

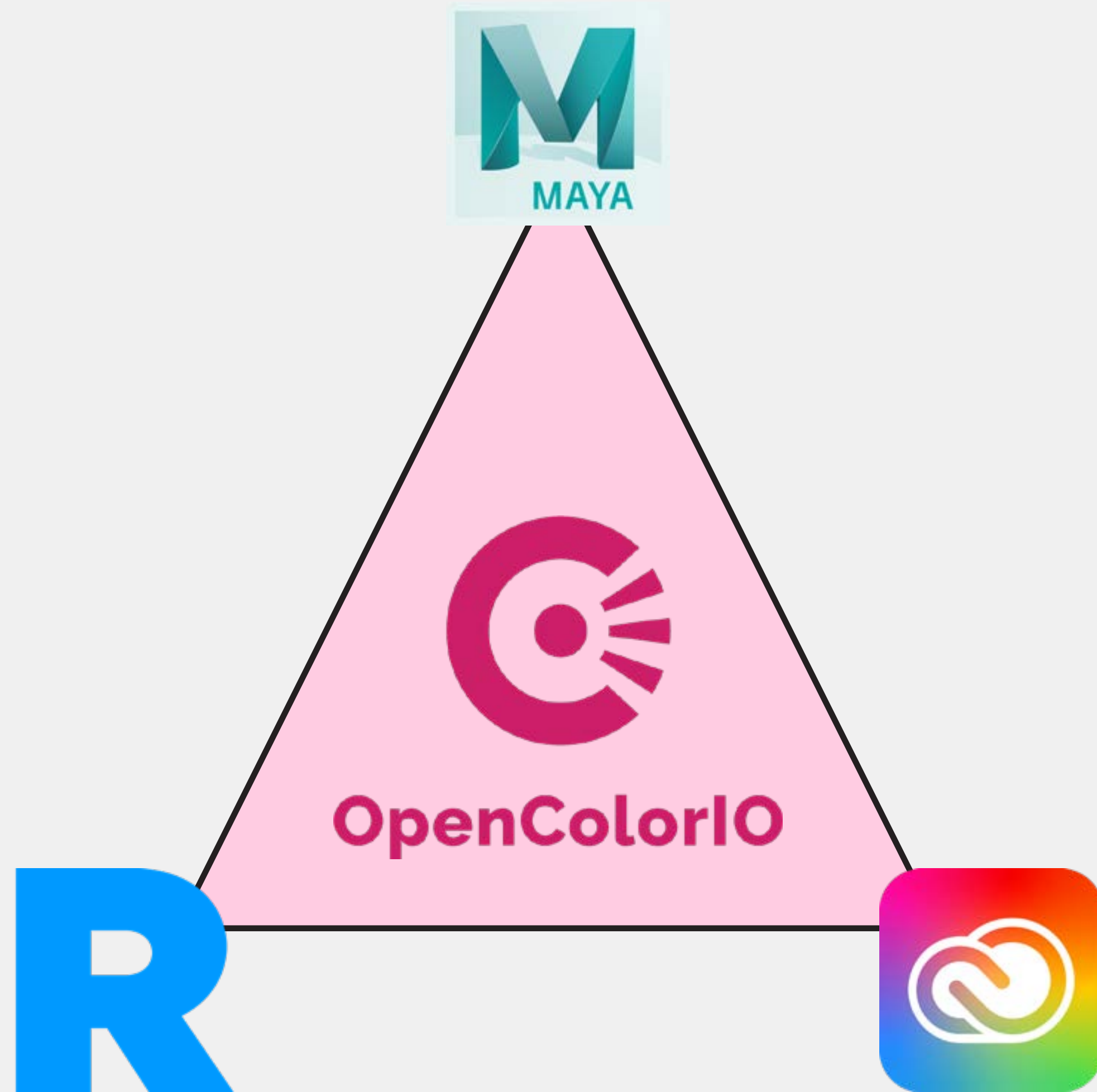
## Introduction

In this document I'll be explaining the sRGB and ACES colour spaces, the difference between linear and gamma lighting, and how to set up Maya, RenderMan, Photoshop and After Effects correctly to ensure a consistent workflow for your renders.

