

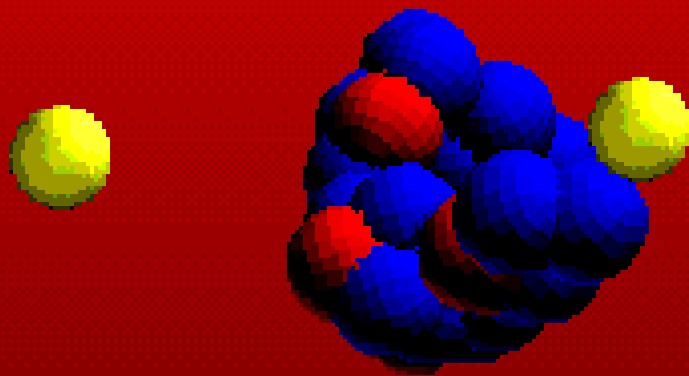
Positron Emission Tomography (PET)

- Imaging techniques
 - Neurology
 - Oncology
 - Cardiology
 -
- Only possible with advances from
 - Mathematics/physics
 - Computer science
 - Medical engineering
- Complementary to MRI techniques
- Why so hot?
 - Oncology (clinical demand)
 - MicroPET (basic research, animal studies)

What to cover

- Basic PET physics
- The use of PET technique in medical research
- PET image reconstruction algorithms
- Various measurement error sources and correction procedures

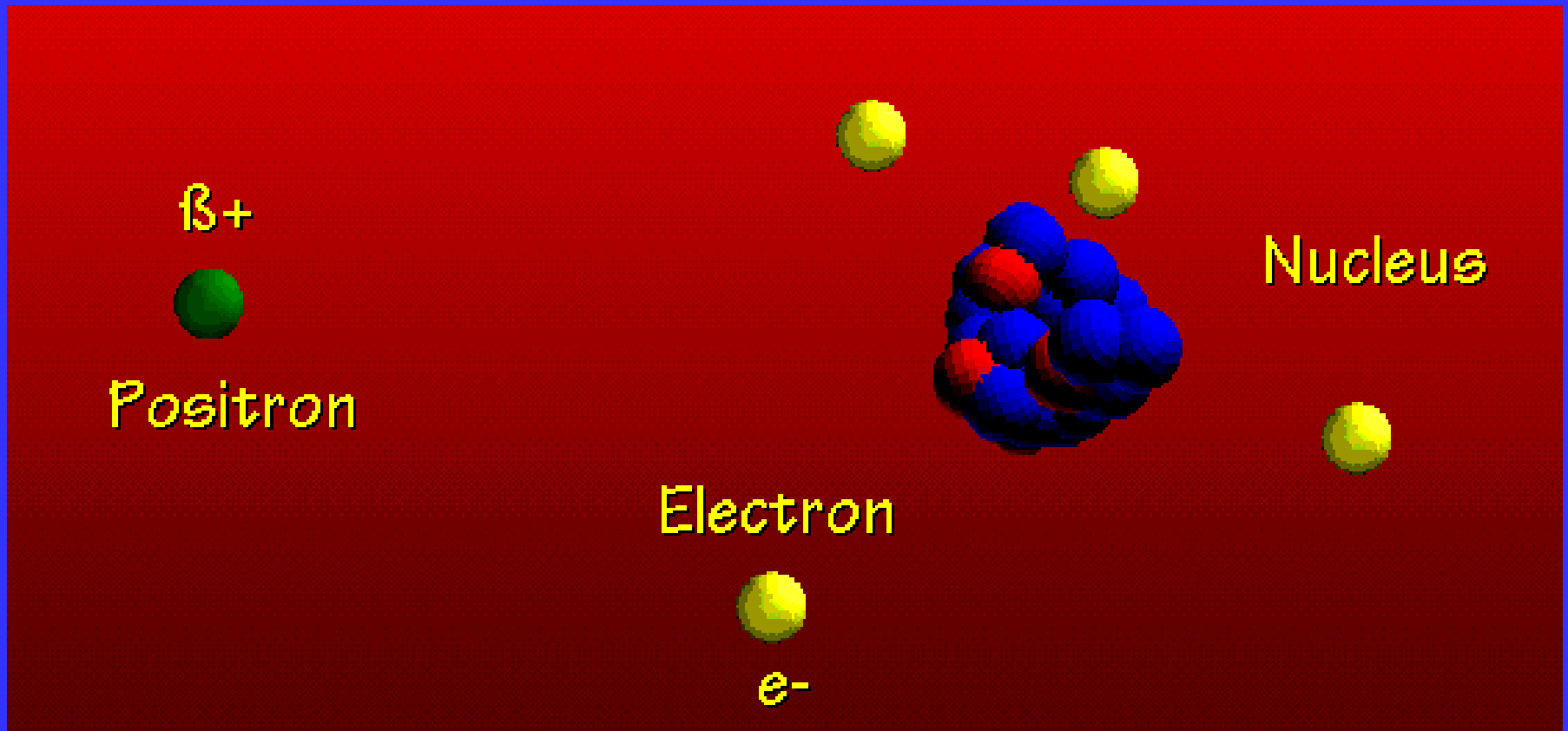
Nucleus (Protons + Neutrons)

