

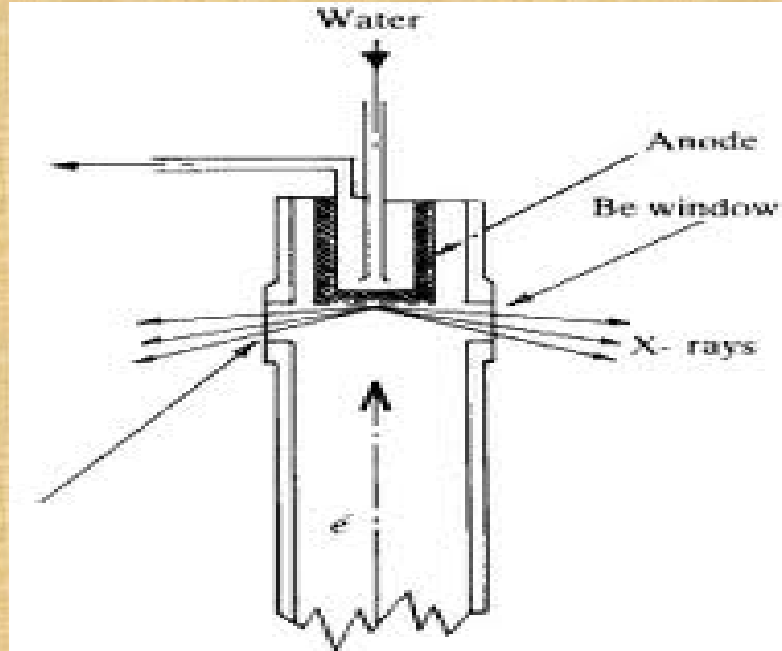


Radiography, Tomography



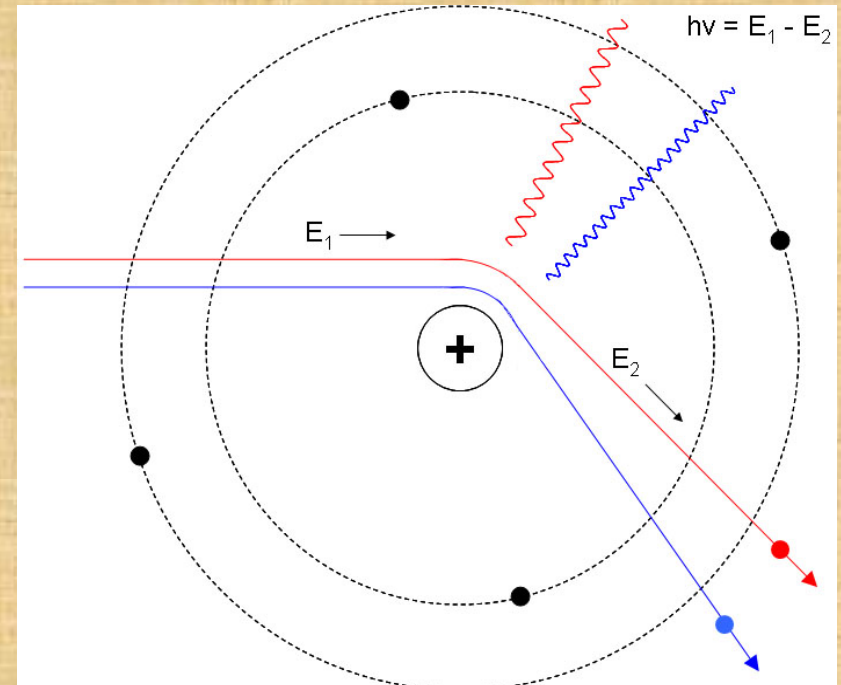
Physics of Radiography

- Source -> electron jet -> collision -> EM-ray ejection(Compton Scattering) or Absorption (photoelectric effect)