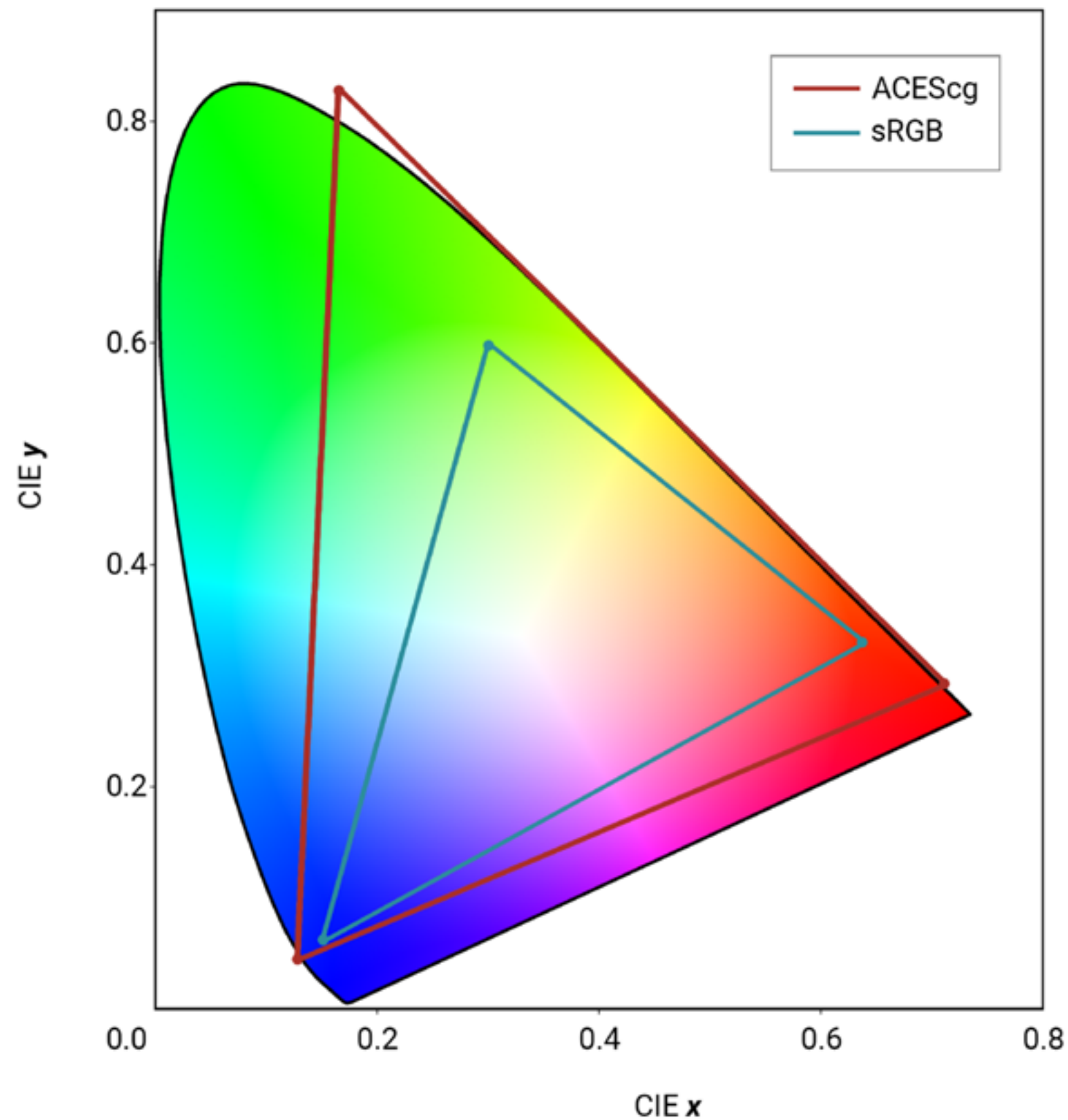
This is my software of preference that I use for most of my work since October 2017. Why you ask? Because Maya is industry-standard and free for students, and RenderMan is free for everyone, as long as it's for non-commercial use. RenderMan is the renderer I insist on using whenever I can, mainly due to brand loyalty to its creators over at Pixar.

Photoshop and After Effects are both essentials tools for a creative tertiary student and they, along with many others, come included in an affordable monthly Adobe Creative Cloud subscription.

With the promotion out of the way, let's begin.



ACEScg, sRGB CIE 1931 2 Degree Standard Observer - CIE 1931 Chromaticity Diagram



This illustration compares the ACEScg and sRGB gamuts to the CIE 1931 color space. The diagram is based on scientific data and is transferred to an sRGB encoded image, which may result in inaccuracies.

