https://robast.github.io

https://github.com/ROBAST/ROBAST

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What is ROBAST?

ROOT-based simulator for ray tracing (ROBAST) is a non-sequential ray-tracing simulation library developed for wide use in optical simulations of gamma-ray and cosmic-ray telescopes. The library is written in C++ and fully utilizes the geometry library of the ROOT analysis framework.

In 2007 ROBAST was first developed to simulate the modified Baker–Nunn optical system of the Ashra experiment, which is composed of three aspherical lenses and spherical segmented mirrors as illustrated in Figure 1. In 2010 ROBAST was released as an open-source project to be more widely used in the cosmic-ray and gamma-ray community. It is currently used by many sub projects of the Cherenkov Telescope Array and some other projects.

If you are already familiar with ROOT and C++, and if you are looking for a ray-tracing simulator suited for cosmic-ray telescopes, ROBAST is what you want. Even if you are a ROOT/C++ beginner, it is worth to try ROBAST and start learning ROOT and C++ right now.

Fig 1. ROBAST 3D model of the Ashra optical system (modified Baker–Nunn optical system)

Complex Telescope Geometry

Thanks to the ROOT geometry library and additional ROBAST classes, complex telescope geometry with a number of segmented mirrors and telescope masts can be built. Indeed, ROBAST is currently used for optics simulations of several telescope designs of the Cherenkov Telescope Array;

- Large-Sized Telescope (LST): A parabolic telescope comprising of 198 hexagonal segmented mirrors with spherical surfaces.
- Medium-Sized Telescope (MST): A Davies–Cotton system comprising of 88 hexagonal segmented mirrors with spherical surfaces.
- Schwarzschild–Couder Medium-Sized Telescope (SC-MST): A system with aspherical primary and secondary mirrors divided into 48 and 24 segmented facets, respectively. The facet shapes are tetragons and pentagons.
- Schwarzschild–Couder Small-Sized Telescope (SC-SST): A system similar to the SC-MST optics, but the primary is divided into 6 mirrors, and the secondary is monolithic.

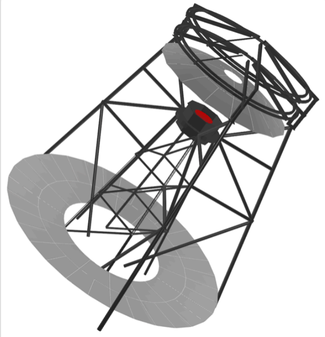

Fig 2. A Schwarzschild-Couder optical system to be used in CTA

As shown in Figures 1 and 2, segmented mirrors, telescope masts and trusses, lenses, and focal plane can be modeled in ROBAST. The telescope geometry can be drawn in an OpenGL window.

In addition to telescope simulations, ROBAST has a few dedicated geometry classes for light concentrators (also known as Winston cones). Multiple reflections on the surface of a light concentrator can be easily simulated by the non-sequential ray-tracing functionality of ROBAST.

Direct Analysis with ROOT

github.com/ROBAST/ROBAST

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akira-okumura Fix minor bugs that can be more visible i... 326d76a on Sep 2, 2020 355 commits

.github/ISSUE_TEMPLATE	Update issue templates	3 years ago
include	Add Lambertian reflection	11 months ago
misc	Change permission	2 years ago
src	Add Lambertian reflection	11 months ago
tutorials	Fix minor bugs that can be more visible in future param...	10 months ago
.gitignore	Add ROBASTDict_rdict.pcm to .gitignore	5 years ago
INSTALL	Add INSTALL	4 years ago
LICENSE	Create LICENSE	6 years ago
Makefile	Update Makefile to make it compatible with ROOT6 on ...	4 years ago
README	Update README	6 years ago
README.md	Remove the zenodo banner because I don't think it is u...	4 years ago
mkhtml.sh	Add misc/footer.html and misc/header.html to customiz...	6 years ago

README.md

ROOT-Based Simulator for Ray Tracing (ROBAST)

1. About

ROBAST is a non-sequential ray-tracing simulation library which is aimed for wide use in optical simulations of cosmic-ray and gamma-ray telescopes. The library is written in C++ and fully utilizes the geometry library of the ROOT analysis framework. ROBAST offers several functionalities required for ray-tracing simulations of cosmic-ray telescopes.

