

Paragon材质设计 灯光美术需求及UE4中的实现

Lightingmass烘焙效率

李文磊 资深开发者美术支持

视觉目标； 平台； 工具； 团队； 预算

- 不断更新，3周更新一个角色
- 每个角色需要升级不同的皮肤
- 高品质高频细节，近距离观观看
- 快速的修改和迭代
- 需要在不同地区团队间协作
- 在一个相当长时期内保持品质统一性



除了皮肤以外；使用各种Mask的
贴图区分基础材质创造变化

高低模型

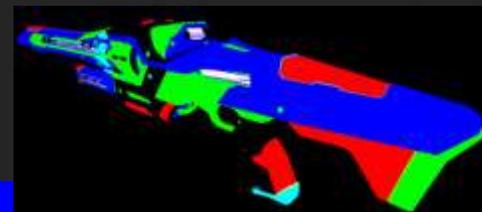
基本信息: Normalmap, ID MASK, AO/Cavity



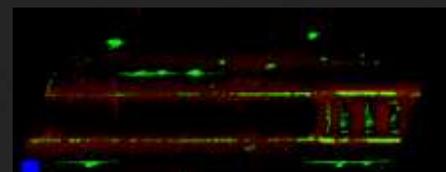
Normalmap

AO

ID Mask



添加细节 (划痕, 污渍, 环境特征等)



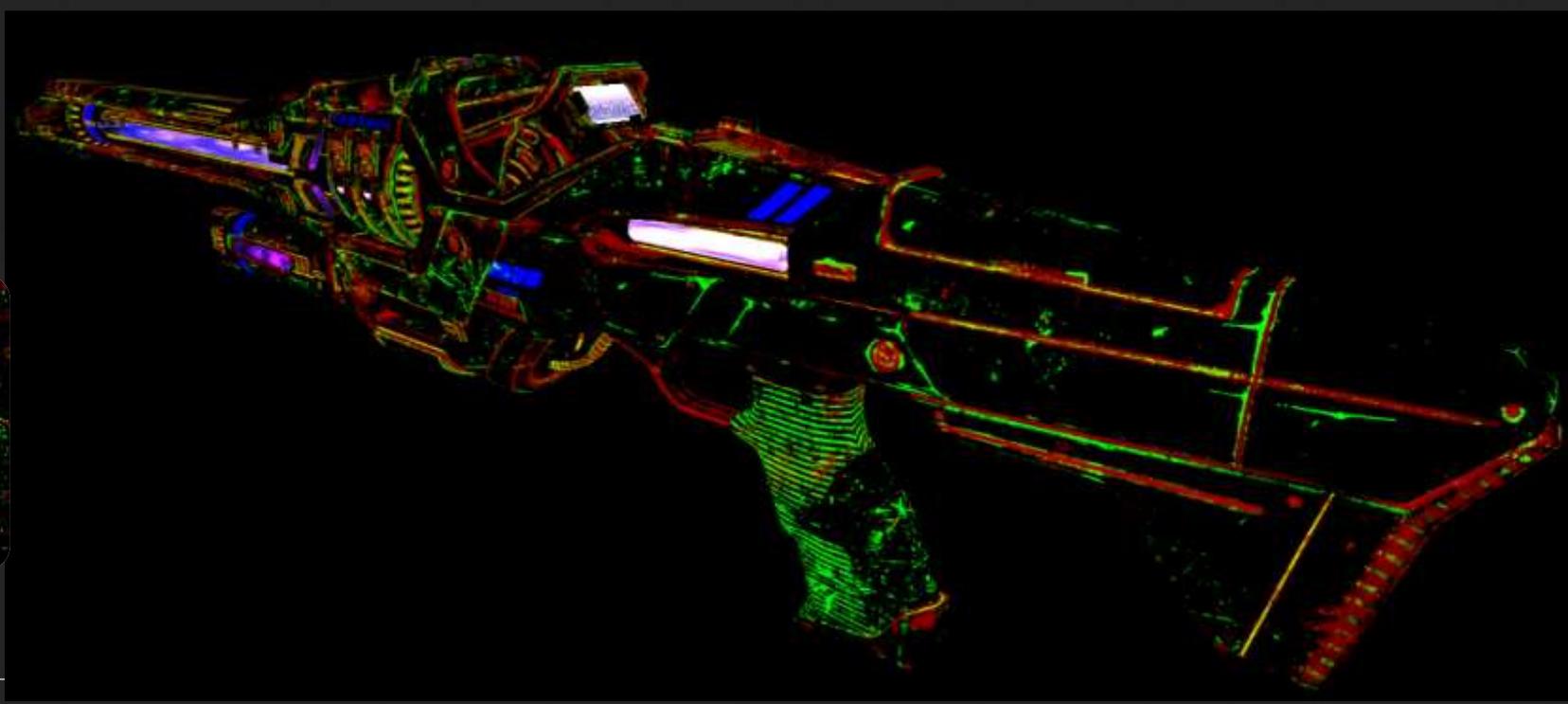
UE4 (基础材质, 最终混合, 添加特效)