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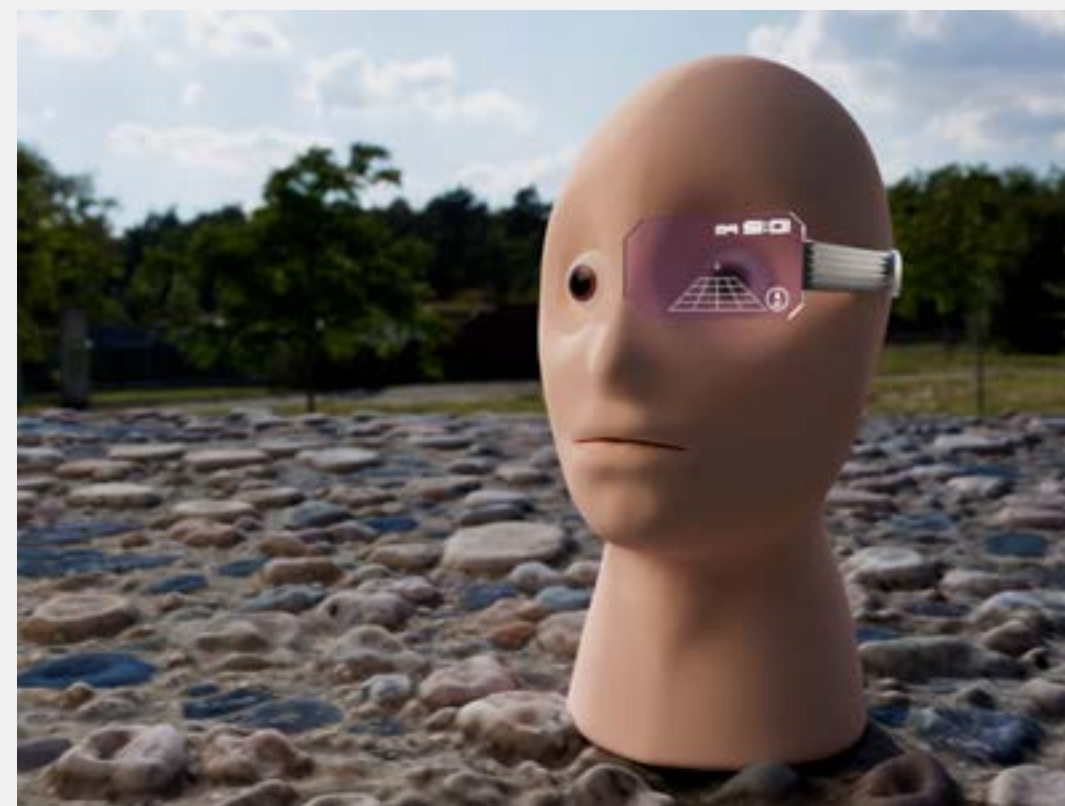
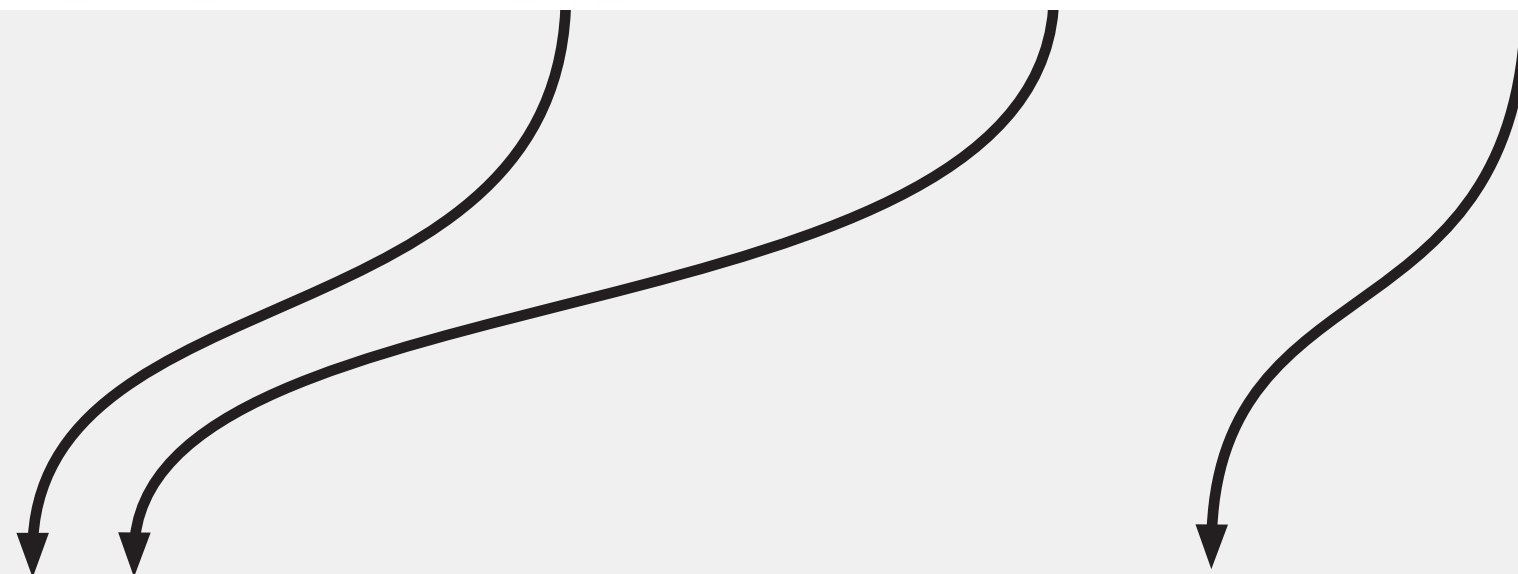
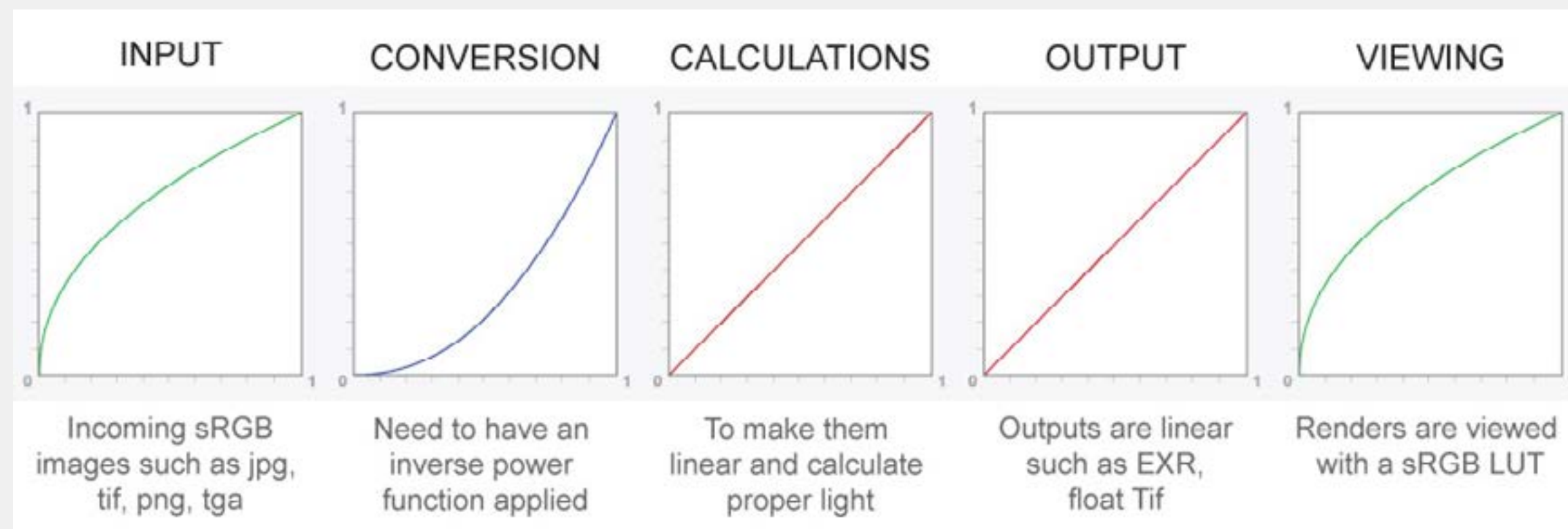
## What are colour spaces?

A fundamental part of any kind of digital art is getting your colours right, and part of this involves picking a colour space.

sRGB is the standard choice these days for photos and videos on the internet. Based on the diagram to the left, it might not seem like it supports that many colours, but if you think about the most beautiful photo you've seen on Flickr or Instagram, chances are it was uploaded as an sRGB jpeg.

In the development process however, it's best to have as much data to work with as possible. This is where the ACES colour space comes in. It supports a much wider range of colours compared to sRGB, and while you might not notice the difference on your consumer-grade monitor, those extra colours are still there, providing greater flexibility for colour correction.

Using another example, if you've ever asked for advice from a professional photographer, chances are they told you to "shoot raw, and use a high bit depth like 14-bit". While most consumer-grade monitors are only 8-bit, the same rules apply. By shooting 14-bit, you have more data to work with.



## How does light work?

The human eye doesn't see light in a linear fashion. This makes sense for survival reasons as it means we can see dark areas lighter than they really are.

Consider the diagram to the top-left. In order for light to affect stuff in a CGI environment properly, it needs to be calculated linearly.

At the bottom we have two versions of the same render. The left one is what the renderer sees. It doesn't look pretty, but it's technically accurate. This has a gamma curve of 1.0 and might be called Linear or Raw. Same thing in this context.

The right image is the same but with a gamma curve of 2.2 applied, making it sRGB. This is what we're aiming for when it's time to publish stuff online.