X-ray tube

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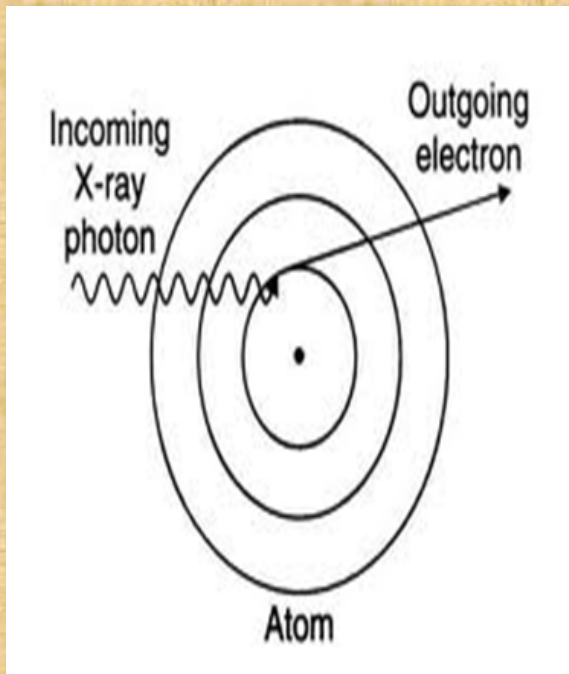
Bremsstrahlung Radiation

chemwiki.ucdavis.edu

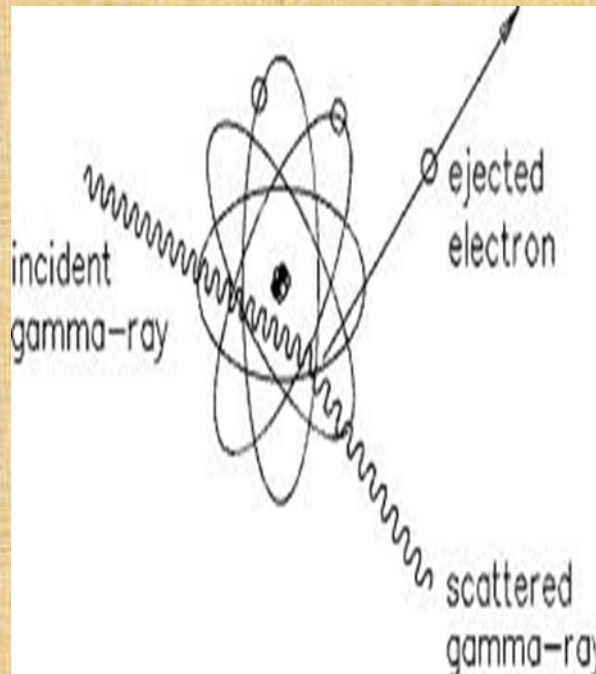


Physics of Radiography

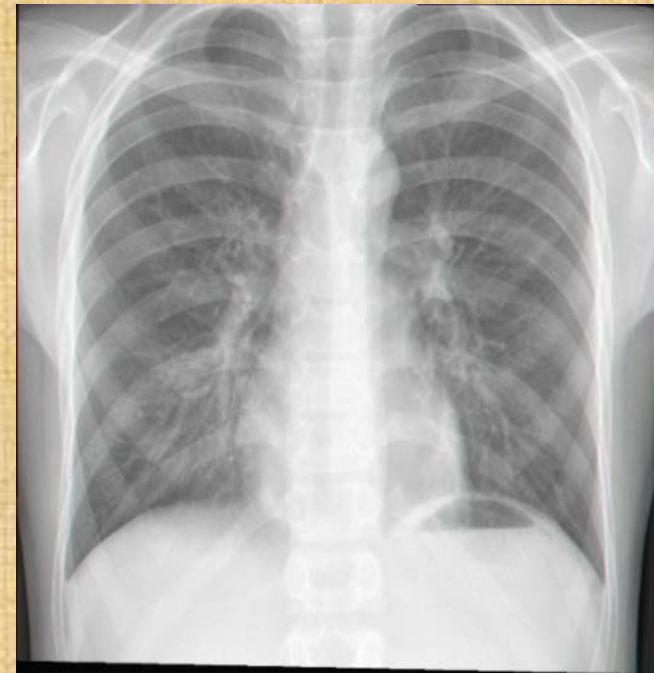
- Densities, energy levels, penetration depths, etc