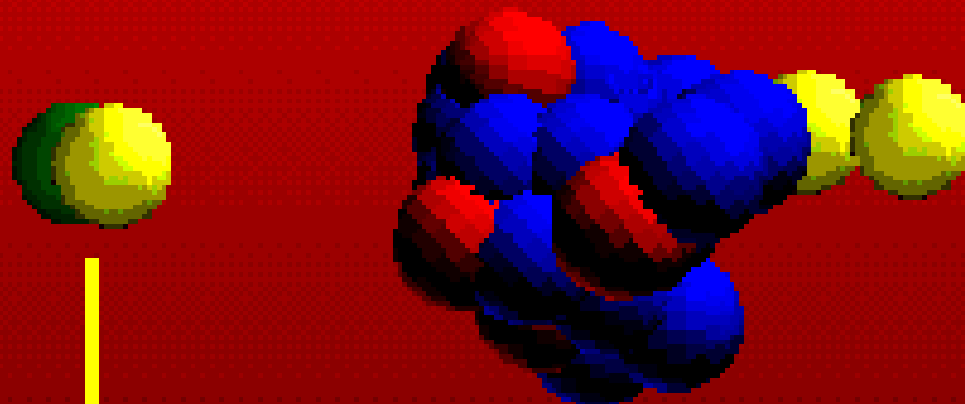


Electron

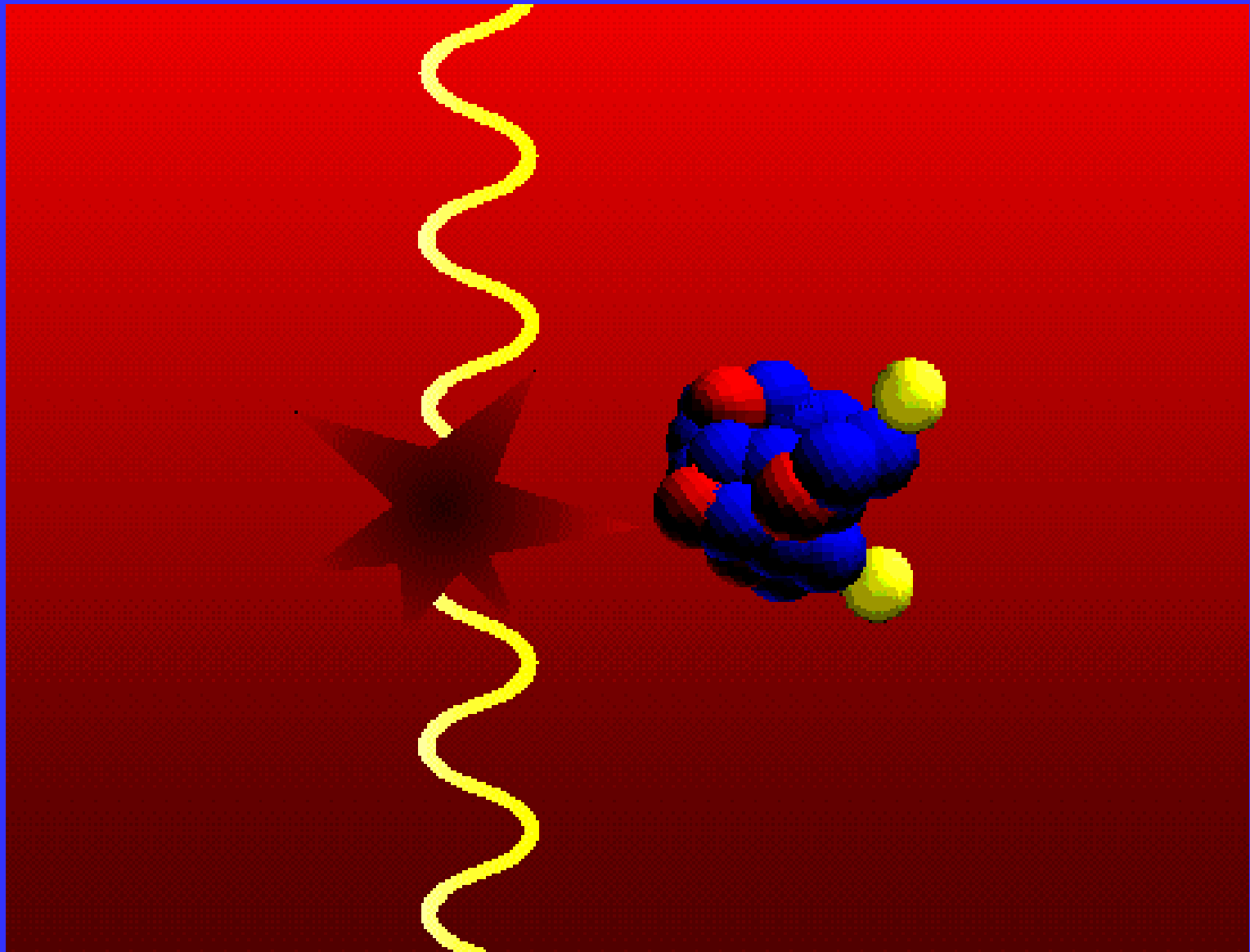
Isotope	Maximum Positron Range (mm)
F-18	2.6
C-11	3.8
Ga-68	9.0
Rb-82	16.5