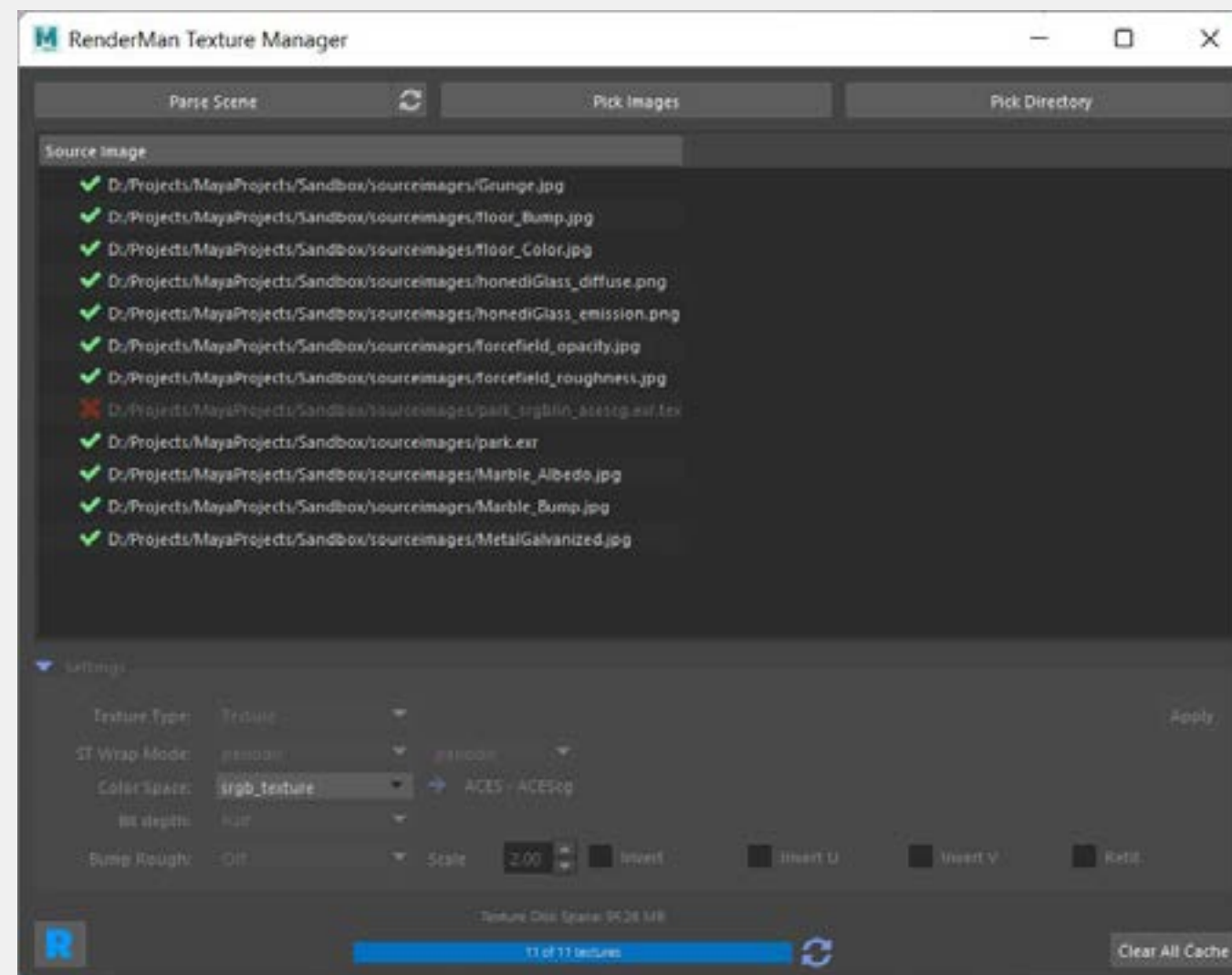
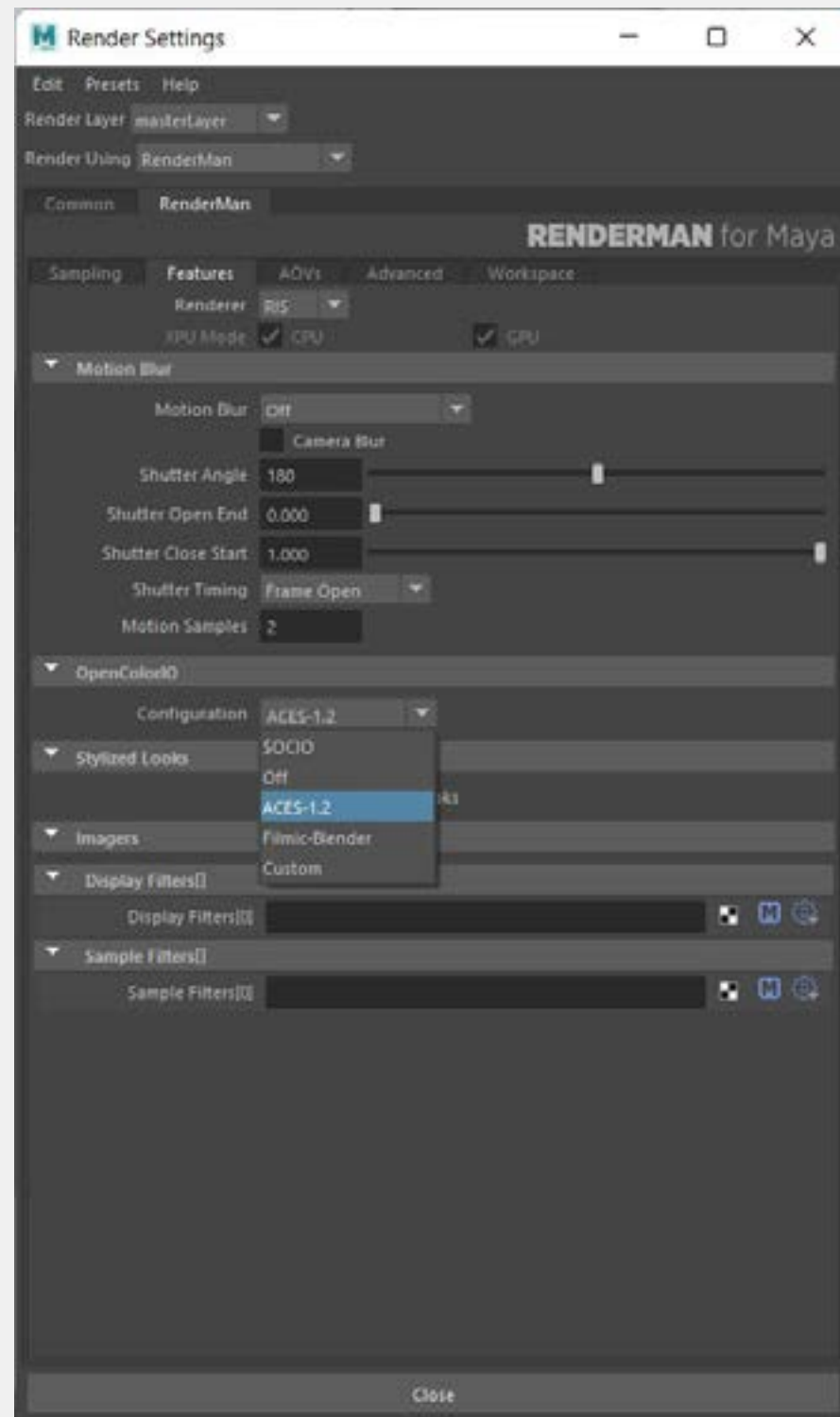


