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Optical Optimization of a New Telescope Array

Arrays of large gamma-ray telescopes are excellent for research but costly to produce. Attempts are now being made to design arrays of smaller telescopes that are cheaper to produce while still effectively detecting gamma ray photon showers. By designing and simulating each part of the telescope the optimal settings can be found. A computer program called GrOptics is used to simulate the telescope optics and display the photons that the telescope's mirrors reflect into the detector. The optical efficiency of the design can be evaluated by the point spread function (PSF), which represents the telescope's response to a point source. Using the telescope characteristics designed by group members from the NASA Goddard Space Flight Center and University of Delaware, I ran simulations for the new telescope design and tested the impact of misalignment in the mirror display on the PSF. I found that this telescope's PSF increased nearly linearly as the misalignment increased. Next steps for optimization include testing the detector for the size PSFs found and incorporating improvements from the other pieces of the telescope.