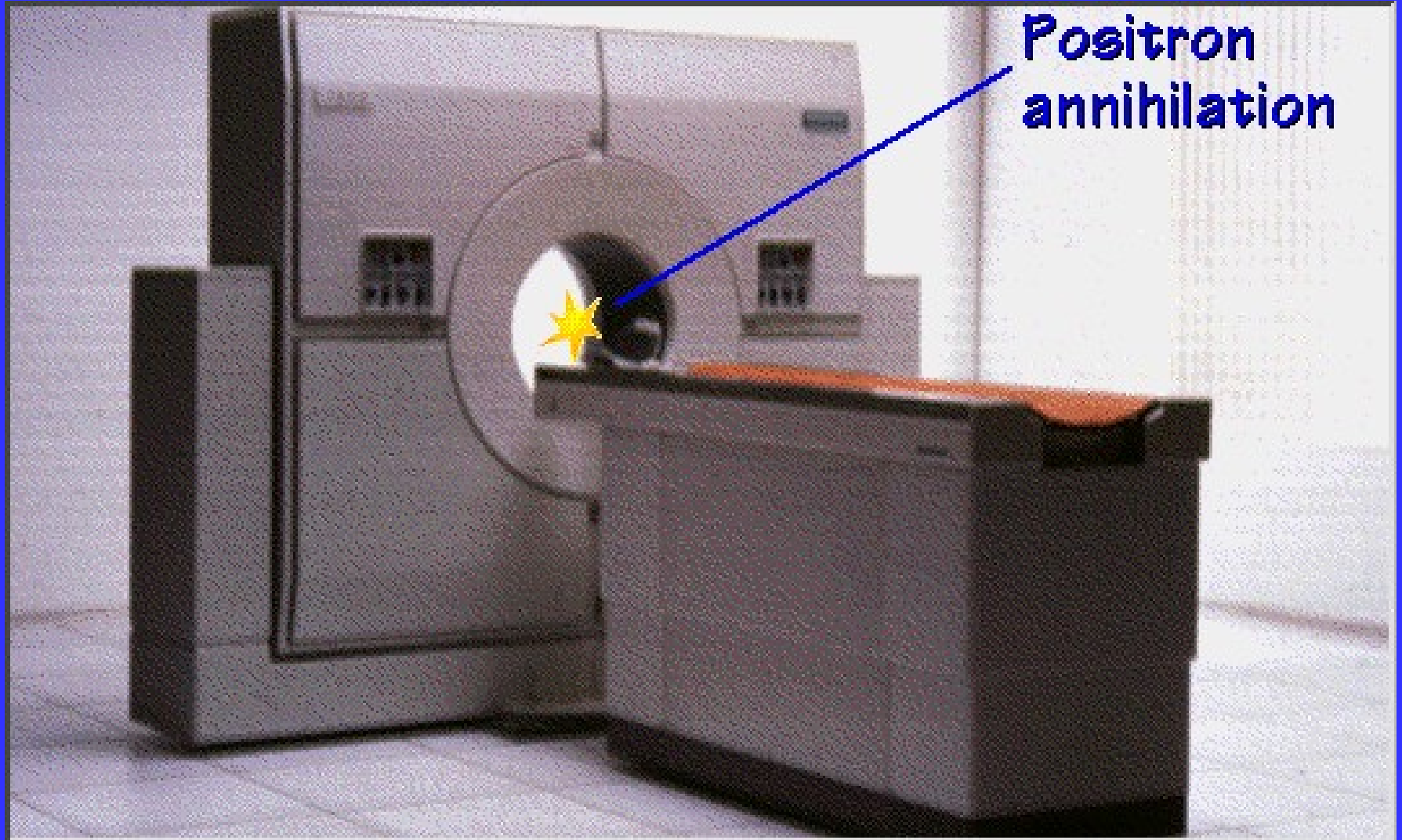
Positronium