About

ROOT-based simulator for ray tracing (ROBAST) is a non-sequential ray-tracing simulation library developed for wide use in optical simulations of gamma-ray and cosmic-ray telescopes. The library is written in C++ and fully utilizes the geometry library of the ROOT analysis framework.

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Readme

LGPL-2.1 License

Releases 19

Version 3.2.0 (stabl... Latest
on Aug 24, 2020

+ 18 releases

Packages

No packages published
Publish your first package

Contributors 2

akira-okumura Akira Okum...

jeisch Jonathan Eisch

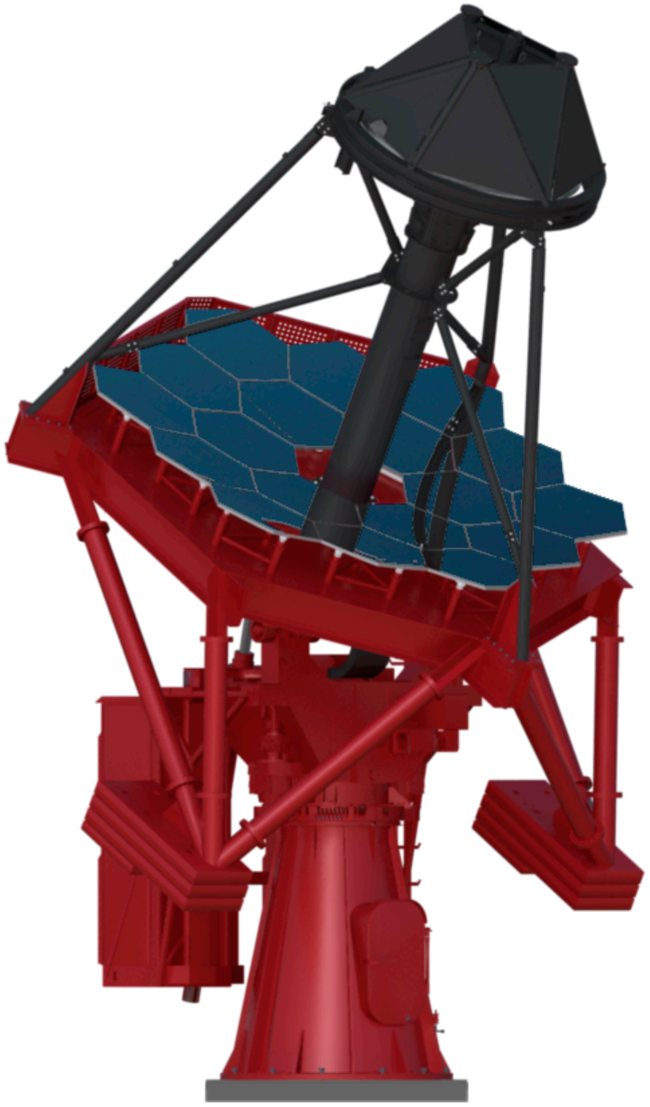
Step 1

ROBAST

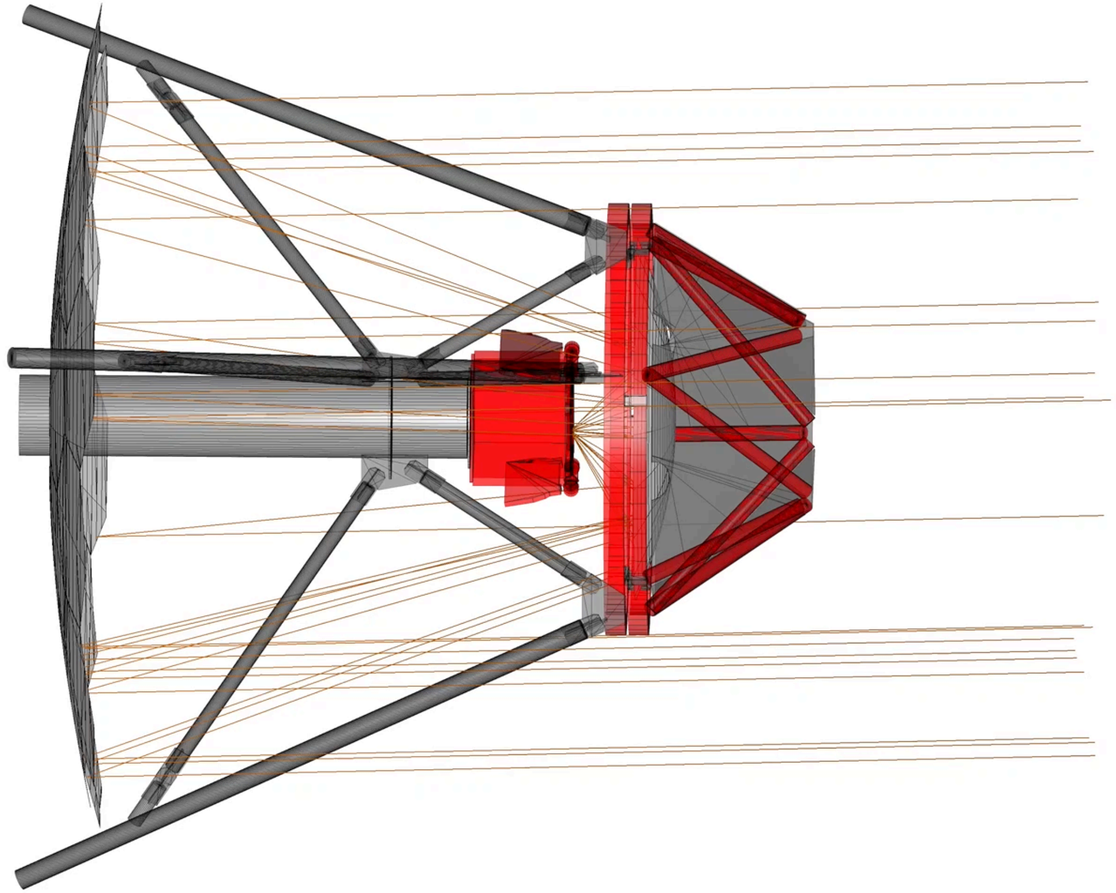
Step 2

Ignore it!