Photoelectric Effect



Compton Scattering

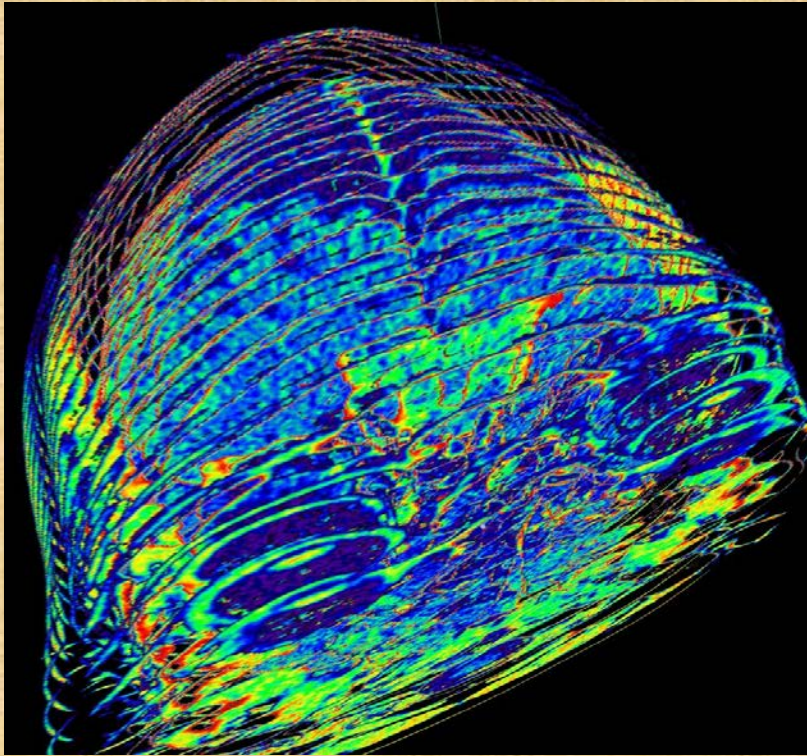


Chest x-ray, openi.nlm.nih.gov

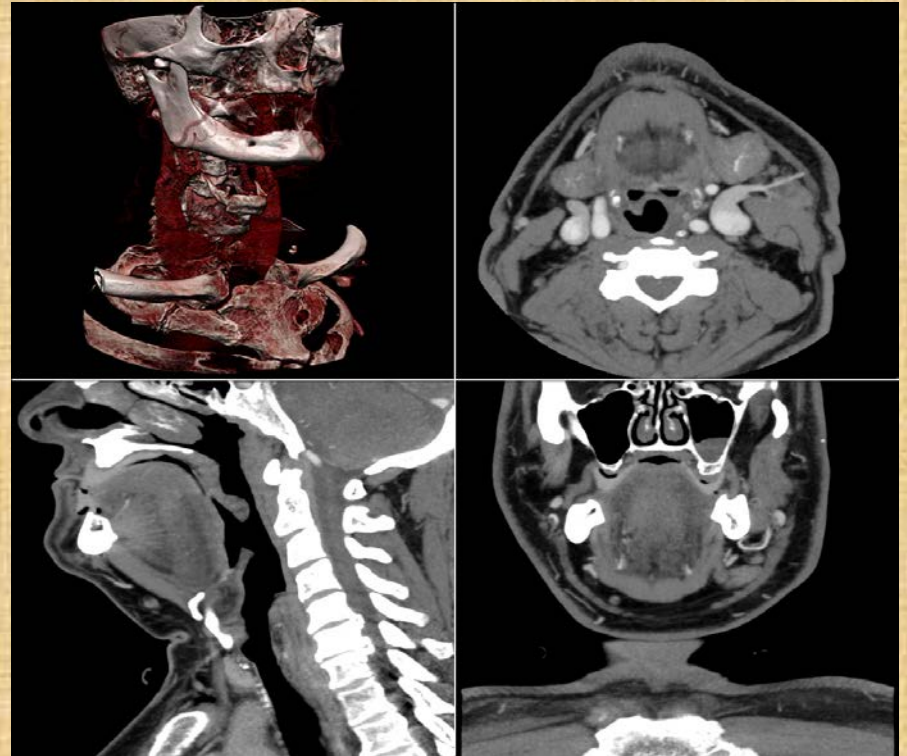
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Tomography



