

Estimates for the efficiency of the Arapuca-Açu

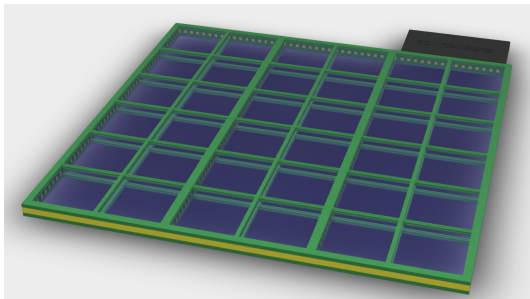
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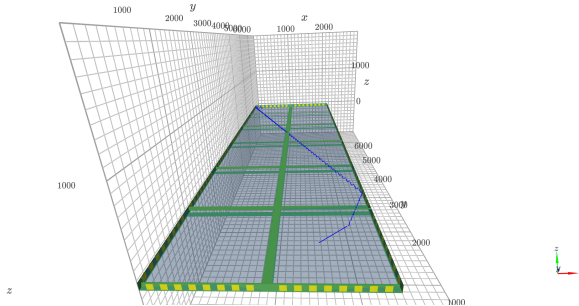
Base model

Our simulations were based in the current working prototype of the Arapuca-Açu (by Heriques Frandini)



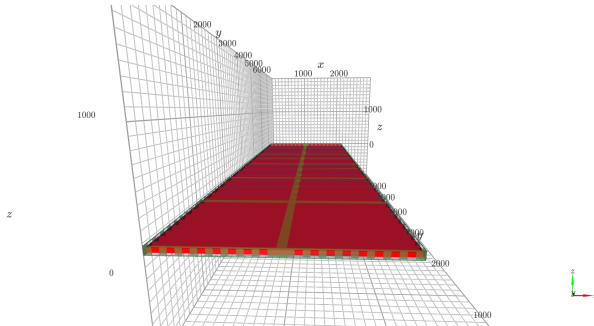
Presenting the model

Inner walls of the Arapuca-Açu. Without a light guide.



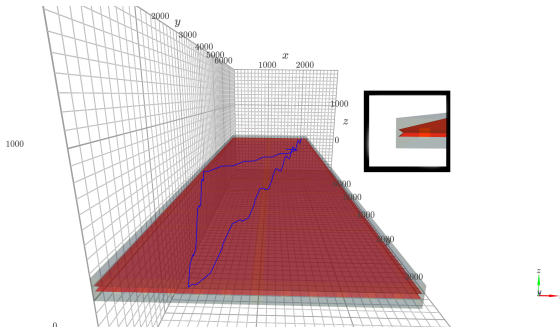
Presenting the model

Arapuca-Açu with a 4mm thick light guide.



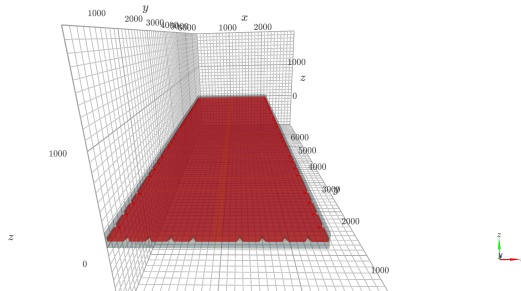
Horizontal slit

► Light-guide with horizontal slit



Vertical slits

- ▶ Light-guide with vertical slits



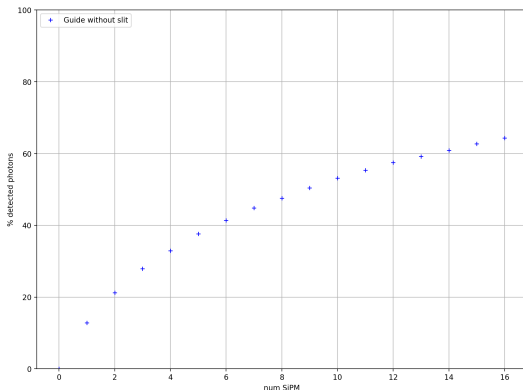
Simulation parameters

Our simulations used the following parameters

- ▶ Size of the outer box: 21.0cm × 64.2cm.
- ▶ Light guide thickness 4.0mm. Distance to the outer box 1.0mm.
- ▶ Dichroic filters: 12 on top and 12 on the bottom - 10cm × 10cm. The skip is 8mm.
"relative refraction index": 1.58/1.228,
- ▶ "default threshold": 0.05,
"guide abs threshold": 0.002
Photons start at the Dichroic filters.
Once inside the light guide, they are re-emitted in
- ▶ a random direction once.
Only considered reflection, refraction (Snell's law),
total internal reflection and absorptions.

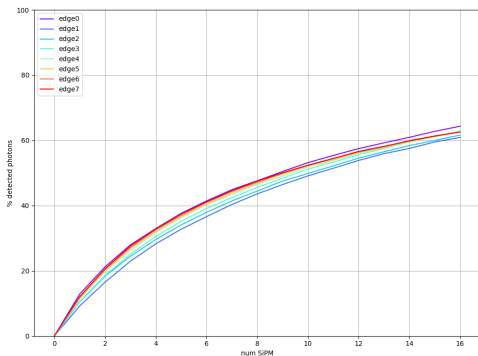
Guide without slit

Plot of the percentage of detected photons by number of SiPM per side of dichroic filter. ($\times 16$ for the whole cell)



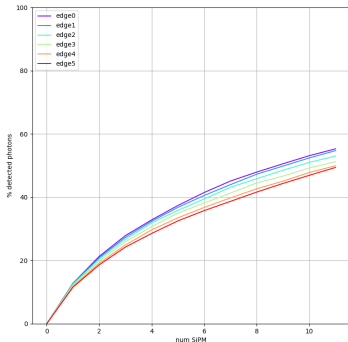
Guide with horizontal slits

We simulated all the Arapucas-Açu with 1 - 16 SiPMs and heights in the range of 8mm to 17.5mm and slit depths in the range of 0mm to 7mm



Guide with horizontal slits

We simulated all the Arapucas-Açu with 1 - 11 SiPMs and heights in the range of 8mm to 10mm and slit depts in the range of 0mm to 5mm



Acknowledgement

This work could not have been done without the help of

- ▶ Prof. Ana Amélia Bergamini
- ▶ Prof. Ettore Segreto
- ▶ Prof. Gustavo Valdivieso

The End