

## AbstractID: 7214 Title: OSCaR: An Open-Source Cone-Beam CT Reconstruction Tool for Imaging Research

**Purpose:** In spite of over twenty years of computerized tomography (CT) research since the well-known Feldkamp-Davis-Kress (FDK) method was first derived for three-dimensional Cone-Beam Computerized Tomographic (CBCT) reconstruction, there is a noticeable lack of practical software implementations available. Medical physics researchers needing CBCT reconstructions to prototype more advanced imaging techniques generally need to code the FDK method from scratch or adapt third-party code that may be sophisticated and inflexible. To address this gap in free software tools, the AAPM Imaging Research Subcommittee has supported the development of OSCaR, a simple-yet-flexible open-source Matlab FDK tool for algorithm development.

**Method and Materials:** OSCaR includes open source, executable, and GUI software (Matlab; The MathWorks, Natick MA) for CBCT reconstructions from 2D projections. As a pre-processing stage, projection data are parsed from a standard data-file. Upon specification of a Field-Of-View (FOV), voxel size, and reconstruction filter, the 3D sinogram is filtered and back-projected to produce a 3D reconstruction. The final reconstruction can be exported to various data formats as specified by the user.

**Results:** OSCaR accepts data in a variety of formats accessible to Matlab. A circular source-detector geometry is assumed, but OSCaR allows specification of the piercing point as a function of the projection angle. The aperture can be freely selected, as can the voxel size and the reconstruction filter. Visualization in 3D and in 2D (e.g., slices) is supported.

**Conclusion:** OSCaR demonstrates flexibility, ease of use, and support of a broad range of input data formats. Upon completion of beta testing, the code will be freely available via the AAPM web-site to AAPM members. The software is intended for algorithm development and research purposes rather than for clinical or commercial use. The software provides a reference-able base of code to accelerate new imaging research in CBCT and facilitate multi-institutional collaboration.