Enhancing 3D Visualization tools for the Pierre Auger Collaboration

3D Visualization

LIP

Contents

P. A. Observatory

Pierre Auger Observatory

- Location: Pampa Amarilla in western Argentina.
- Structure: about 3000 km^2
- Objective: Study the highest energy particles in the Universe(Cosmic ray)
- Two independent methods to catch data.

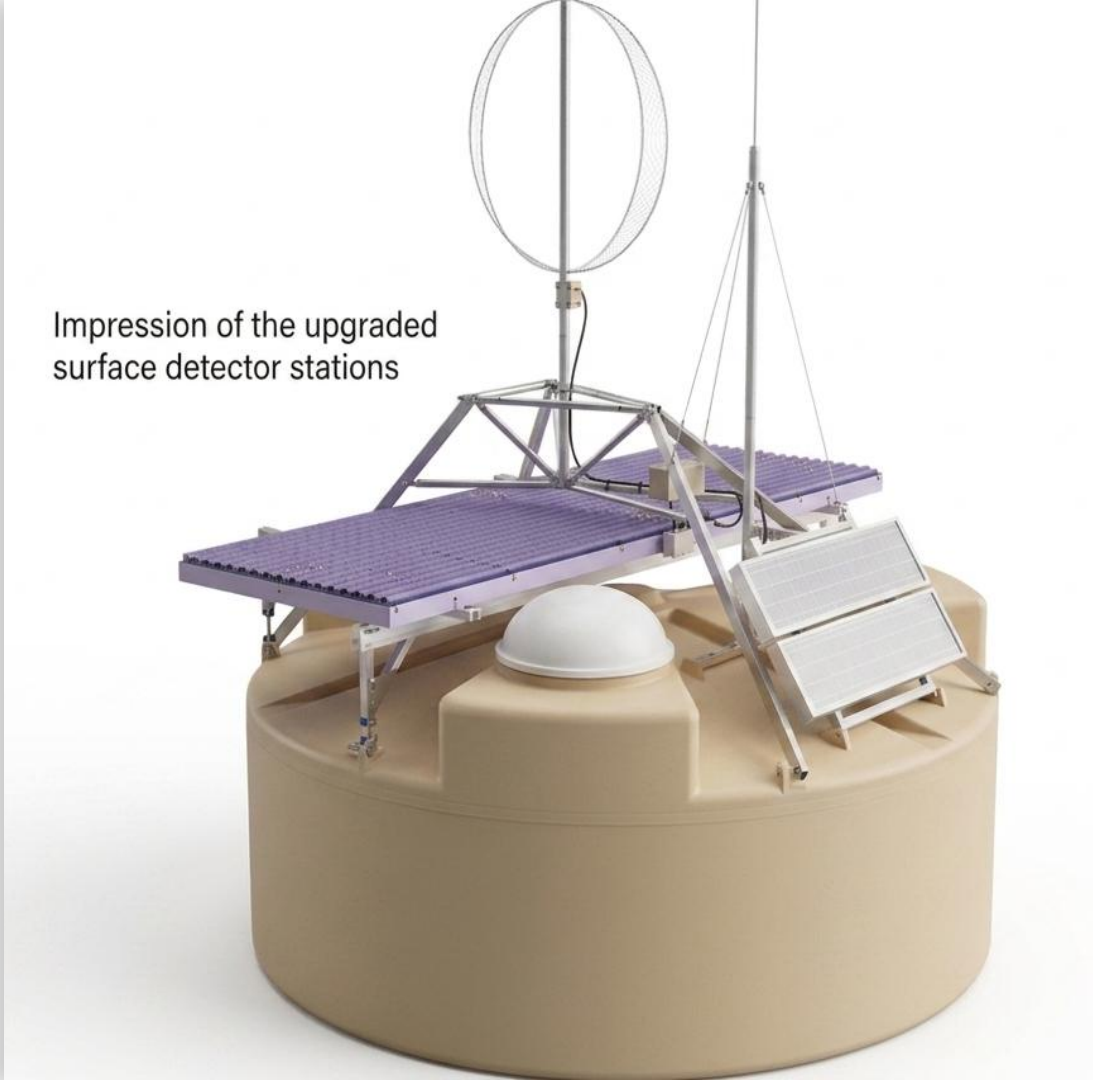
Surface Detector

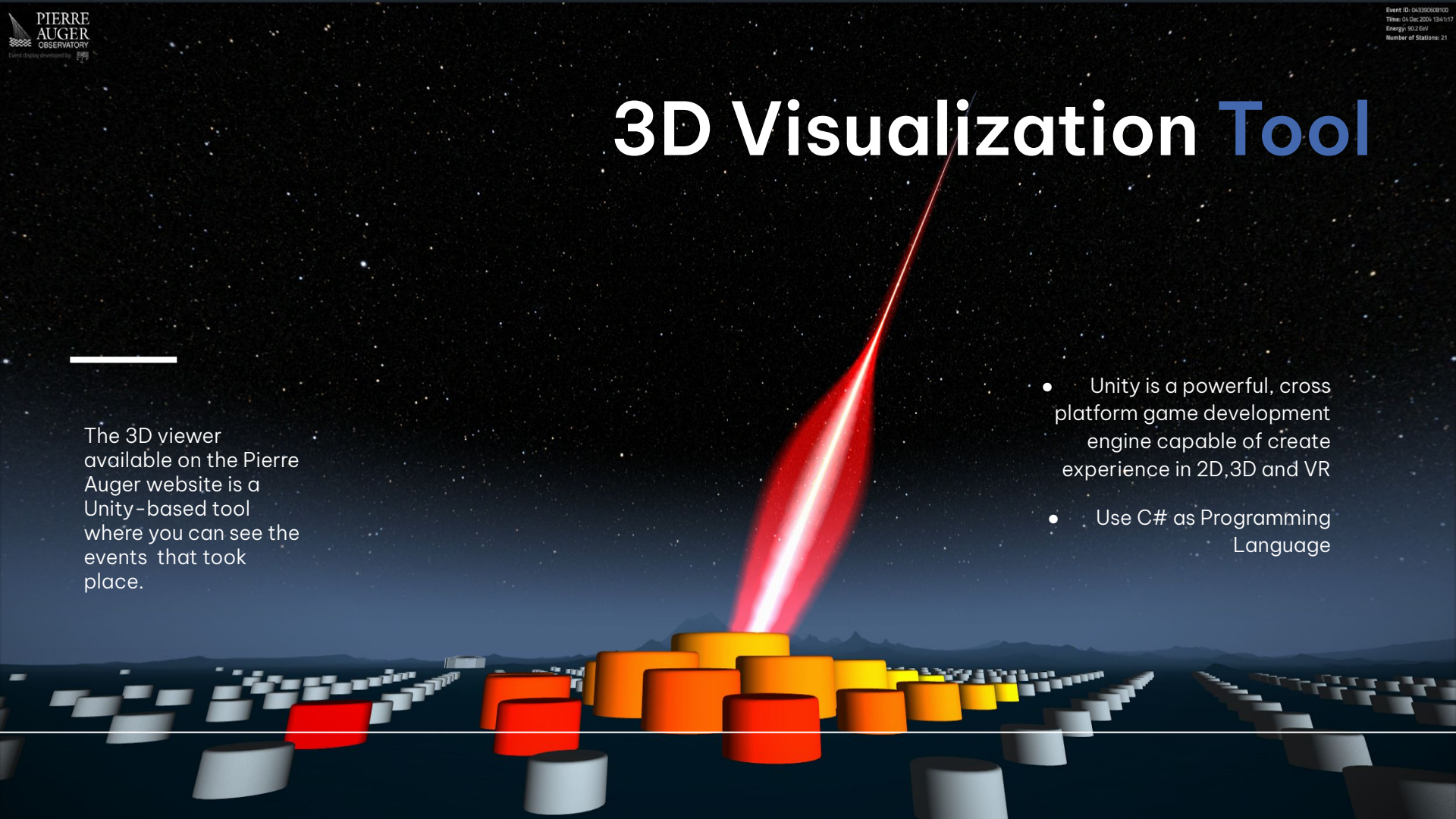
- External: Communications antenna, Solar panel, electronics box and battery box.
- Inside: 3000 gallon of highly purified water, completely dark and 3 sensitive photomultiplier tubes.

AugerPrime

UPGRADE:

- Plastic Scintillator(SSD)
- Enhanced electronics with an Upgraded Unified Board
- Additions of a small photomultiplier to the SD
- installation of the underground scintillator muon detector AMIGA
- measures to increase the duty of cycle of the fluorescence detector.





3D Visualization Tool

The 3D viewer available on the Pierre Auger website is a Unity-based tool where you can see the events that took place.

