I will discuss inversion of a generalization of the broken-ray transform, which we refer to as the star transform. The star transform is of the form

$$\Phi_K(R) = \sum_{k=1}^{K} s_k I_k(R), \quad R \equiv (Y, Z) \in \bar{S} = \{0 \leq z \leq L\}$$

$$I_k(R) = \int_{0}^{\ell_k(Z)} \mu(R + \hat{u}_k \ell) d\ell.$$  

Here $R$ is the vertex of the star and $\Phi_K(R)$ is the data function for a $K$-ray imaging geometry, $\hat{u}_k = (u_{ky}, u_{kz})$ is a set of $K$ unit vectors with nonzero projections onto the $Z$-axis (that is, $u_{ky}^2 + u_{kz}^2 = 1$ and $u_{kz} \neq 0$), $\ell_k(Z)$ is the distance (defined for each ray) from the vertex to the boundary, finally, $s_k \neq 0$ is a set of known coefficients.

I will explain how the star transform can be obtained from physical measurements, discuss computationally-efficient methods for its inversion and analyze stability. (Received January 28, 2014)