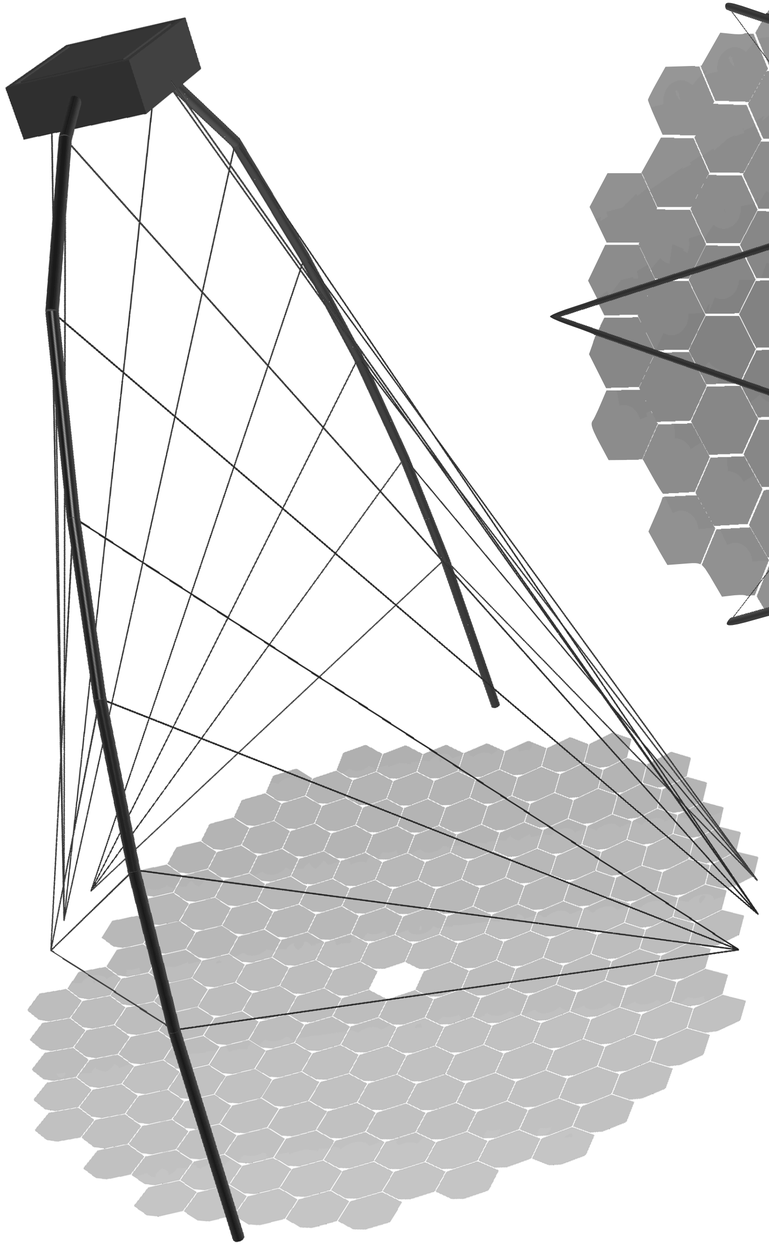
Did you mean: ***ROBUST***



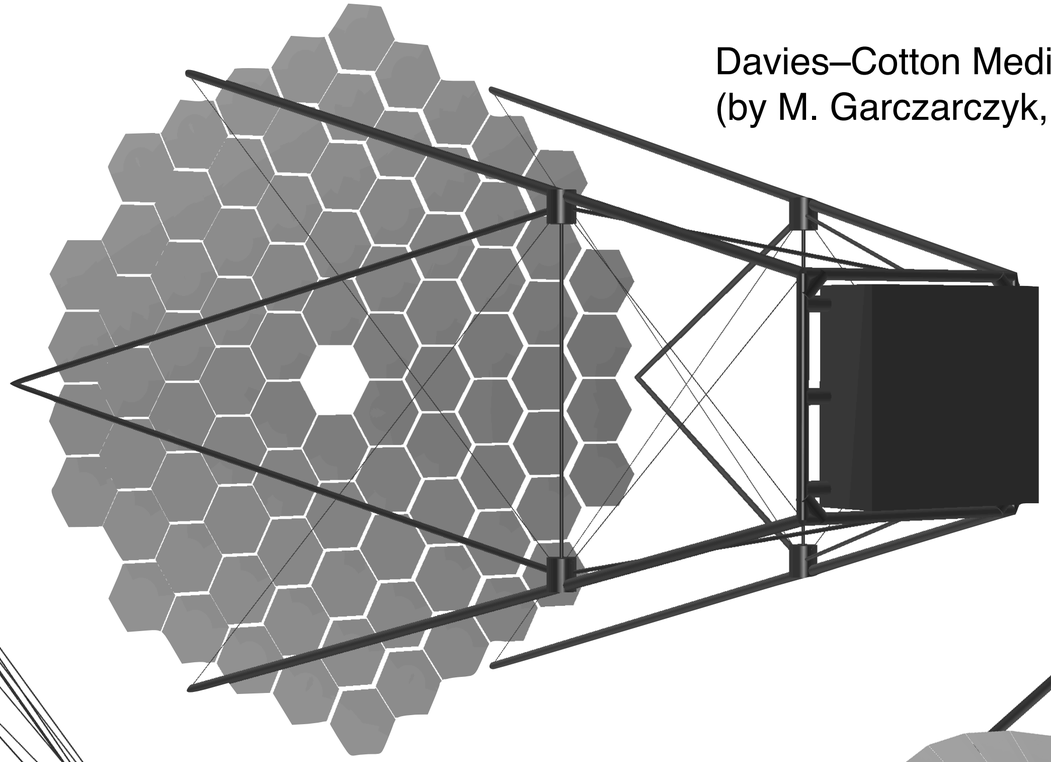
CTA Small-Sized Telescope (Image Credit: G. Pérez, IAC, SMM)



