

charge readout: transferring technology from rare event searches

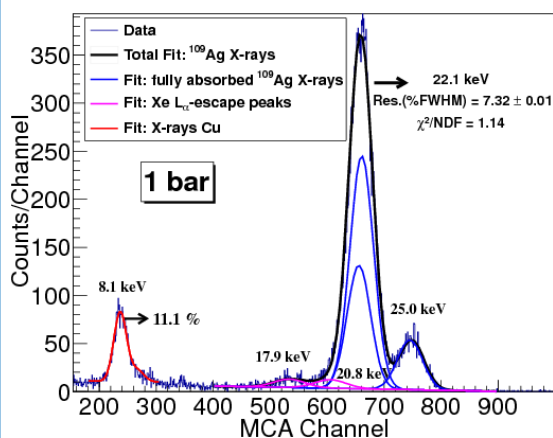
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Introduction

- Imaging techniques are essential for medical diagnosis. The traditional scintillation detectors have **limited efficiency** and **resolution**, while new semiconductor detectors are **expensive**.
- **What do we need for imaging?**
 - A large active volume to reduce exposure time and doses
 - A high fraction of “good” events
 - Good energy resolution
 - Excellent spatial resolution
 - A powerful signal reconstruction software
 - Easy to mount and low cost

The Idea/Concept

- **Gas chamber detectors** equipped with **high granularity charge readout** working with **Xenon at high pressure**
 - **good energy resolution** and excellent **spatial resolution**,
 - competitive **efficiency, uniformity** and **no dead areas**
 - **easy to build**, long term **stability, low cost** and the ability to **scan large areas**
- These novel detectors in the frontier of technology development are more and more used in particle physics due to their high performance → **ready be transferred to medical imaging**.
- RESTSoft (Software for Rare Event Searches with TPCs) → **A software package optimized** for simulation, data acquisition, event reconstruction and analysis
- The Zaragoza group offers its **expertise, know-how** and **a lab** to work on this concept.



Cd109 X-Ray spectra in a TPC detector (Xe+1.7%TMA)

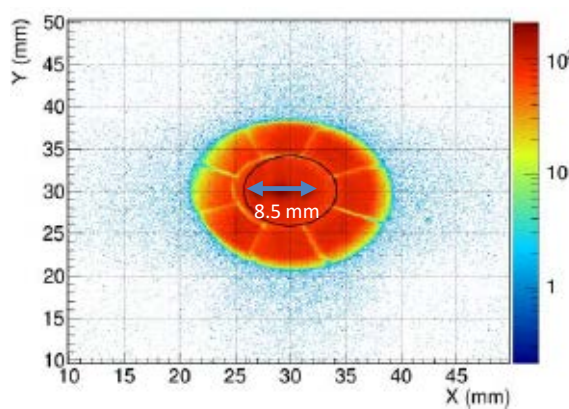
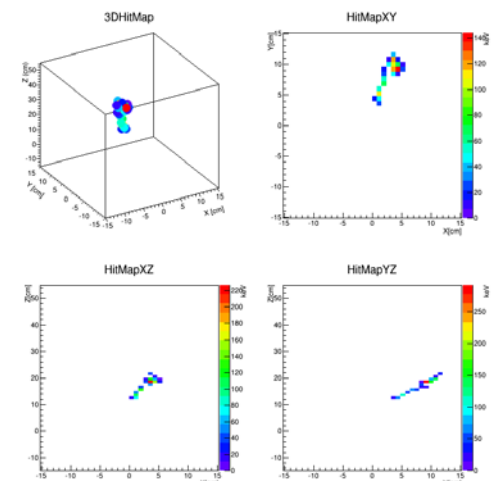


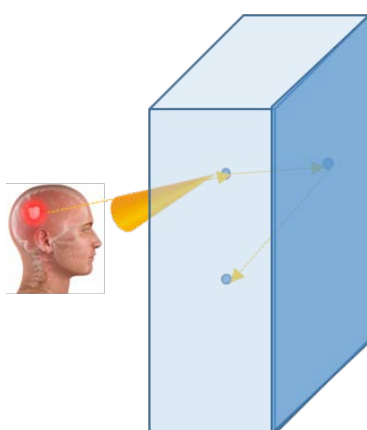
Image of the spider-web shape of the window strongback - CAST experiment



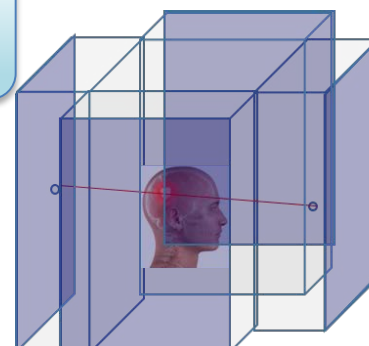
Na source- 511keV events (8mm/pixel) - TREX-BB detector

Potential Impact

A qualitative leap in terms of **imagen quality** and **cost** thereof



Compton Camera



PET system

