

Scanning the Unseen

By sending low-dose X-rays at an object through a range of angles and measuring the rays' absorption, CAT (Computed Axial Tomography)-scans provide precise images that conventional X-rays can't. Multivariable calculus and a mathematical tool known as the *Radon transform*—invented early in the 20th century—are crucial to the efficient reconstruction of a three-dimensional image from the information gleaned along the one-dimensional lines. That efficient reconstruction allows for better images with less exposure to X-rays—benefiting doctors and patients alike.

The same mathematical principles used in CAT-scans are also used in a field called *astrotomography*, providing unprecedented resolution of binary stars and the surfaces of rapidly rotating stars. In this application the rotation of a star or pair of stars replaces the rotation of the scanning machine and positions and velocities are found based on radiation detected from the star(s). Thus, mathematics discovered long before CAT-scan technology enables detailed views from within the human body to far beyond our solar system.

For More Information: *Mathematical Methods in Image Reconstruction*, F. Natterer and F. Wübbeling.

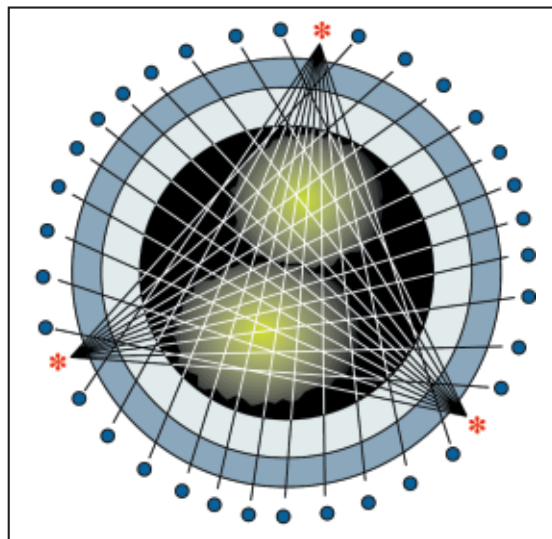


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