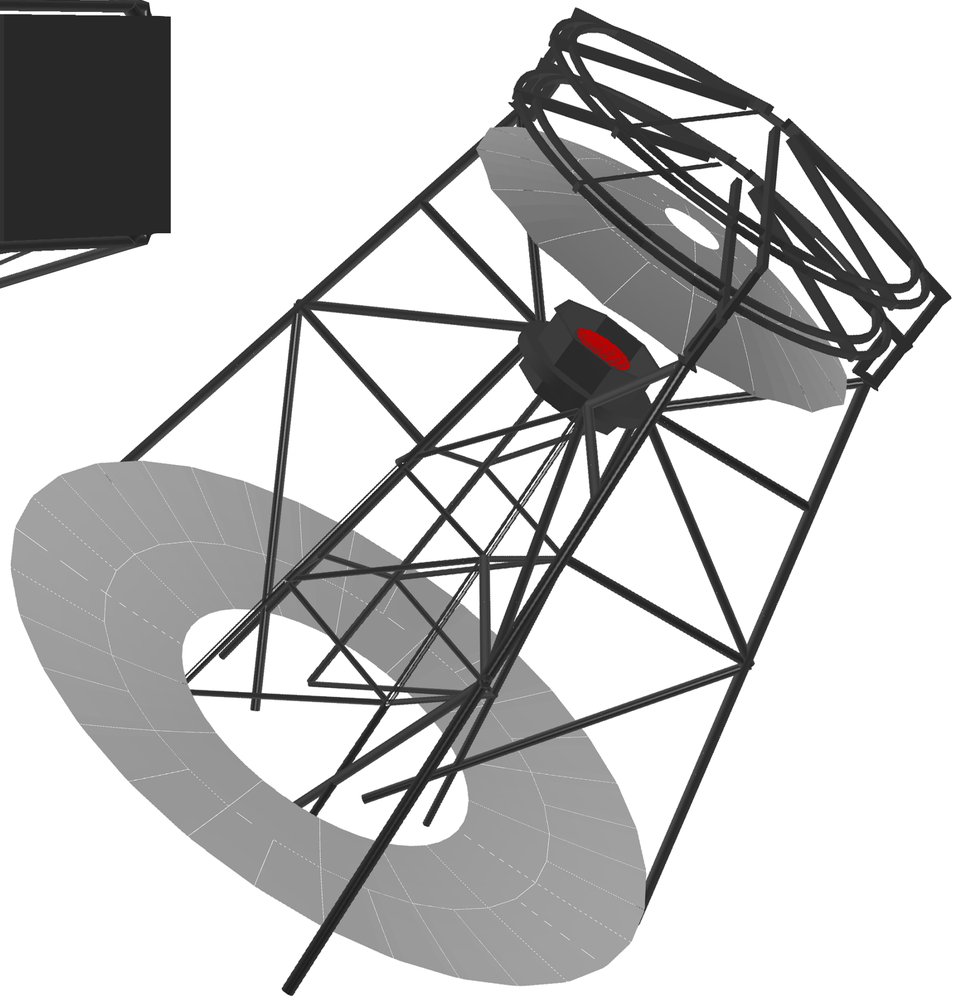
ROBAST 3D Model (by SST Optics Team and AO)



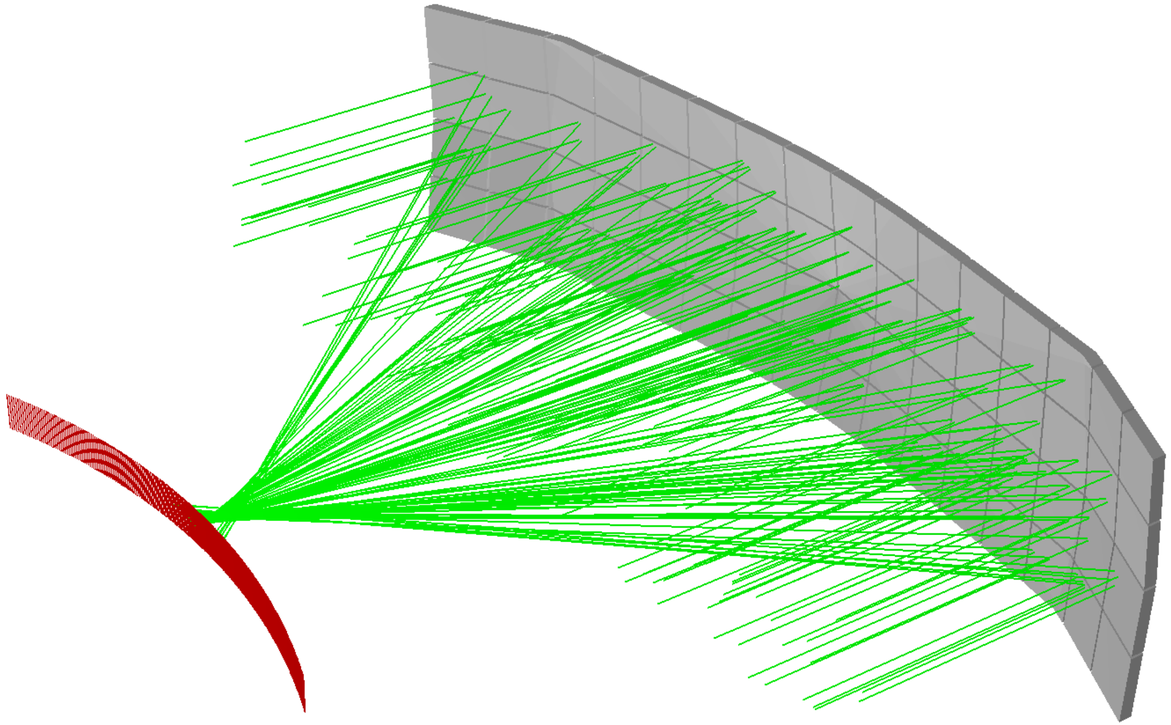
Parabolic Large-Sized Telescope (by K. Noda)