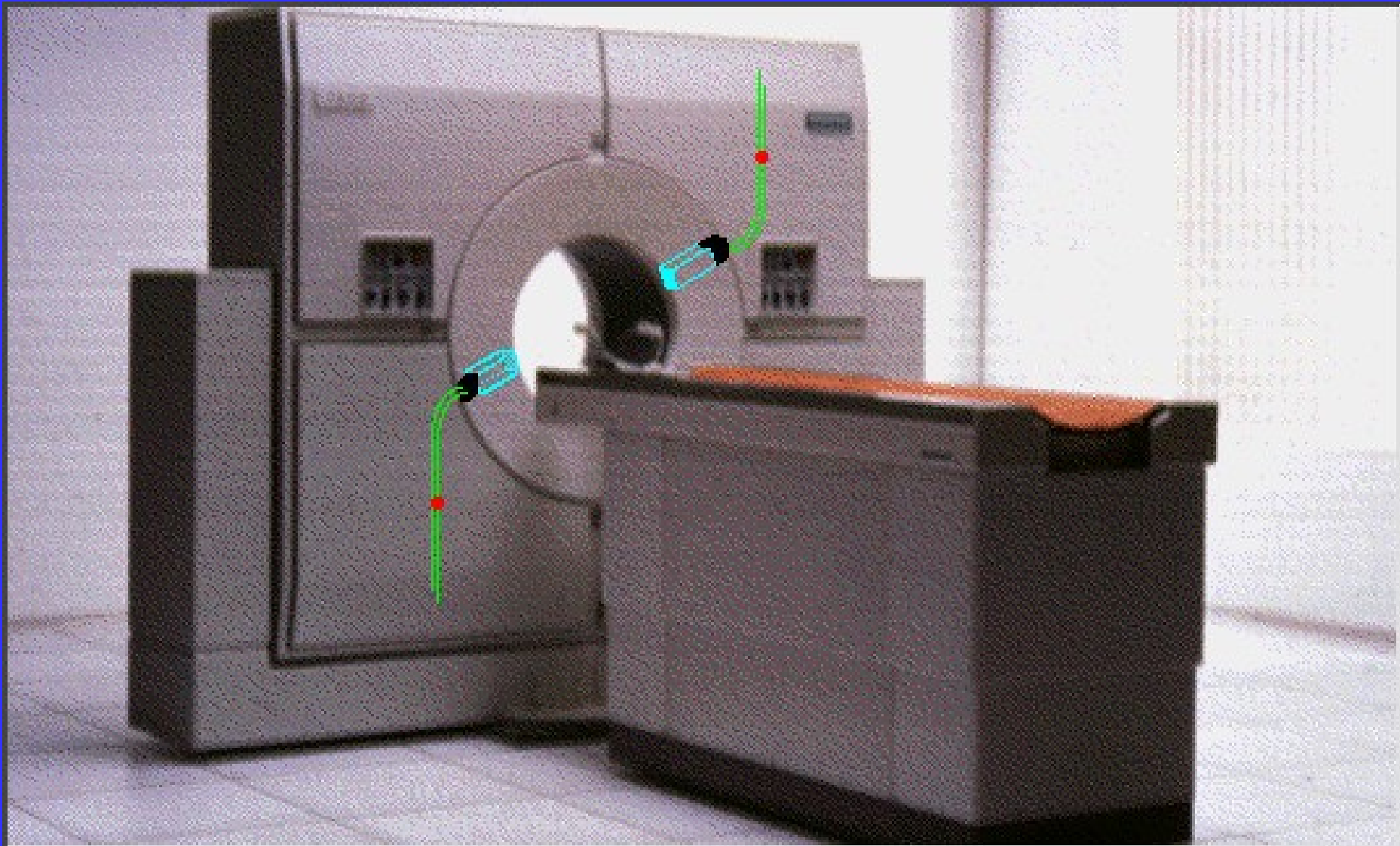


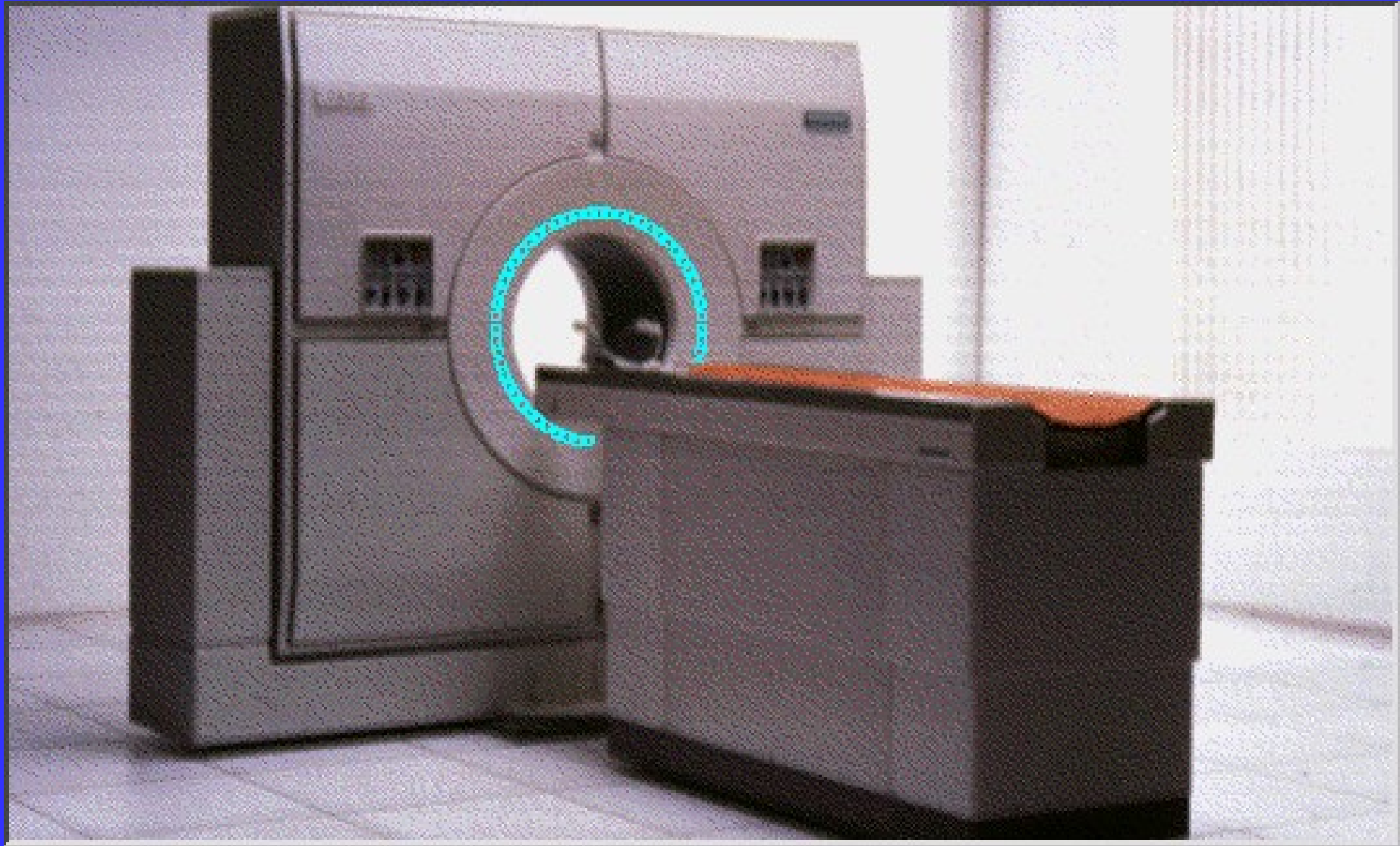
