The separation of light from the fast and slow components for $BaF\_2$ can be determined for any alpha particle from the measured slow and fast quenching factors. The total light from the fast component is found by solving Birk's Law to be a function of the integral of energy lost per distance.

\noindent

$ dL/dx = S \* (dE/dx)/(1 + \alpha\_Q \* (dE/dx)) $

The total energy is also determined using the above analysis. The integral of $dE/dx$ is the total energy from the particle which is already known. By replacing general $\alpha\_Q$ with $\alpha\_f$ for the particles energy the light yield can be determined.

In high energy physics experiments collaborators are trying to determine the energy or mass of a particle. Instead $dL/dx$ is known from the calorimeter. For experiments of this nature, our measured Birk's constants will allow for precision in alpha particle discoveries using Barium Fluoride.

\section{Acknowledgements}

The California Institute of Technology and its Student Faculty Programs office made the measurement of the quenching factor for barium fluoride crystals possible. A. Hasse would also like to express her deep gratitude towards Professor David Hitlin, Jake Kim, and Jason Trevor and the High Energy Physics group for this opportunity and their continuing support.