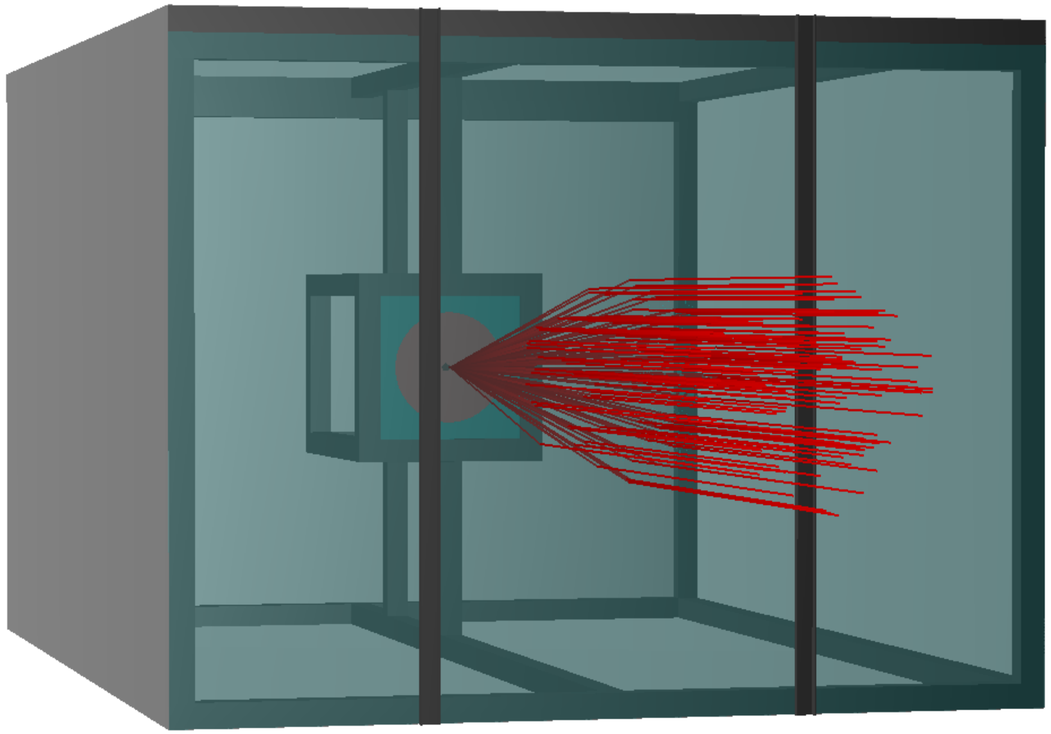
Davies–Cotton Medium-Sized Telescope
(by M. Garczarczyk, D. Parsons, and AO)



Schwarzschild–Couder Medium-Sized Telescope
(by AO)



Trinity (by the Trinity Collaboration)



