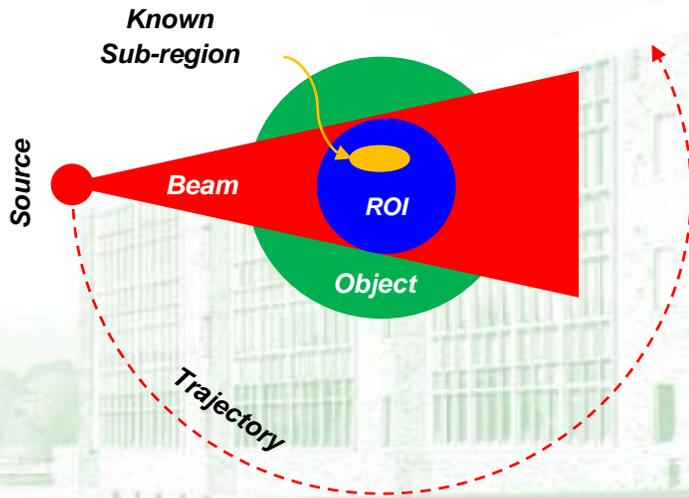


## Interior Tomography — Depict with Direct Data



While the conventional wisdom states that the interior problem - to reconstruct a region of interest (ROI) only from projection data through the ROI - does not have a unique solution, **in June 2007 we published the first paper on interior tomography to solve the interior problem exactly and stably, aided by the prior knowledge on a sub-region in the ROI.** We underline that interior tomography is potentially a powerful, even indispensable tool to handle large objects, reduce radiation dose, suppress scattering artifacts, refine image quality, decrease engineering cost, increase system functionalities, and boost scanner throughput in many biomedical and other applications. Interior tomography can be extended to other similar tomography modalities including MRI, ultrasound tomography, SPECT and PET.

### Prior-art in the Field

Natterer F: *The Mathematics of Computerized Tomography*. Classics in applied mathematics 32, Philadelphia: Society for Industrial and Applied Mathematics, 2001 (**Classic proof of the solution non-uniqueness of the interior problem**)

Defrise, M., Noo F, Clackdoyle R, Kudo H: Truncated Hilbert transform and image reconstruction from limited tomographic data. *Inverse Problems* 22:037-1053, 2006 (**One-side data truncation allowed for exact reconstruction of a peripheral ROI**)

### Publications by Our Team

Wang G, Ye YB and Yu HY: Methods and systems for exact and appropriate ROI/VOI reconstruction. Patent disclosure filed with the Virginia Tech., May 15, 2007 (**VTIP Ref: 07-071; US Patent Application 60/989,591, May 15, 2007**)

Ye YB, Yu HY, Wei YC and Wang G: A General local reconstruction approach based on a truncated Hilbert transform. *International Journal of Biomedical Imaging*, Article ID:63634, 2007, 8 pages (**First journal paper on interior tomography, proved the uniqueness, established the stability, described an algorithm and demonstrated the feasibility; independent work also reported by Kudo H., Courdurier M, Noo F and Defrise M**)

Ye YB, Yu HY and Wang G: Exact interior reconstruction with cone-beam CT. *International Journal of Biomedical Imaging*, Article ID:10693, 2007, 5 pages (**Formulated interior tomography for cone-beam CT**)

Ye YB, Yu HY and Wang G: Exact interior reconstruction from truncated limited angle data. *International Journal of Biomedical Imaging*, Article ID:427989, 2008, 6 pages (**Formulated interior tomography from limited-angle data**)

Yu HY, Ye YB and Wang G: Interior reconstruction using the truncated Hilbert transform via singular value decomposition. *Journal of X-ray Science and Technology*, to appear (**First non-iterative method for interior tomography to improve the speed by two orders of magnitude**)