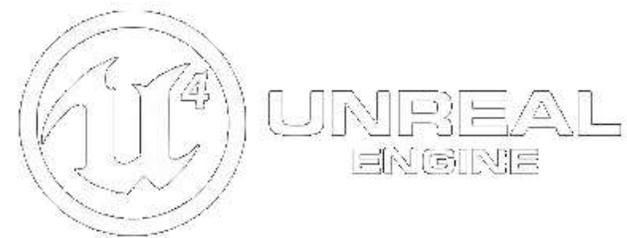
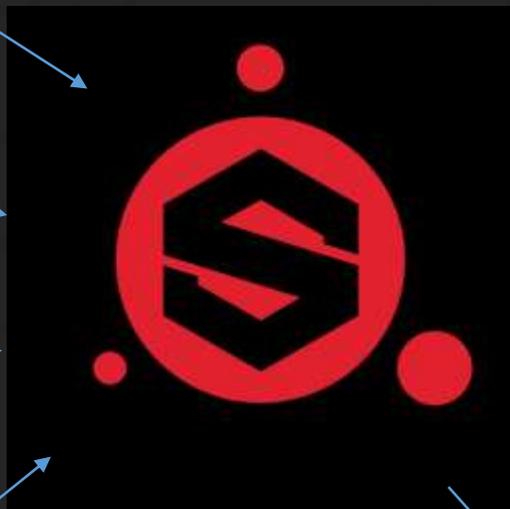