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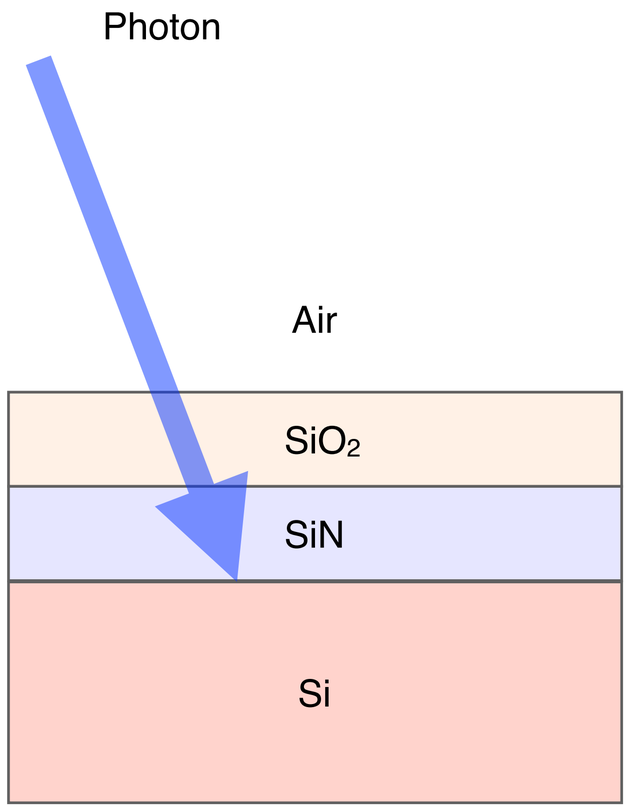
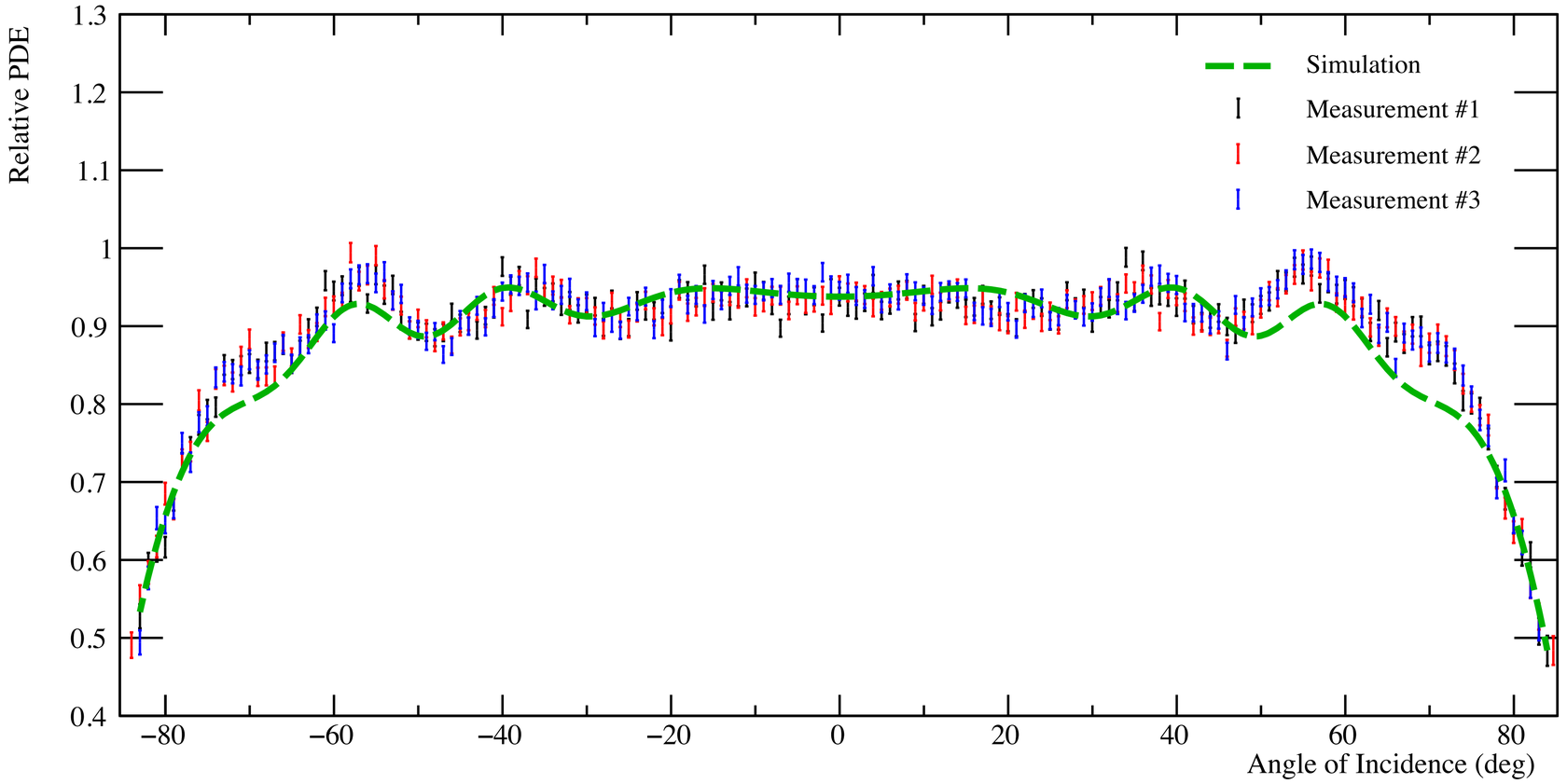