Digital tomographic reconstruction of brain,
Wikimedia Commons, Dale Mahalko



Digital tomographic reconstruction of skull, neck,
upper chest, Wikimedia Commons

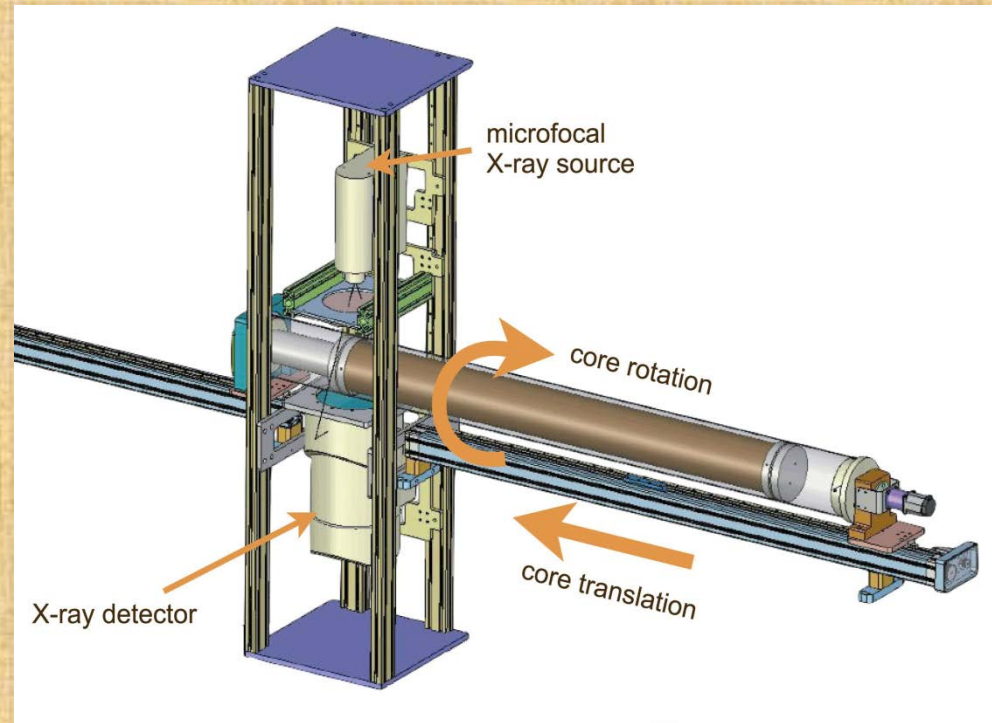
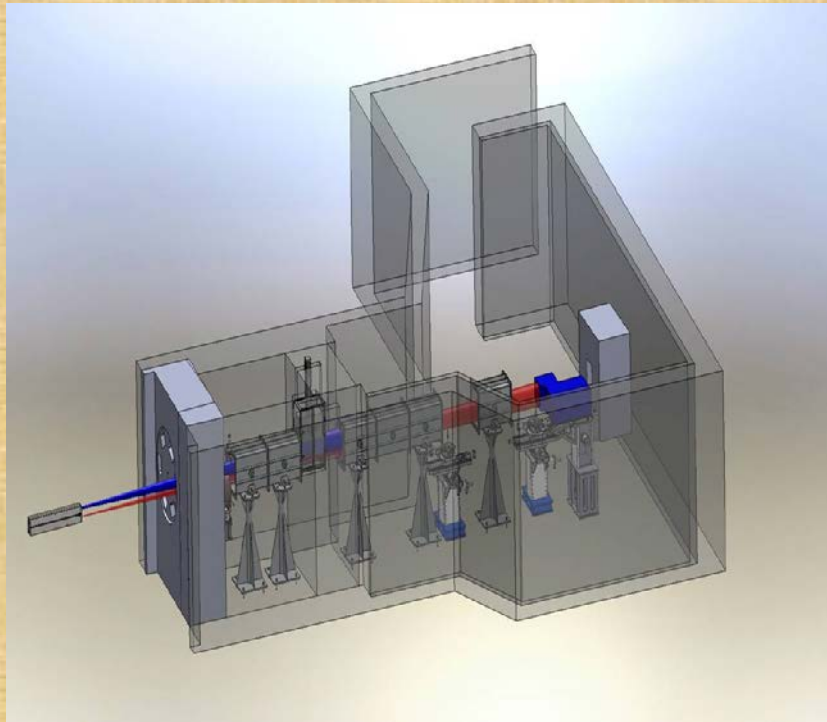