## Preparing RenderMan

No matter what software you decide to use to view your rendered images, first you'll need to setup Maya and RenderMan to export them properly.

First, open the Render Settings window, navigate to the RenderMan>Features tab, scroll down to OpenColorIO, and set the configuration to ACES-1.2. While you're there, double-check that you're rendering to an appropriate format like OpenEXR.

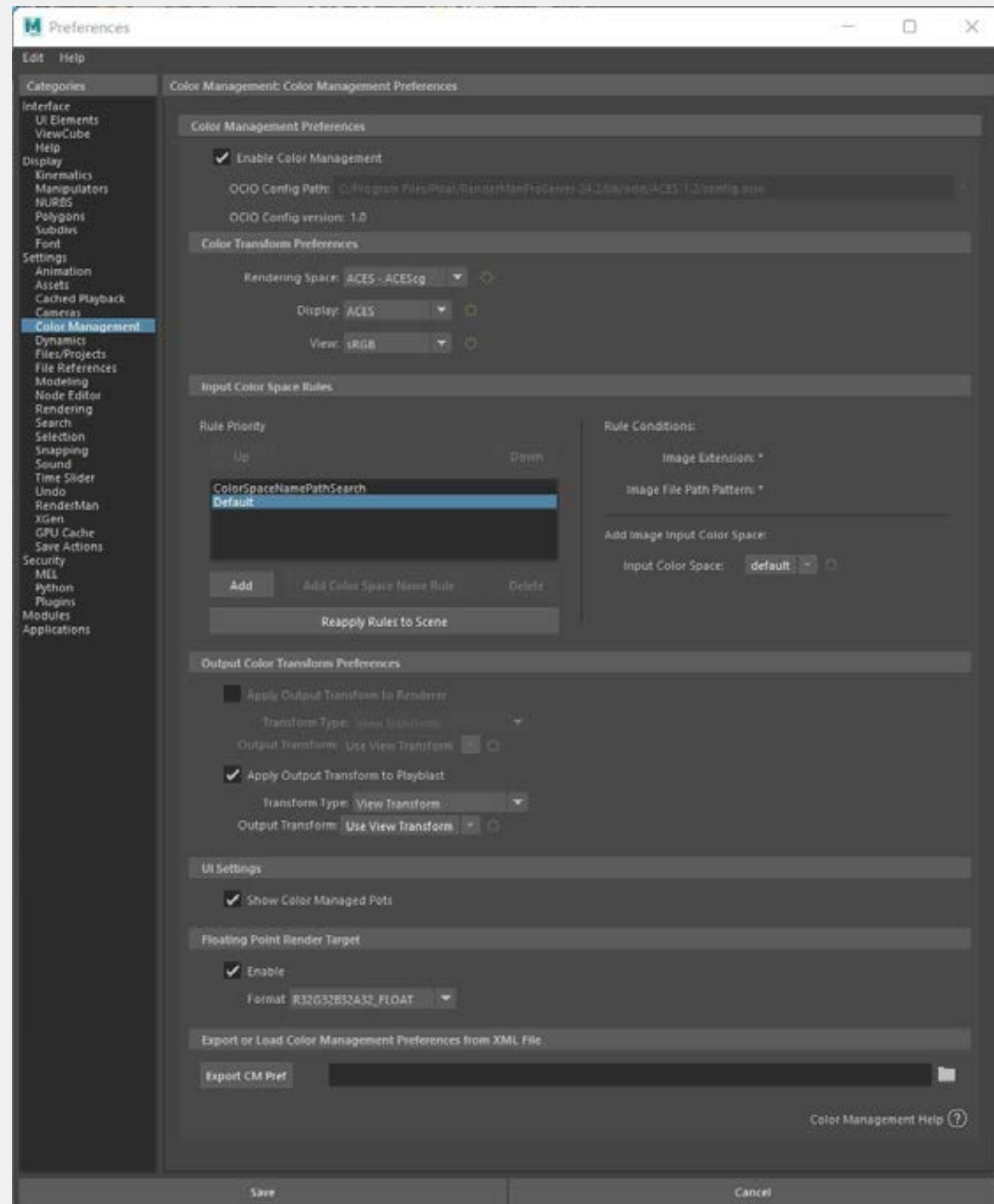
After this, open the Texture Manager and make sure all of your textures are converted to the ACEScg colour space by clicking the refresh button in the top-left. This might take a moment depending on your textures.



## Preparing Maya

Open the Maya preferences window and find the Colour Management page.

The section we're interested in here is the second one, with 3 drop-down menus. They should be set to ACES-ACEScg, ACES and sRGB.



