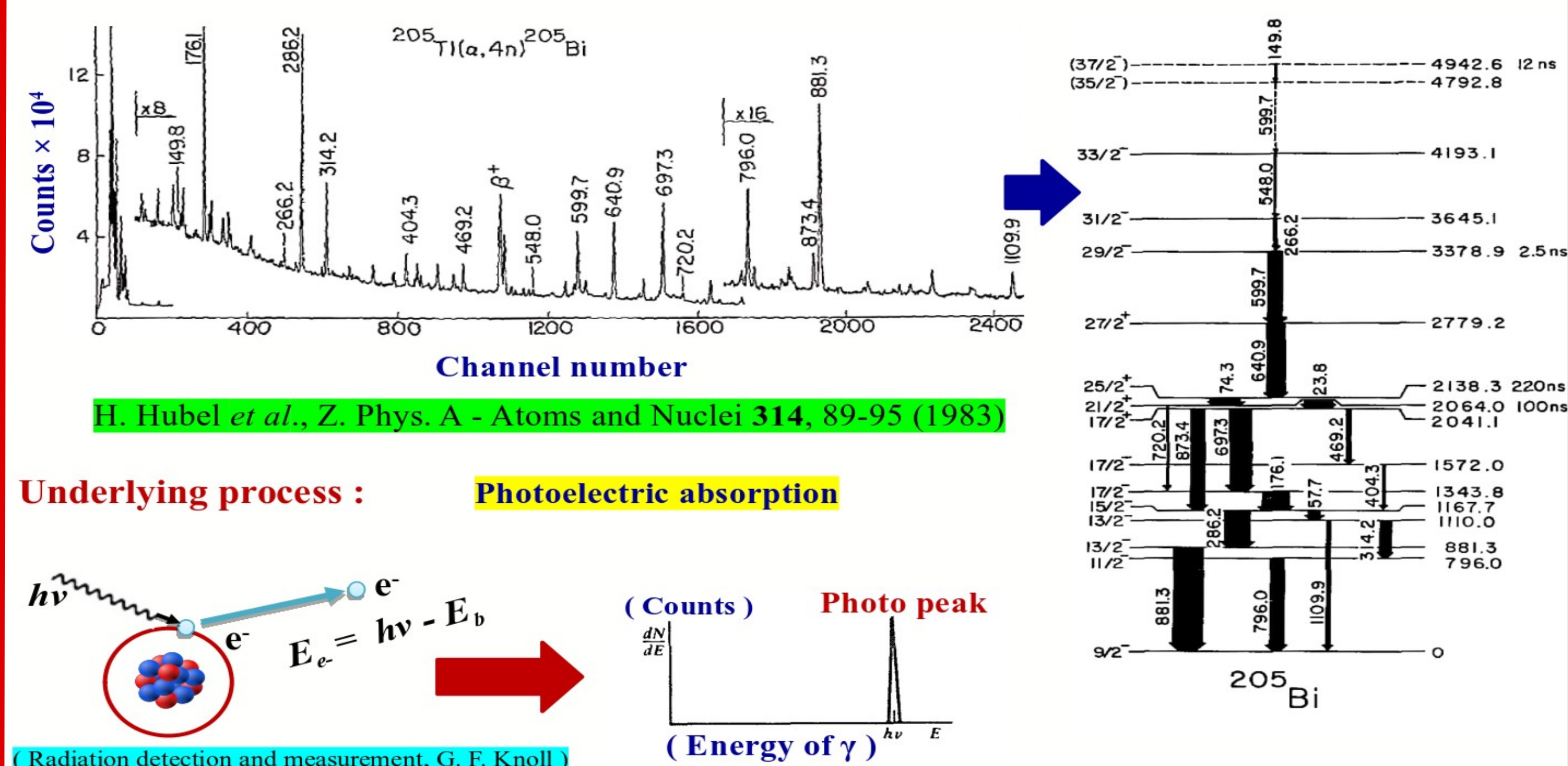


Nuclear Electronics



Probing Nuclear Structure through Gamma-ray Spectroscopy

γ-ray Spectroscopy is a tool for experimental approach to study nuclear structure.