coincidence time window

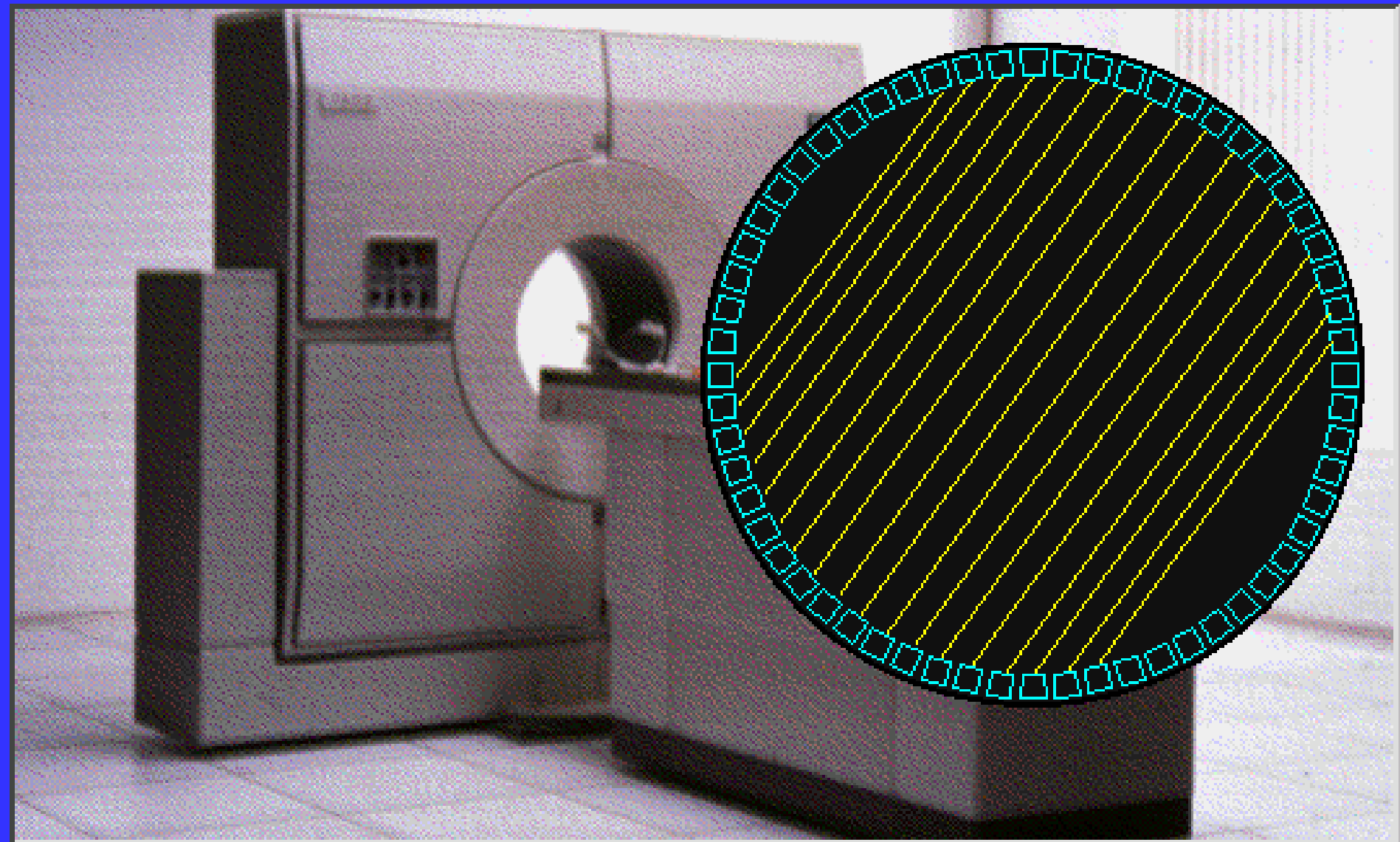
Source: <http://www.crump.ucla.edu/software/lpp/lpphome.html>