## Preparing OpenColorIO

Before you get started with Photoshop and After Effects, you'll need to install the OpenColorIO plugins, along with the configuration files prepared by RenderMan. Everything you need can be found in this archive I put together:

<https://www.ambiguousphoenix.com/files/luke-renderman-aces.zip>

Credit goes to Fnordware for the plugins.

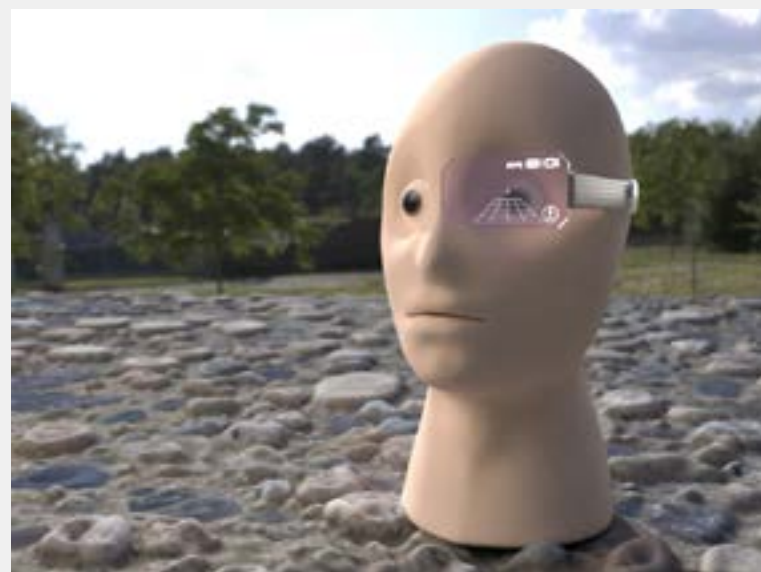
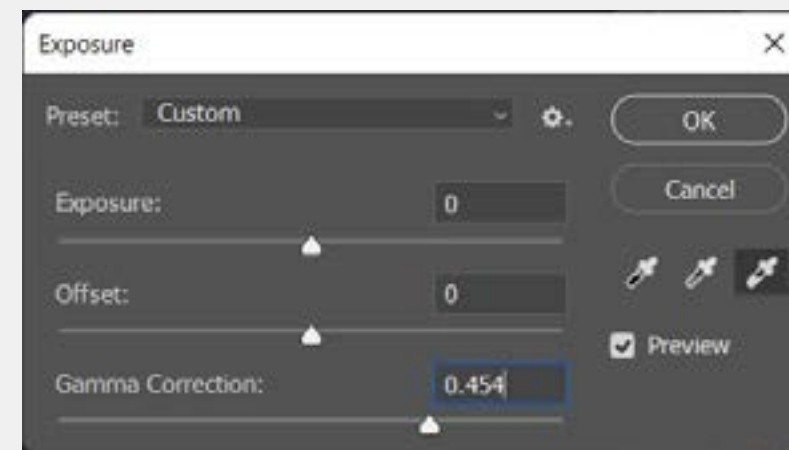
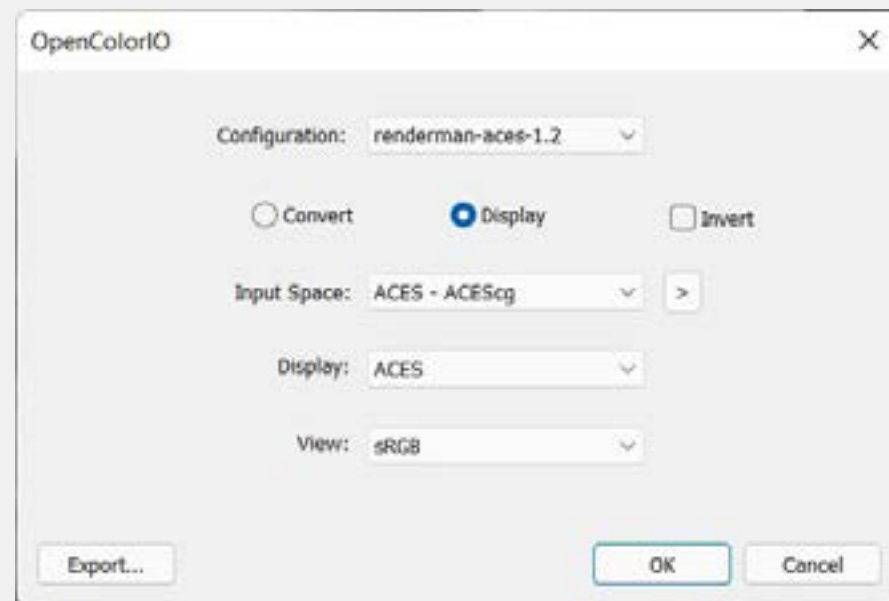
Extract the 8BF and AEX files to Photoshop and After Effects' plugin folders respectively, and move the downloaded folder to "C:/ProgramData/OpenColorIO/" (you might have to create the directory).

## Converting to sRGB in Photoshop

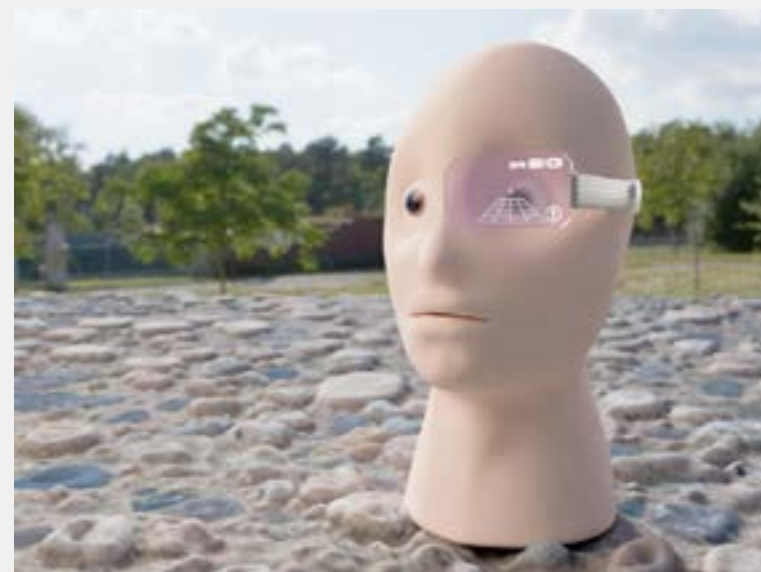
Bring up your rendered EXR, and open the OpenColorIO window from the Filters menu.