Instrumentation

- Materials
 - X-ray
 - Gamma Ray
- Examples of actual instruments
 - Film, digital imaging

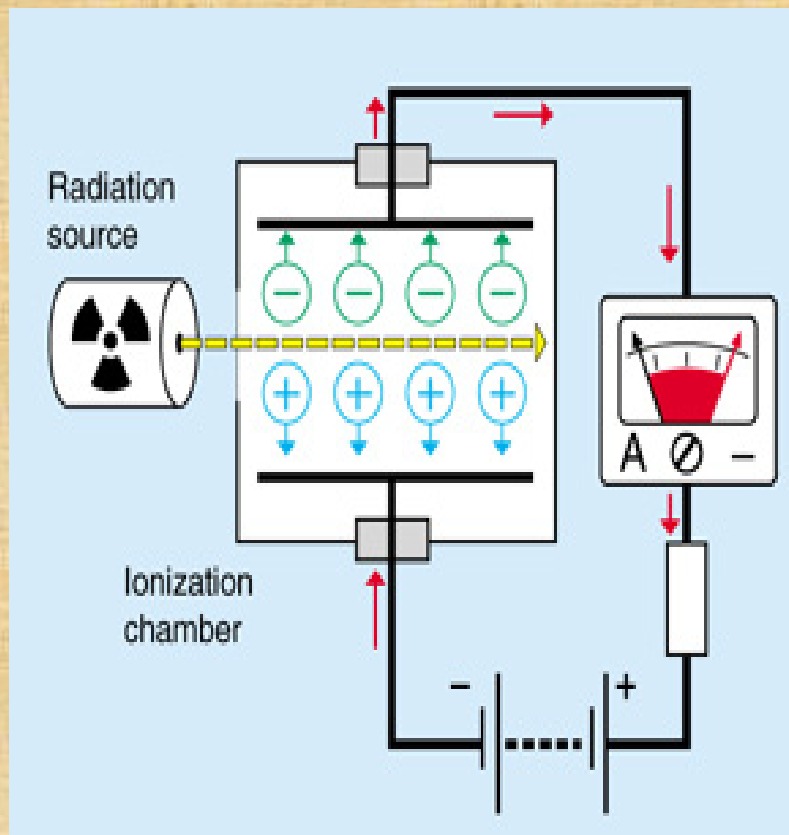


Current Tech and Techniques

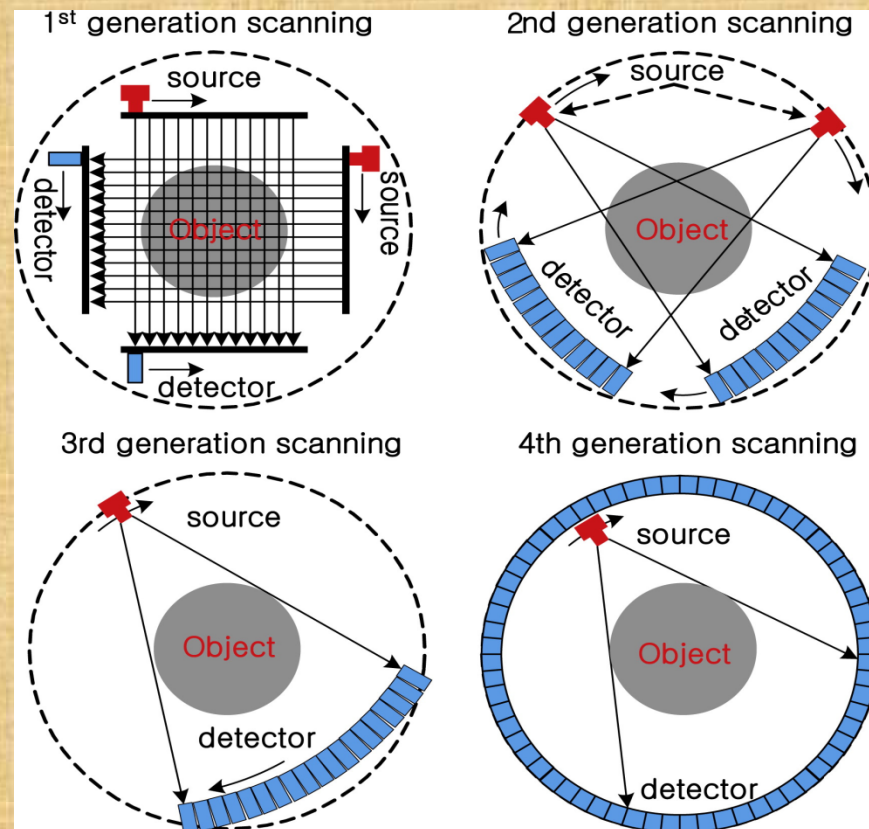


Neutron radiography, Dingo, ansto.gov.au

MSCL-XCT , tomography of geological cores, paleomag.uqar.ca



Ionization chamber, euronuclear.org



Geometry of source-detection scanning,
<http://dx.doi.org/10.1016/j.nima.2011.02.082>



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Industrial gamma-ray tomographic scan method for large scale industrial plants

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ABSTRACT

In this paper, a tomographic scan method with fixed installed detectors and a rotating gamma-ray source system is presented to diagnose industrial plants, which were impossible to examine by conventional tomographic systems. Monte Carlo simulations had been performed for two kinds of phantoms. Lab-scale experiments with the same condition as one of the phantoms, have been carried out. Algebraic and statistical reconstruction methods were applied for the reconstruction of simulation and experimental data. The reconstruction results from different algorithms were compared. Simulation results showed that reconstruction from the photopeak counting measurement gave better results than the gross counting measurement, although the photopeak counting measurement had large statistical errors. The statistical algorithm gives better results for tomographic scan methods than the algebraic method for the simulation data. Simulation and experimental data showed that this work demonstrates the feasibility of the fixed detection and rotating source system for scanning of industrial plants. Those results appear to be promising for industrial tomographic applications, especially for petrochemical industries.

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Sites Using Radiography



Radiography and Artifacts



Possibilities, Feasibility

- Best if used in combination with numerous other techniques
- However, not economically efficient; still, most reliable procedure

Bibliography