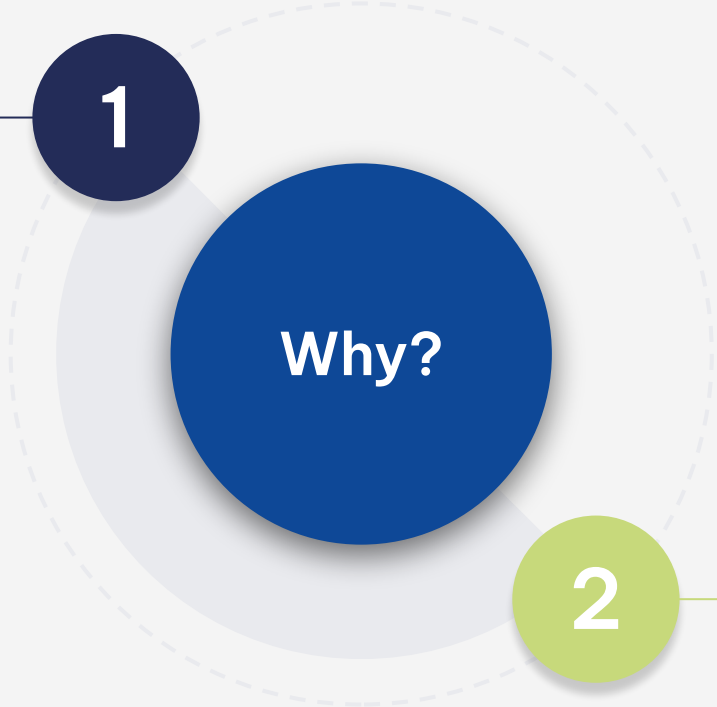
- Unity is a powerful, cross platform game development engine capable of create experience in 2D,3D and VR
- Use C# as Programming Language

Update Process

First Steps

Learning to use Unity and producing JSON files with the new data.

1



2

Final Steps

make the program read the new data and displaying the information.

```
{
    "meta": {
        "type": "auger data release",
        "release": 3,
        "format": 2,
        "reconstruction": {
            "software": "cdas",
            "version": "v6r2p2"
        }
    },
    "info": {
        "id": 140016086101,
        "sdid": 24915420,
        "gpstime": 1072673676,
        "date": "2014-01-02T04:54:20Z"
    },
    "flags": {
        "sd750": 1,
        "hdSpectrum": 0,
        "hdCalib": 0,
        "hdXmax": 0,
        "multiEye": 0,
        "sd1500": 0
    },
    "sdrec": {
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        "theta": 7.4,
        "phi": 331.51,
        "energy": 0.111,
        "l": -108.08,
        "b": -8.45,
        "ra": 114.11,
        "dec": -38.38,
        "x": -24465.8,
        "dx": 37.83,
        "y": 15182.1,
        "dy": 28.03,
        "z": 86.16,
        "easting": 452766.92,
        "northing": 6114314.24,
        "altitude": 1486.16,
        "s450": 12.29,
        "ds450": 1.43,
        "s35": 8.36,
        "beta": -3.14,
        "gamma": -0.31,
```

PIERRE AUGER OBSERVATORY

Event display developed by:

Event ID: 250015322300
Date: 02 Jan 2025
Time: 02:47:02
Reconstruction: SD S1500
Theta: 27.75°
Phi: 123.36°
Energy: 21.2 EeV