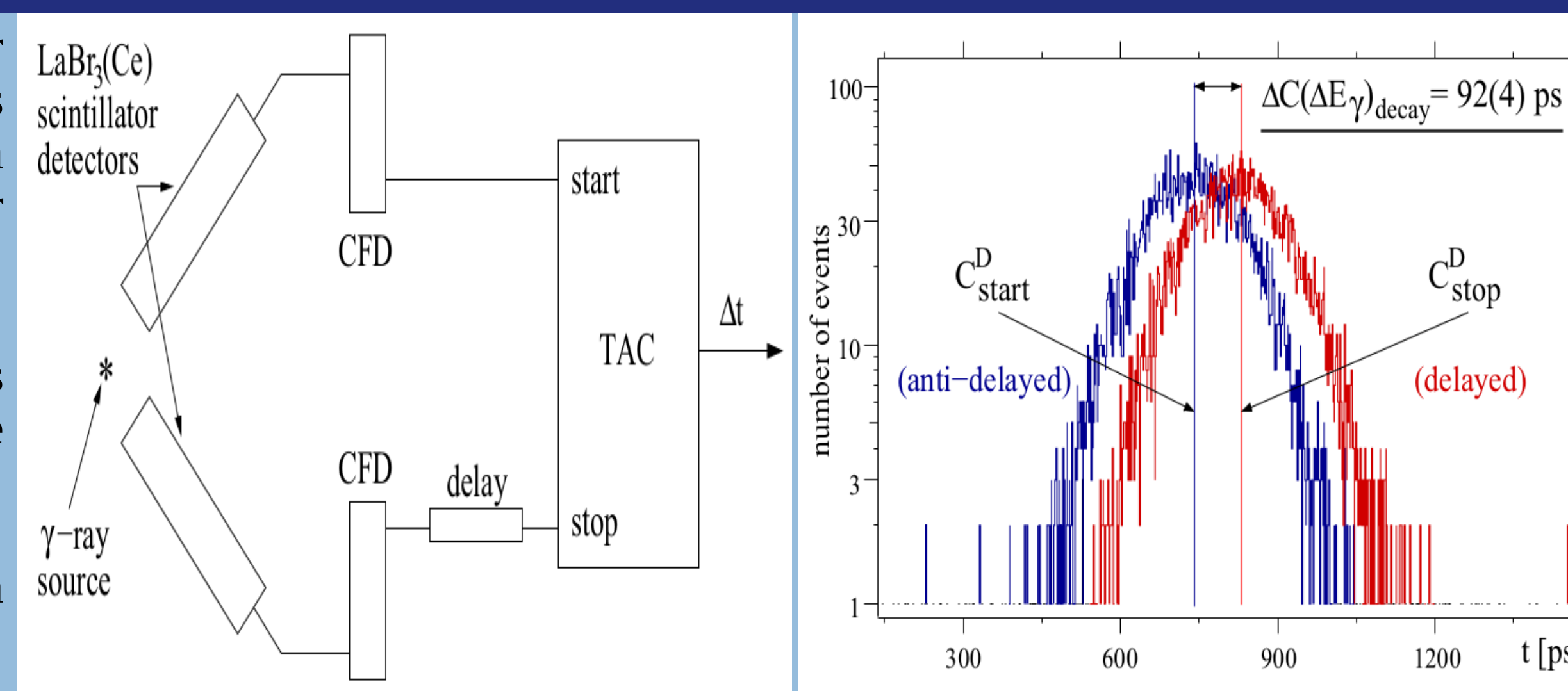


Future plan of experiment with 1 HPGe + 2 LaBr3(Ce) detectors in RDS Laboratory

Direct electronic "fast-timing" lifetime of nuclear excited states will be measured via γ-γ coincidences using an array of two very fast high resolution LaBr3(Ce) scintillation detectors and one HPGe for energy measurement.

A generalized centroid difference method is employed for the measurement of half-life of the excited states more than 20 picoseconds.

For this purpose, digital data acquisition system such as PIXIE4 and CAEN Digitizers will be used.



References:

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- D. Alexiev *et al.*, IEEE TRANSACTIONS ON NUCLEAR SCIENCE 55, 3 (2008)
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