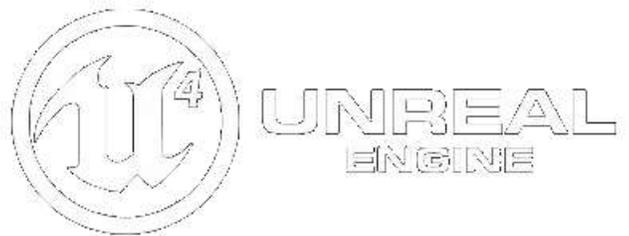
添加基本材质上的细节

- 划痕
- 污渍
- 环境元素

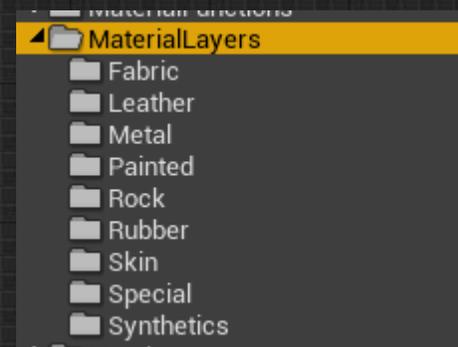








材质函数



每个材质包含的自定义属性

Tint

Grime

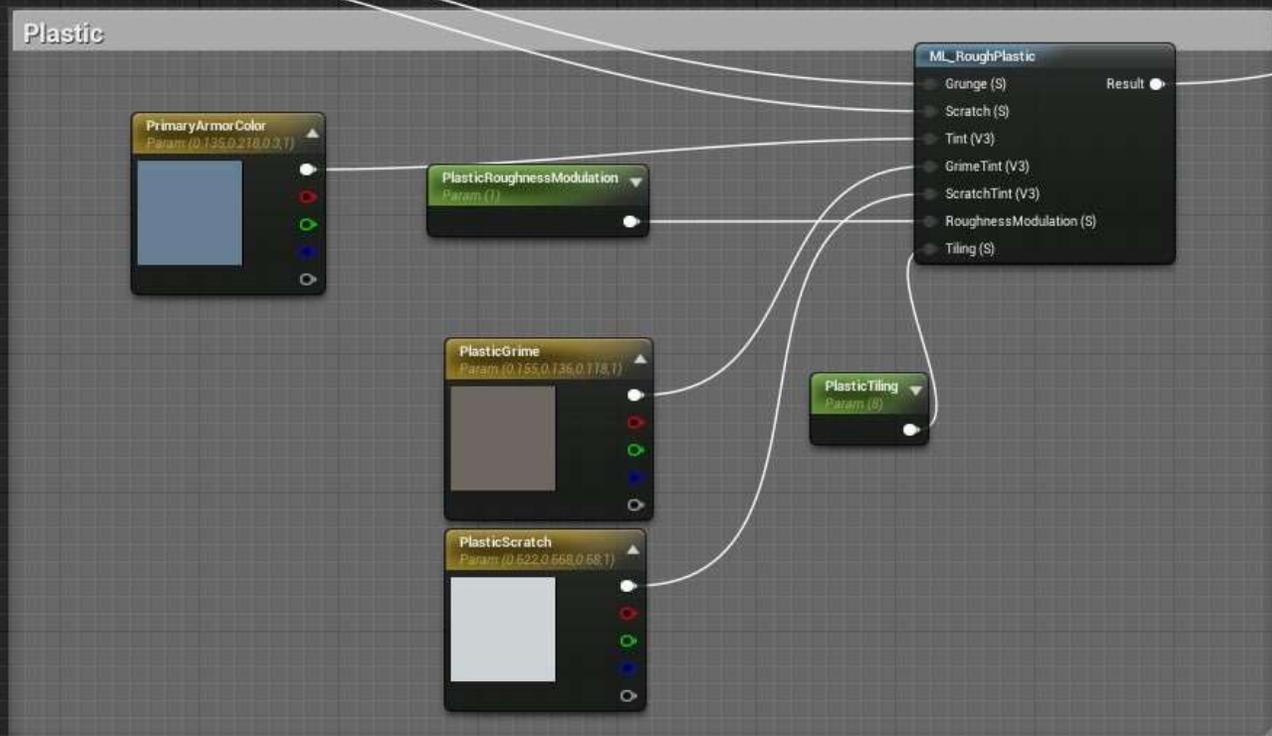
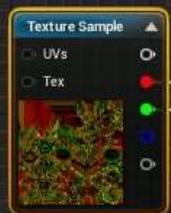
Scratch