Here you would select renderman-aces-1.2 from the configuration menu, switch to Display mode, and set the last 3 menus to match your Maya preferences.

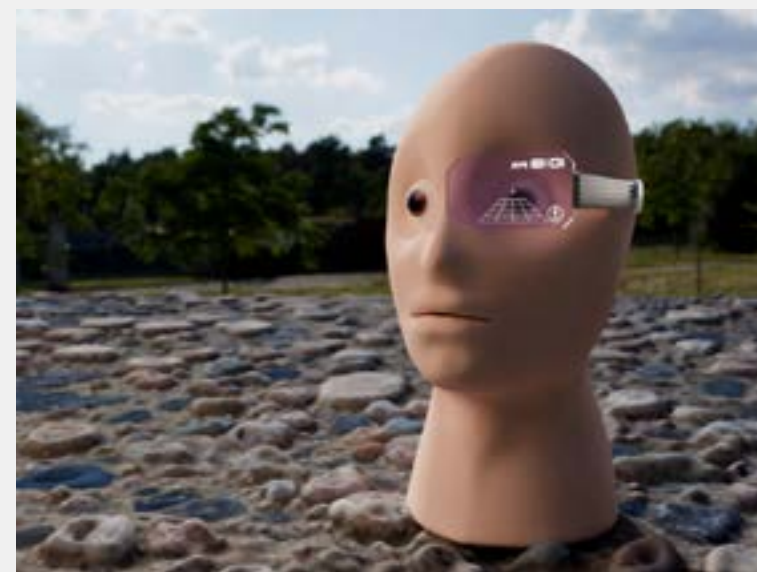
Your render will most likely look a bit dull and washed out after this, like the bottom-center image. This is because Photoshop interpreted the EXR as an sRGB image when you opened it rather than leaving it as is. To counter this, open the Exposure window and set the gamma correction to 0.454. Click OK and you're done!



Imported EXR render.



After applying the OpenColorIO filter.



After correcting the gamma.  
This image is accurate.

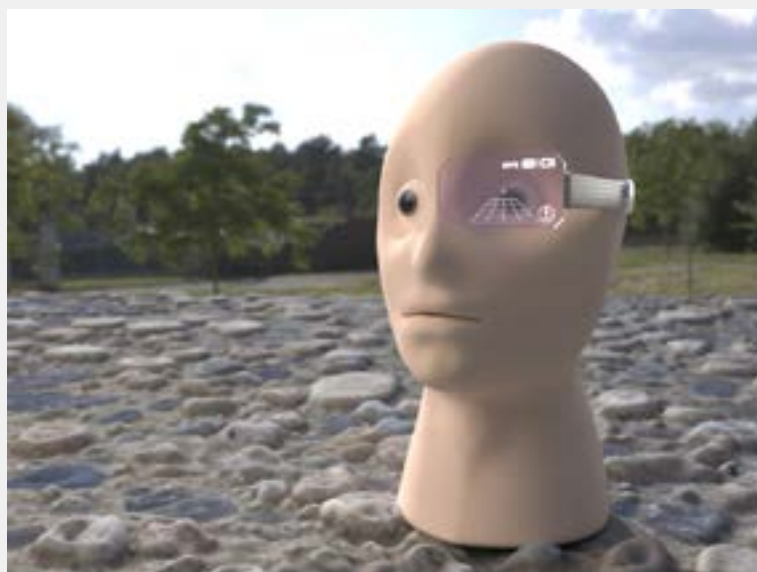
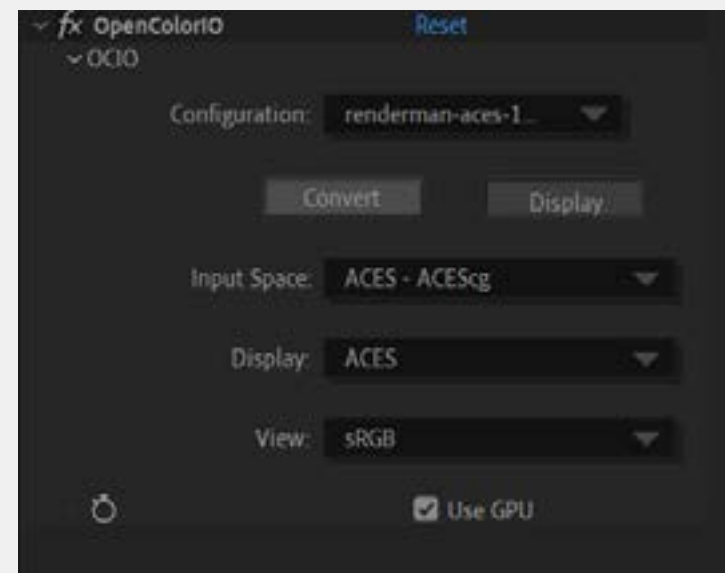
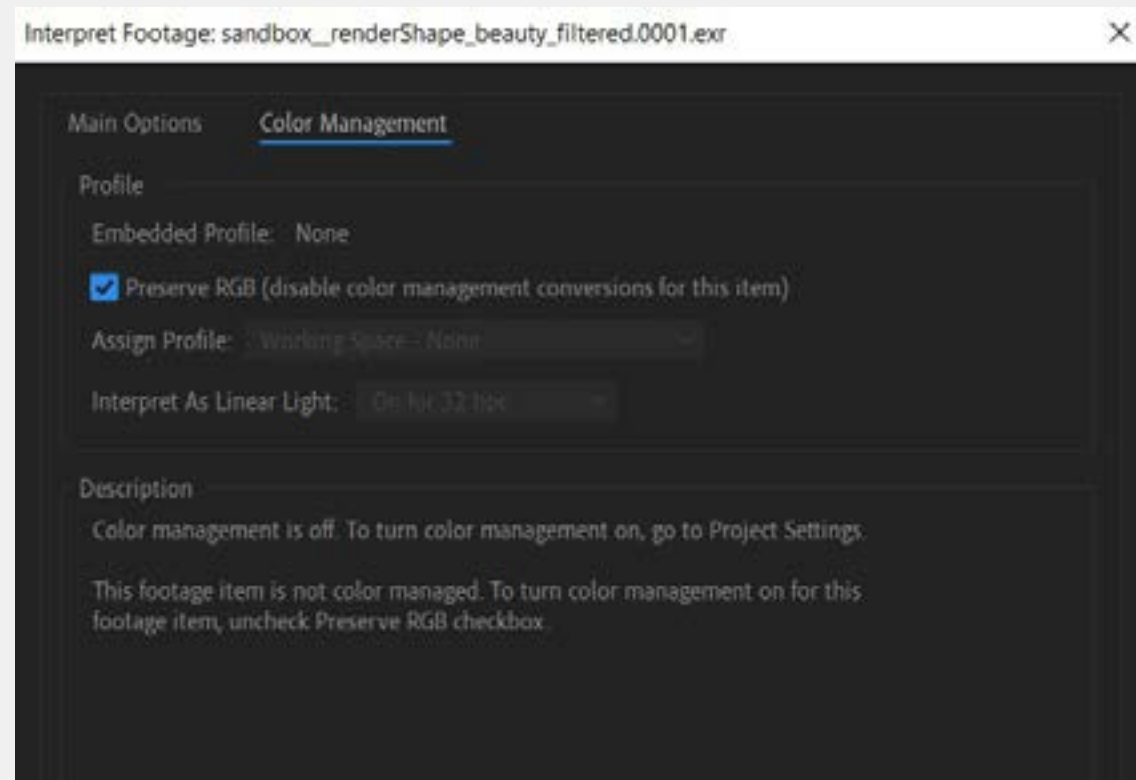


