2015: A Photon Odyssey

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In this study, I examine whether I can modify Beer Lambert's Law to determine the average path-length of a photon that has not interacted with ordinary matter. We know that the absorption of light across short distances can be calculated, using the Beer Lambert Law, but our galaxy is approximately 100,000 light years in diameter. The data from 200 stars in the Hipparcos star database were analyzed. Pictures of stars Betelgeuse, Saiph, Castor, Tsih, Ruchbah, Caph, Almach, Adhil, Segin and Mirach were taken. They were then analyzed in Adobe Lightroom to find how much light, for each star, reached the camera. The data was combined with the published Hipparcos data to ensure the accuracy of the two data sets. Then this data was compared to its established absolute magnitude, to find how much light, for each star, had been absorbed or deflected along its path. Beer Lambert's Law was adapted to solve for the mean free path of a single photon. I have found that there is a correlation between luminosity and the distance starlight has traveled. Due to the low concentration of matter in the galaxy, light can travel very long distances before interacting with ordinary matter.

Awards Won:

European Organization for Nuclear Research-CERN: Third Award $500