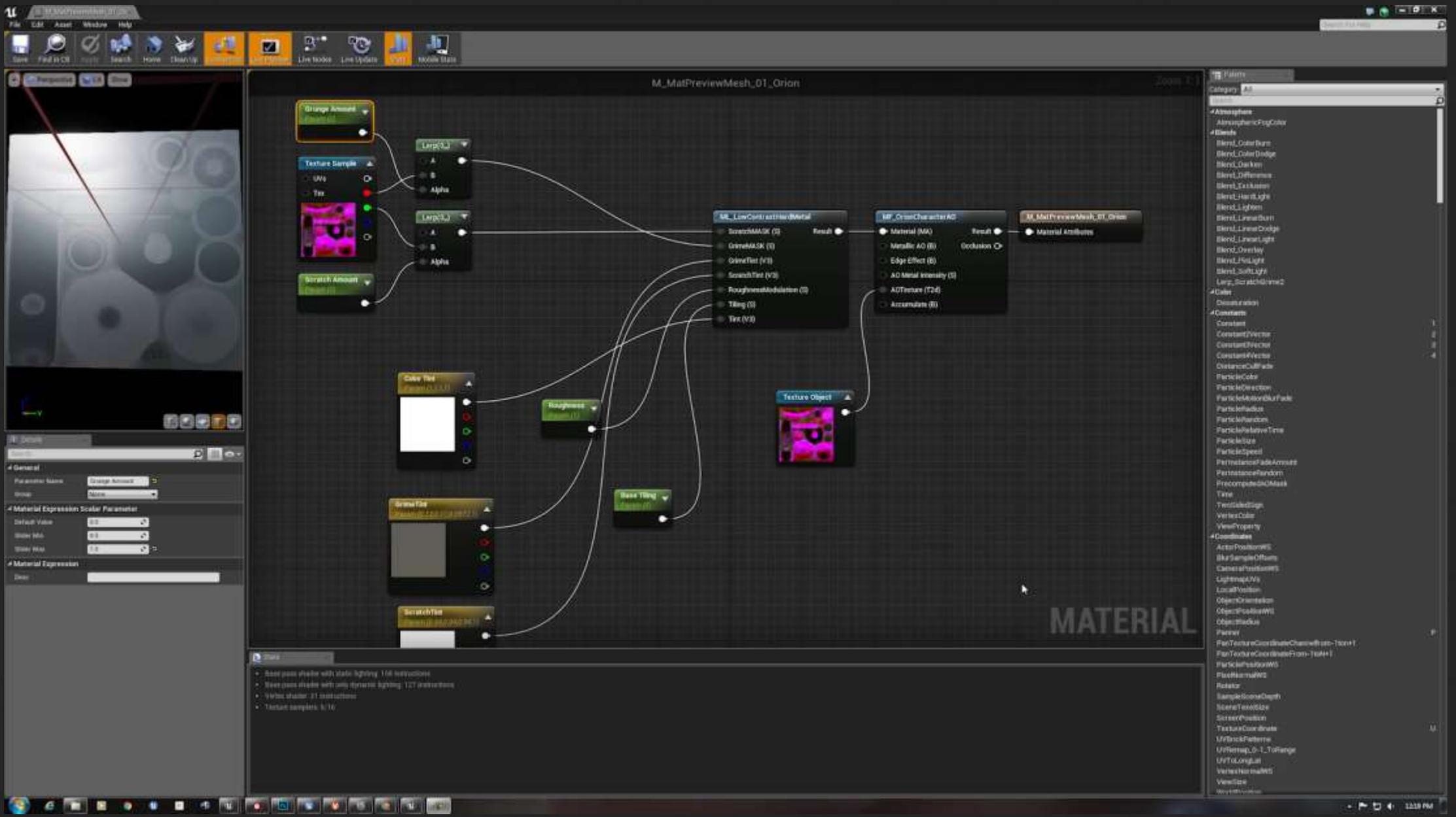
Tiling

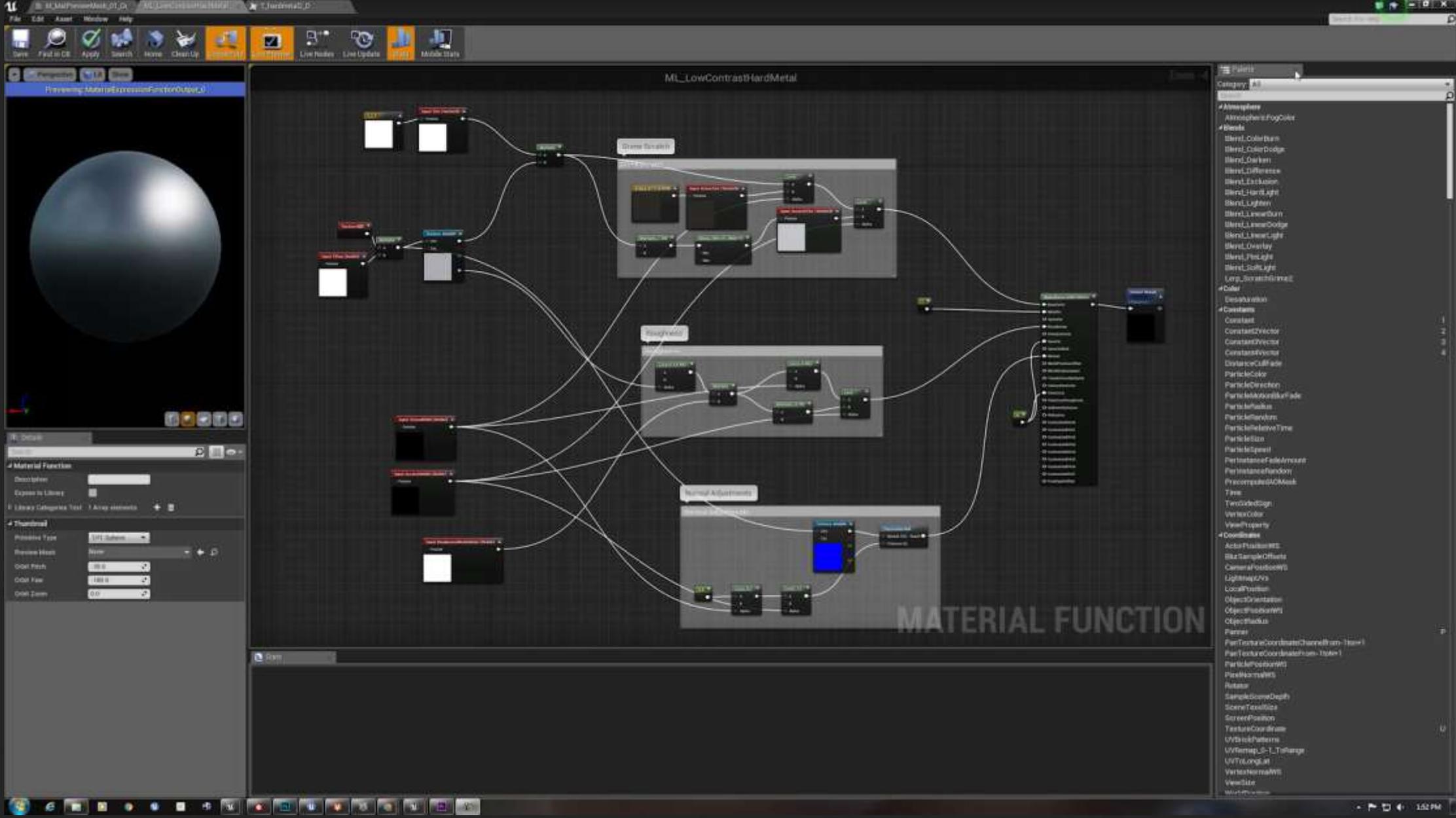
一些特别属性

Fresnel Intensity

Opacity



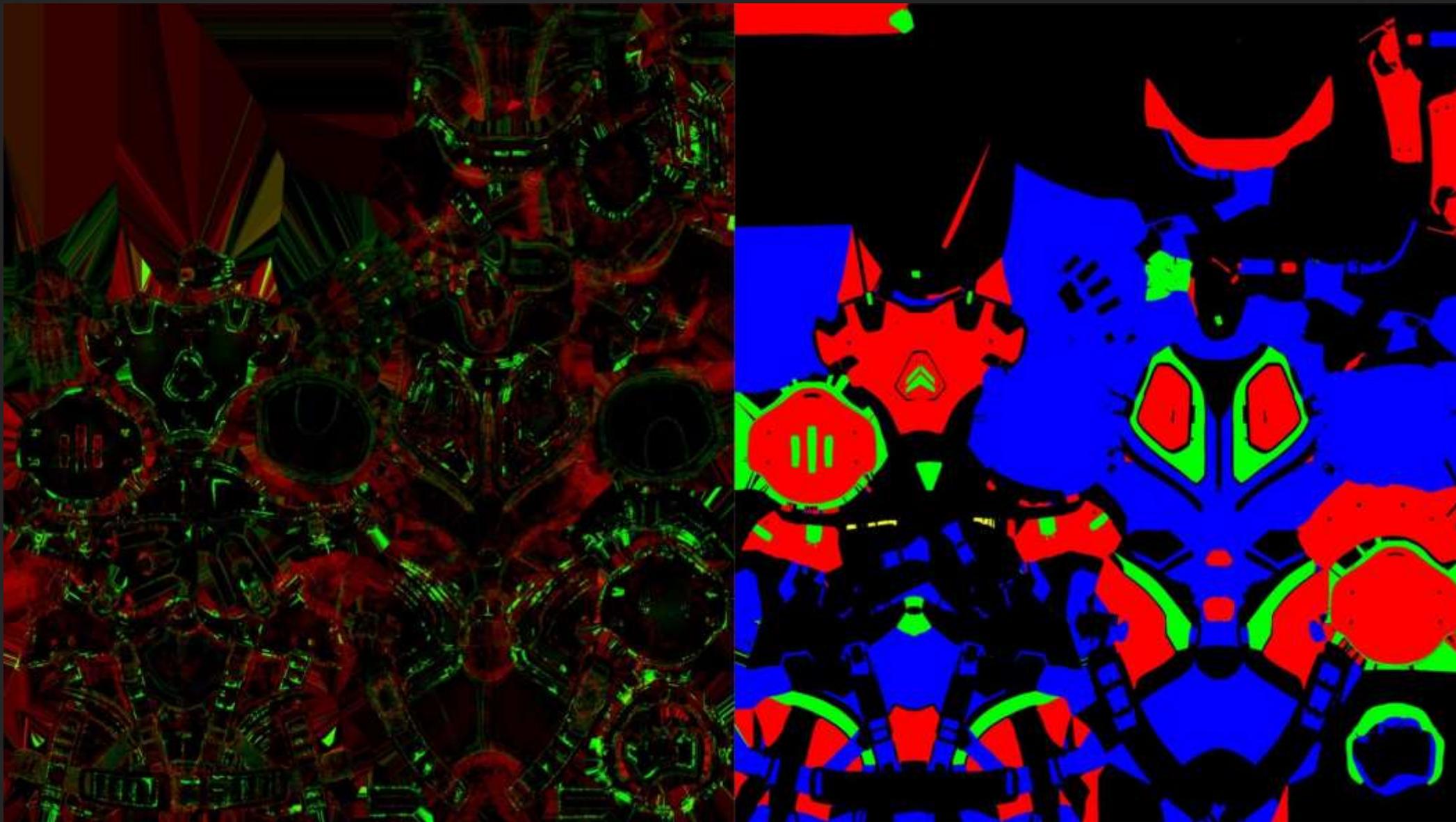






MATERIAL

