AbstractID: 2851 Title: A general method for micro CT system calibration with phantom scan

**Purpose:** System calibration of a micro CT scanner for anatomic imaging of small animals.

**Method and Materials:** A phantom was constructed with lead ball bearings (200 μm in diameter) and scanned with a micro CT scanner designed and built in our laboratory. A general mathematical algorithm was developed to locate the X-ray focal spot and measure the source to detector distance (SID) and the azimuthal rotation of the detector with information acquired from the projection image of the phantom. A wire phantom (0.070mm Ni-Cd) was scanned to calibrate the angle measurement of the stepping motor which drives the rotating stage of the scanner, and also to measure the source to iso-center distance (SIC). An array of different objects was scanned and reconstructed with these calibrated parameters to evaluate the calibration result.

**Results:** With the calibration procedure described, critical system parameters required for cone beam reconstruction including SIC, SID, x-ray focal spot location, detector rotation angle, and stage rotation angle were measured with high precision. Subsequent phantom testing demonstrated the accuracy of this calibration method by qualitative artifact assessment, and spatial resolution metrics (MTF) also demonstrated excellent performance.

**Conclusion:** A simple but precise method for system calibration of a cone beam micro CT system using flat panel detector was developed. This method is likely useful for CT systems across different scales (from micro CT to human CT).

**Conflict of Interest (only if applicable):**