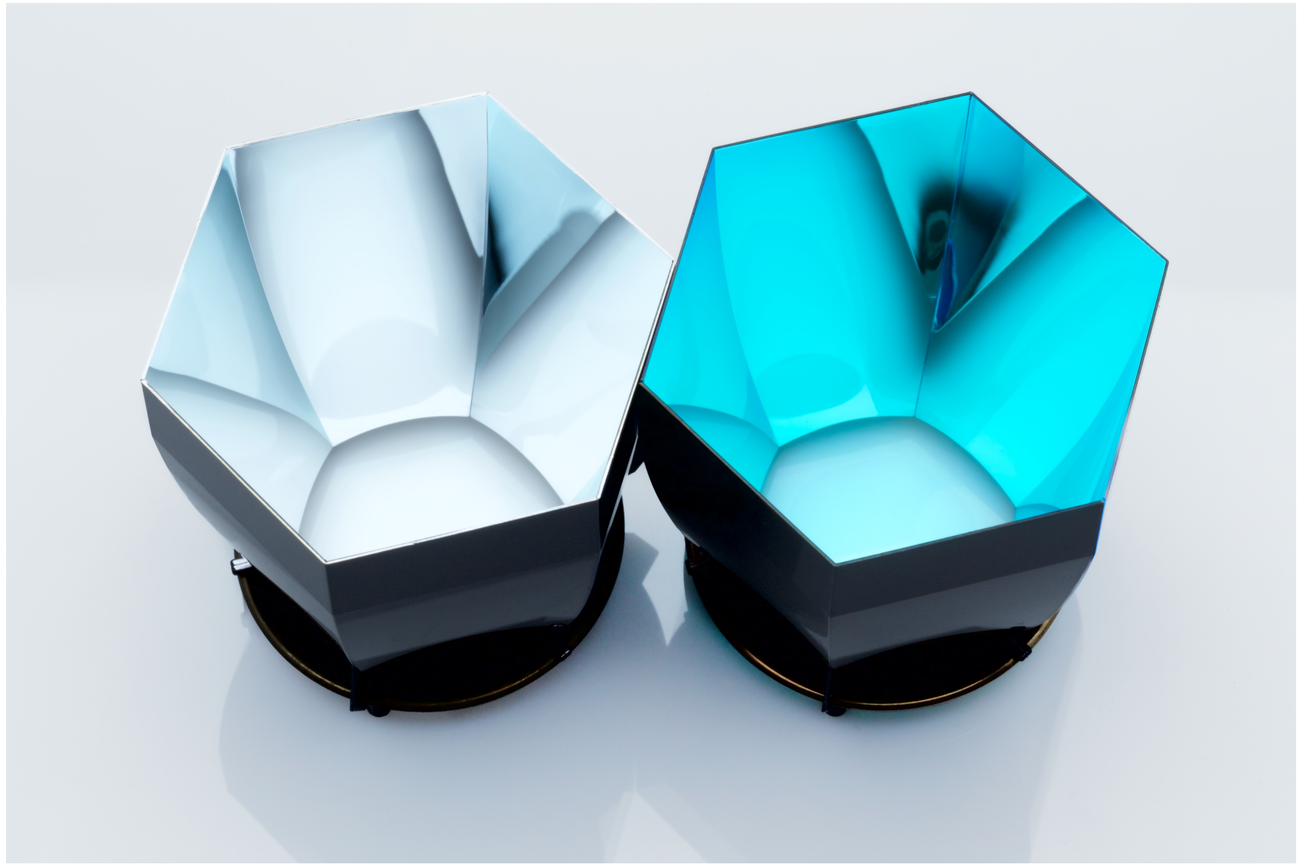


Silicon Photomultiplier (SiPM)





Hexagonal Light Concentrators