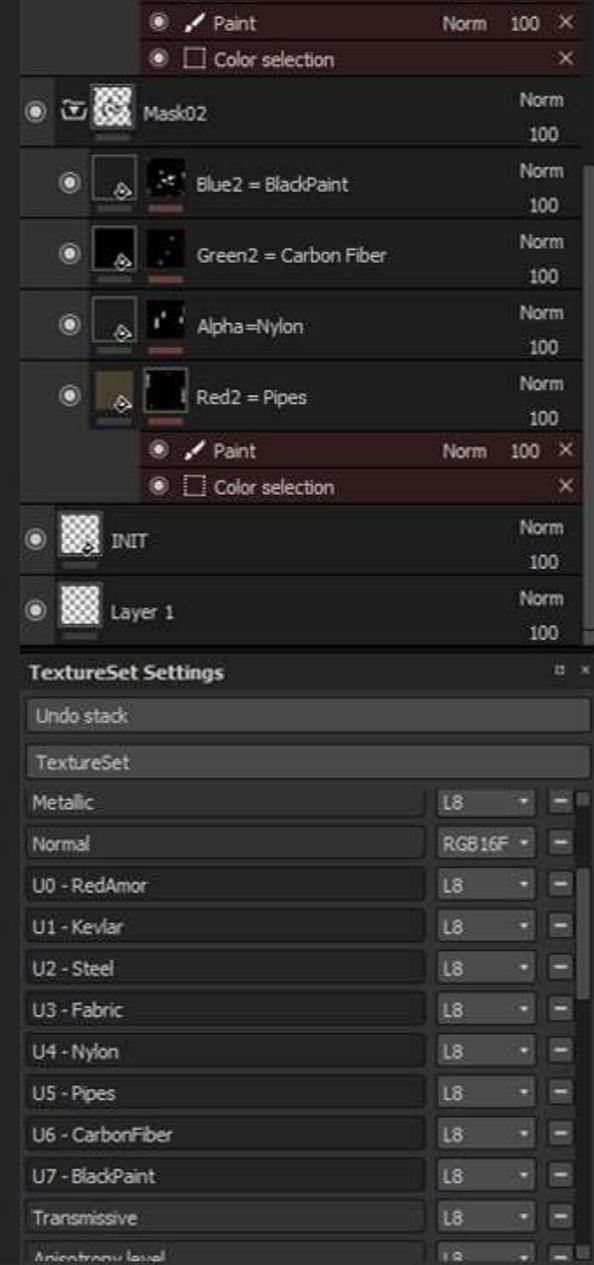






Substance Painter

- 所有基本信息贴图的存储
- 划痕/污渍
使用模板, 生成器, 手绘等方式结合生成
- 纹身/贴花 分开图层





Substance Designer

各种Filter的实现；包括基础材质和Function等

<https://www.youtube.com/watch?v=MmJrH2n1-bl&t=733s>



Paragon学习资源

Animation In general 动画相关

<https://www.youtube.com/watch?v=1UOY-FMm-xo>

Animation Series: 动画系列

<https://www.unrealengine.com/en-US/blog/animation-blueprint-setup-walkthrough-stream-recap>