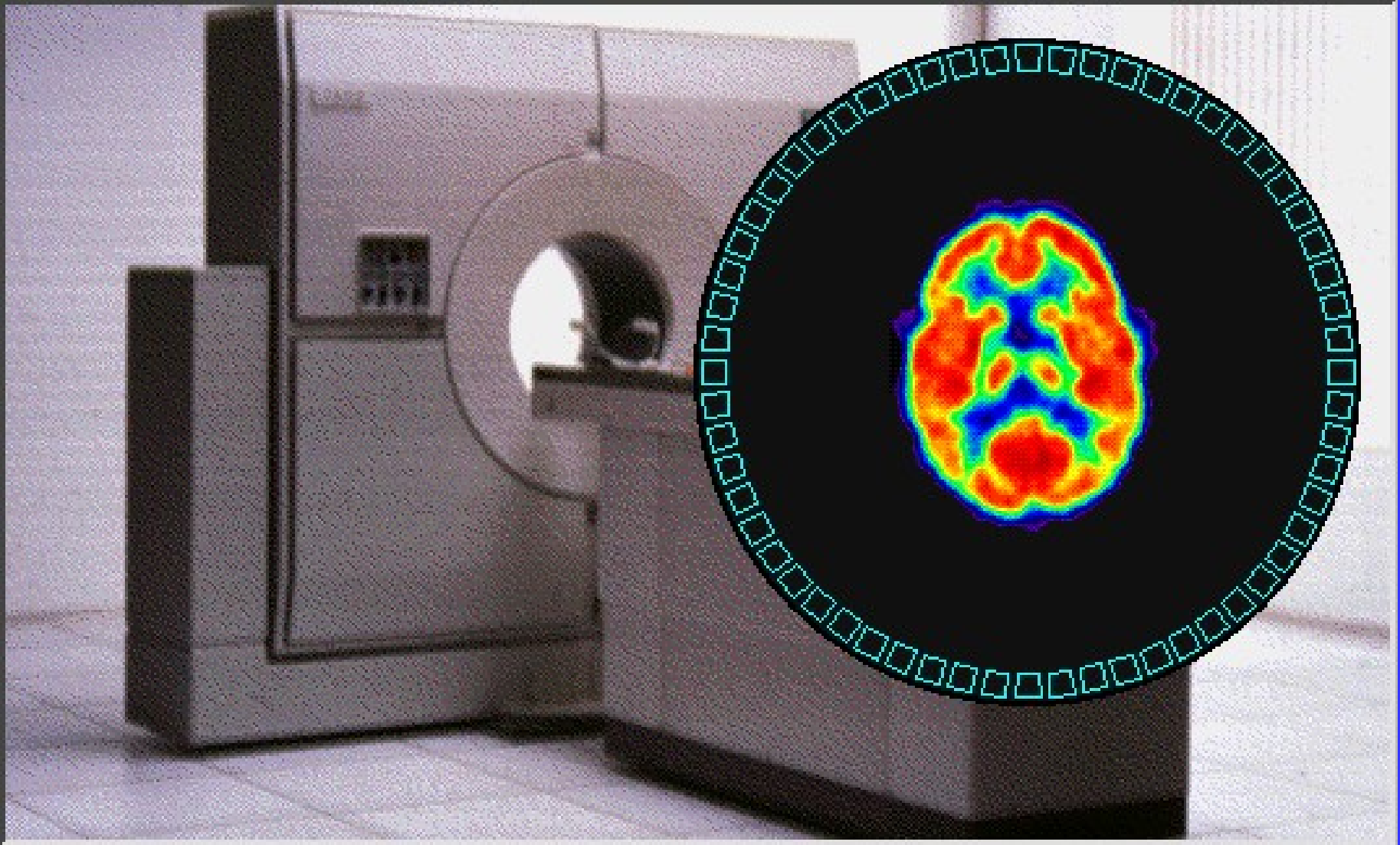
**Positron
annihilation**











Radon transform: you know $\int f(x, y) dl$, you know $f(x, y)$

Very active research area: iterative image reconstruction