1108-44-51 **Alexander Katsevich*** (alexander.katsevich@ucf.edu), Mathematics Department, University of Central Florida, Orlando, FL 32816, and **Roman Krylov**. *Inversion of the broken ray transform in the case of energy-dependent attenuation.*

Broken Ray transform (BRT) arises when one considers a narrow x-ray beam propagating through medium under the assumption of single scattering. Previous algorithms for inverting the BRT assumed that the medium is characterized by a single attenuation coefficient μ. However x-rays lose their energy after Compton scattering, and the energy loss depends on the scattering angle. Since the attenuation coefficient depends on energy, the μ's before and after scattering are different.

The main thrust of this paper is inversion of the BRT with $N \geq 3$ detectors under the assumption that the attenuation coefficient is a linear function of energy. When the number of detectors is four or greater, we derive a family of inversion formulas. If $N > 4$, we find the optimal formula, which provides the best stability with respect to noise in the data. If $N = 4$, the family collapses into a single formula and no optimization is possible. If μ is independent of energy, $N = 3$ is sufficient for inversion. We also develop iterative reconstruction algorithms that can use global and local data. The results of testing the algorithms are presented. (Received December 16, 2014)