## Converting to sRGB in After Effects

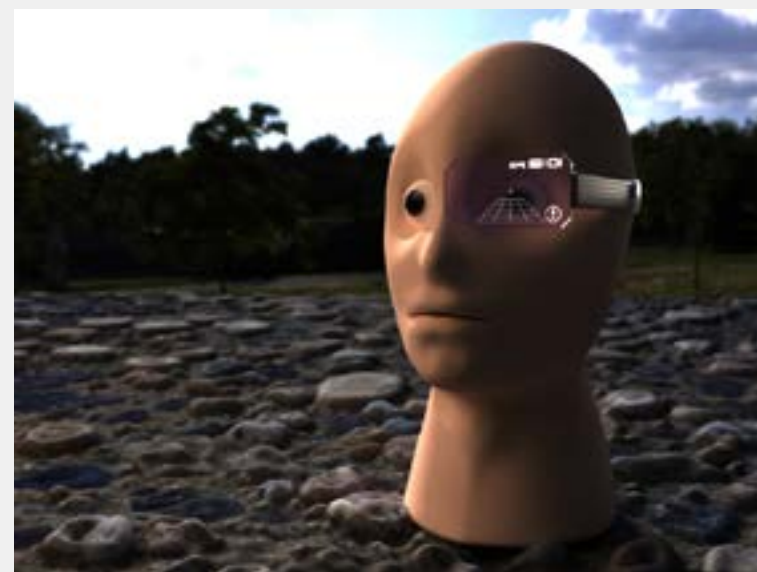
The process in After Effects is more straight-forward. Unlike Photoshop, here you're given the option to leave the EXR's colour alone. This is what you want, so right-click the imported EXR in the project panel and choose Interpret Footage>Main. Click the box that says Preserve RGB.

If you installed the plugin correctly, the OpenColorIO effect should be near the bottom of the Effects panel, under Utilities. Drag it onto your footage, and in the effect's properties, change the mode to Display and set everything else to match your Maya preferences.

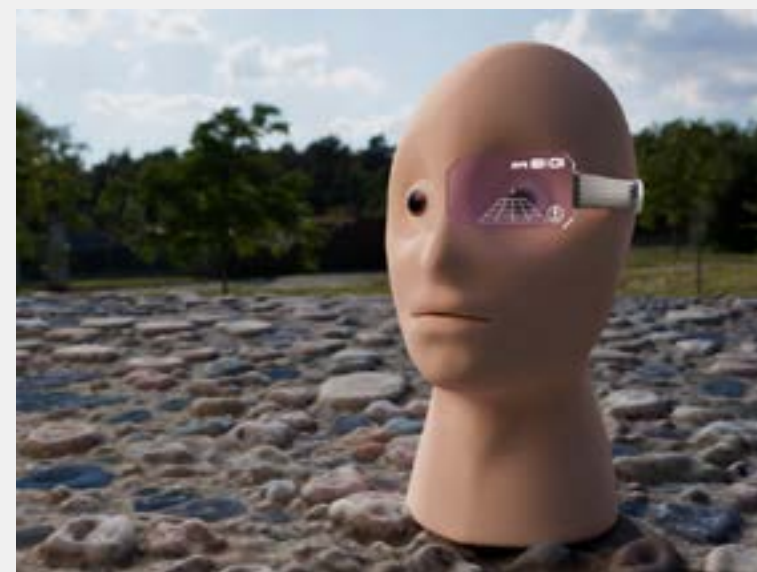
Depending on your situation, you might also need to disable colour management in the Project Settings window.



Imported EXR render.



After choosing "Preserve RGB".



After applying the OpenColorIO effect. This image is accurate.



# Bibliography

Nichols, C. (2020, September 28). [Colour space diagram]

[https://static.chaosgroup.com/images/assets/000/011/098/full\\_width\\_original/ACEScg\\_03.png](https://static.chaosgroup.com/images/assets/000/011/098/full_width_original/ACEScg_03.png)

Pedersen, L. (2018, October 28). [Gamma curves]

[https://pixar-community-production.s3.us-west-1.amazonaws.com/Tutorials/color\\_management/5567\\_11434\\_6414.jpg](https://pixar-community-production.s3.us-west-1.amazonaws.com/Tutorials/color_management/5567_11434_6414.jpg)

## **Fnordware's plugins:**

<http://fnordware.blogspot.com/2017/02/opencolorio-for-photoshop.html>

<http://fnordware.blogspot.com/2012/05/opencolorio-for-after-effects.html>