Galactic | Equatorial

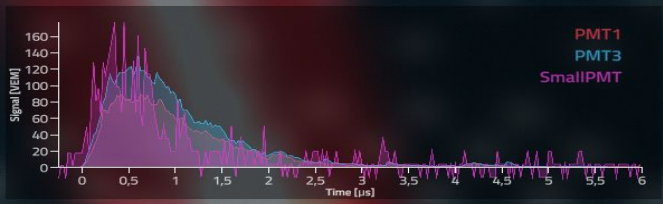
Longitude: 201.82°
Latitude: -43.71°

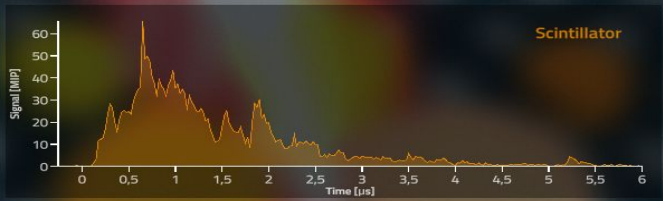
View SD Reconstruction

N. of Stations: 7

ID	Time	Signal
710		
734		
651		
819		
643		
660		
663		

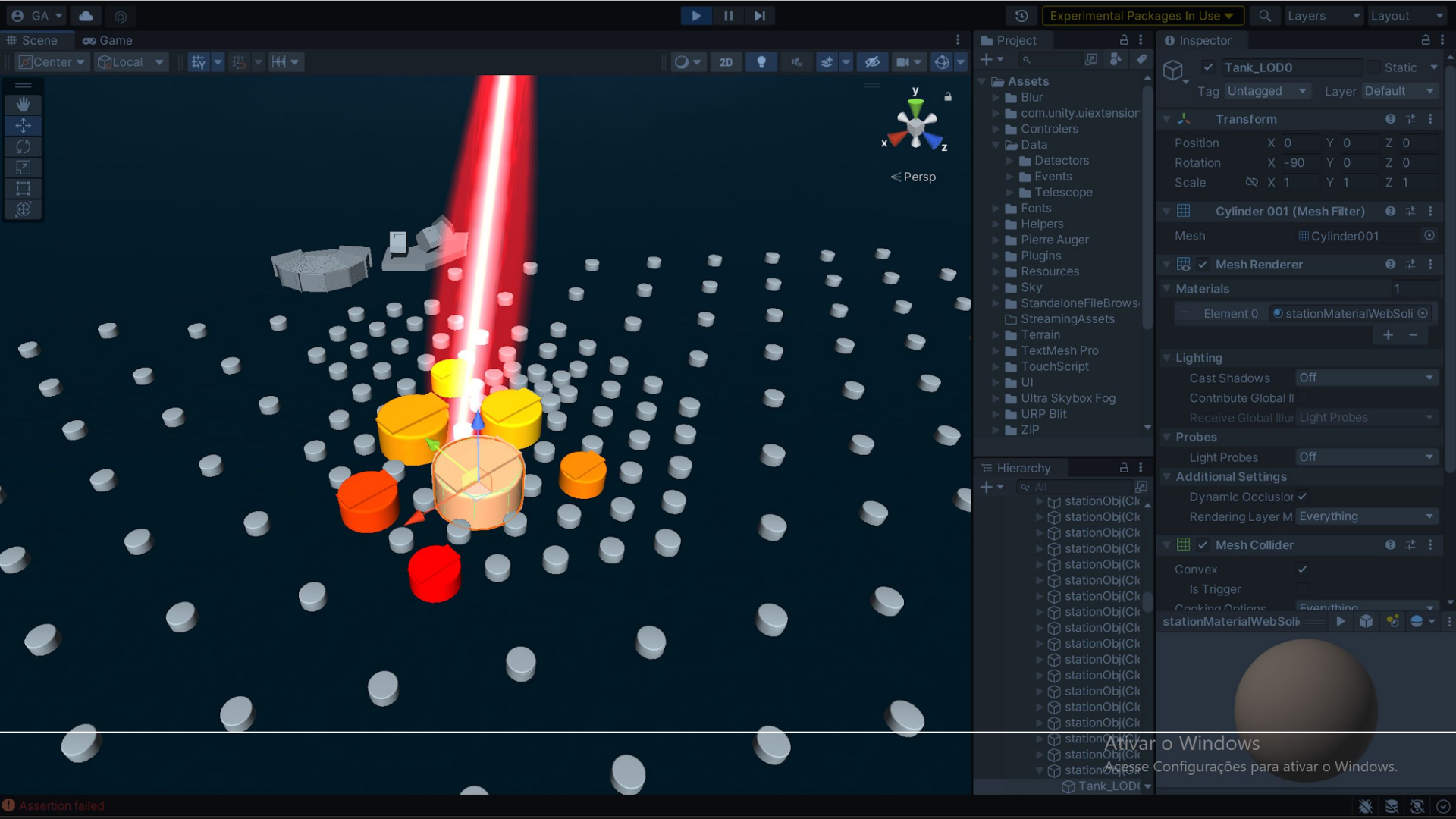
PMTs





Expand PMTs

ID: 643


Scene
Game
Persp
Project
Assets
Blur
com.unity.uiextensior
Controlers
Data
Detectors
Events
Telescope
Fonts
Helpers
Pierre Auger
Plugins
Resources
Sky
StandaloneFileBrows
StreamingAssets
Terrain
TextMesh Pro
TouchScript
UI
Ultra Skybox Fog
URP Blit
ZIP
Hierarchy
Inspector
Tank_LOD0
Static
Tag Untagged
Layer Default
Transform
Position X 0 Y 0 Z 0
Rotation X -90 Y 0 Z 0
Scale X 1 Y 1 Z 1
Cylinder 001 (Mesh Filter)
Mesh Cylinder001
Mesh Renderer
Materials 1
Element 0 stationMaterialWebSoli
Lighting
Cast Shadows Off
Probes
Light Probes Off
Additional Settings
Dynamic Occlusior
Rendering Layer M Everything
Mesh Collider
Convex
Is Trigger
Ativar o Windows
Acesse Configurações para ativar o Windows.
Assertion failed

Thank you
for your attention.

https://opendata.auger.org

LIP - Laboratório de Instrumentação
e Física Experimental de Partículas
Partículas e Tecnologia