1056-35-920 **Cristian E Gutierrez** (gutierre@temple.edu), 1805 N. Broad St., Temple university, Dept of Mathematics, Philadelphia, PA 19122, and **Henok Z Mawi*** (mawi@templeedu), 1805 N. Broad St., Temple University, Dept of Mathematics, Philadelphia, PA 19122. *The refractor problem with loss of energy and Monge - Ampère type of Equation.*

Given $\Omega, \Omega^* \subset S^{n-1}$; two positive functions $f \in L^1(\Omega), g \in L^1(\Omega^*)$; and two homogeneous media I and II with indices of refraction $n_1$ and $n_2$ respectively, suppose from a light source at the origin $O$ inside medium I, a light ray emanates with intensity $f(x), x \in \Omega$ and hits an interface $\mathcal{R}$ between media I and media II. Then the ray of light bends in a direction $m$ according to Snell's law, and it also loses its intensity by a factor according to Fresnel's formulas. Set $x = \mathcal{T}_{\mathcal{R}}(m)$. Finding the weak solution of the general refractor problem for a light beam with illumination intensity $f$ and prescribed illumination intensity $g$ involves finding a radial graph

$$\mathcal{R} = \{x\rho(x) | x \in \Omega\}$$

such that for every Borel set $\omega \subset \Omega^*$

$$\int_{\mathcal{T}_{\mathcal{R}}(\omega)} f(x) t_{\mathcal{R}}(x) dx = \int_{\omega} g(m) dm$$

where $t_{\mathcal{R}}(x)$ is the fraction of intensity lost as given by Fresnel's formulas. In this work we will use ellipsoidal approximation to solve the problem. Moreover we notice that the solution satisfies a fully nonlinear partial differential equation of Monge - Ampère type. This is joint work with Prof. C. E. Gutierrez. (Received September 18, 2009)