Character Creation 写实角色创建

<https://www.youtube.com/watch?v=toLJh5nnJA8>

Texture Pipeline 贴图创建流程

<https://www.youtube.com/watch?v=nVes6OUyzdw>

Substance Pipeline and toolset Substance流程和工具

https://www.youtube.com/watch?v=MmJrH2n1_bl&t=733s

Substance Painter Substance Painter在流程的应用

<https://www.youtube.com/watch?v=Q15ieH8ZWio&t=291s>

Foliage&Parallax Occlusion Mapping 场景材质中用到的POM技术

<https://www.youtube.com/watch?v=4gBAOB7b5Mg&t=4024s>

Building Paragon in general Paragon相关, 涉及各个方面

<https://www.youtube.com/watch?v=BXcw2Irlinc>

Lighting and Rendering 灯光和渲染相关

<https://www.youtube.com/watch?v=22jvxFoTHBk>

Artistic Lighting&Spring 灯光渲染在Paragon和Fortnite中的实践

<https://www.youtube.com/watch?v=DDVJ2JlsB3U>

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- 每个角色需要升级不同的皮肤
- 高品质和高频细节，近距离观看
- 快速的修改和迭代
- 需要在不同地区团队间协作
- 在一个相当长时期内的统一性考量

基础材质(Material Function), SP Filter, SP文件, 模型, Mask, 细节Mask, 母材质, 材质Instance

灯光美术需求及UE4中的实现

关键词

影调; 色彩; 立体感; 空间感; 质感; 造型

工具不仅是灯

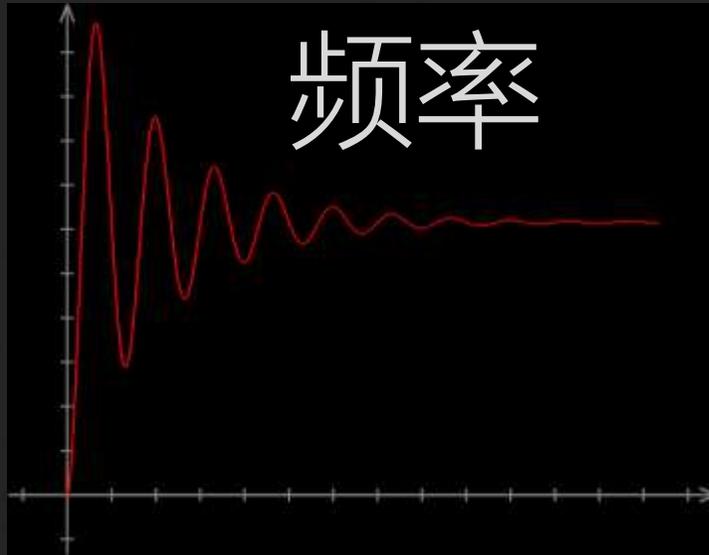
贴图，材质，雾效，蓝图，后期，关
卡，摄像机等等

影调

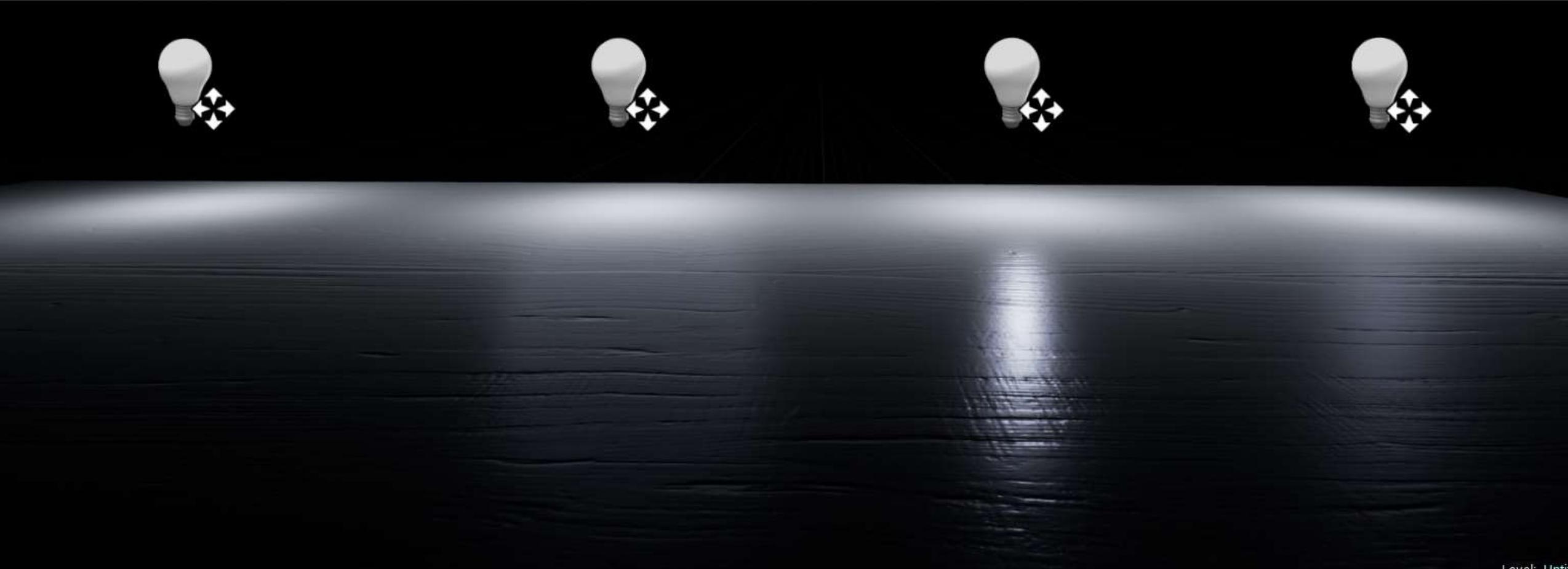
频率; 层次; 品质



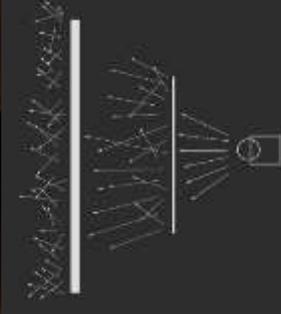
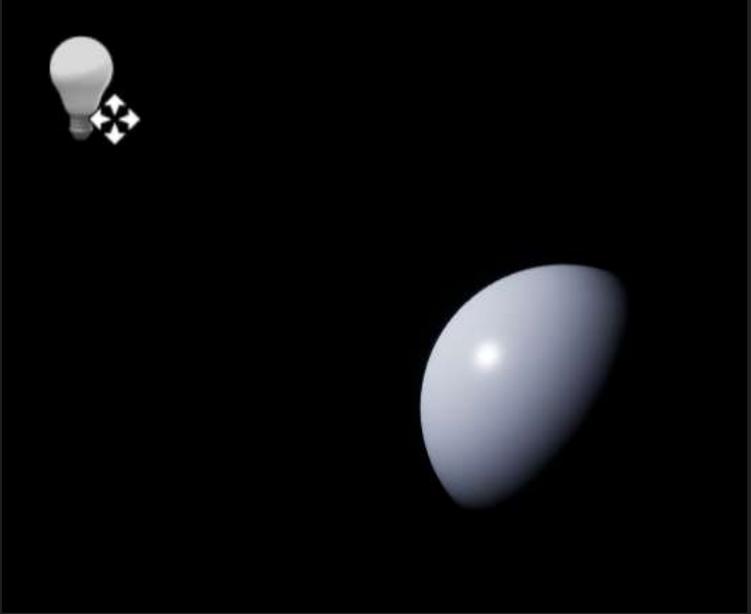
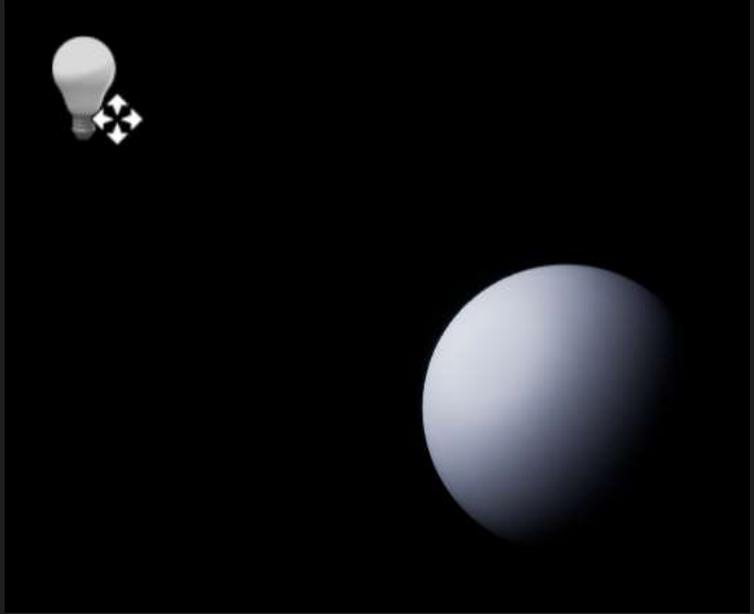
频率

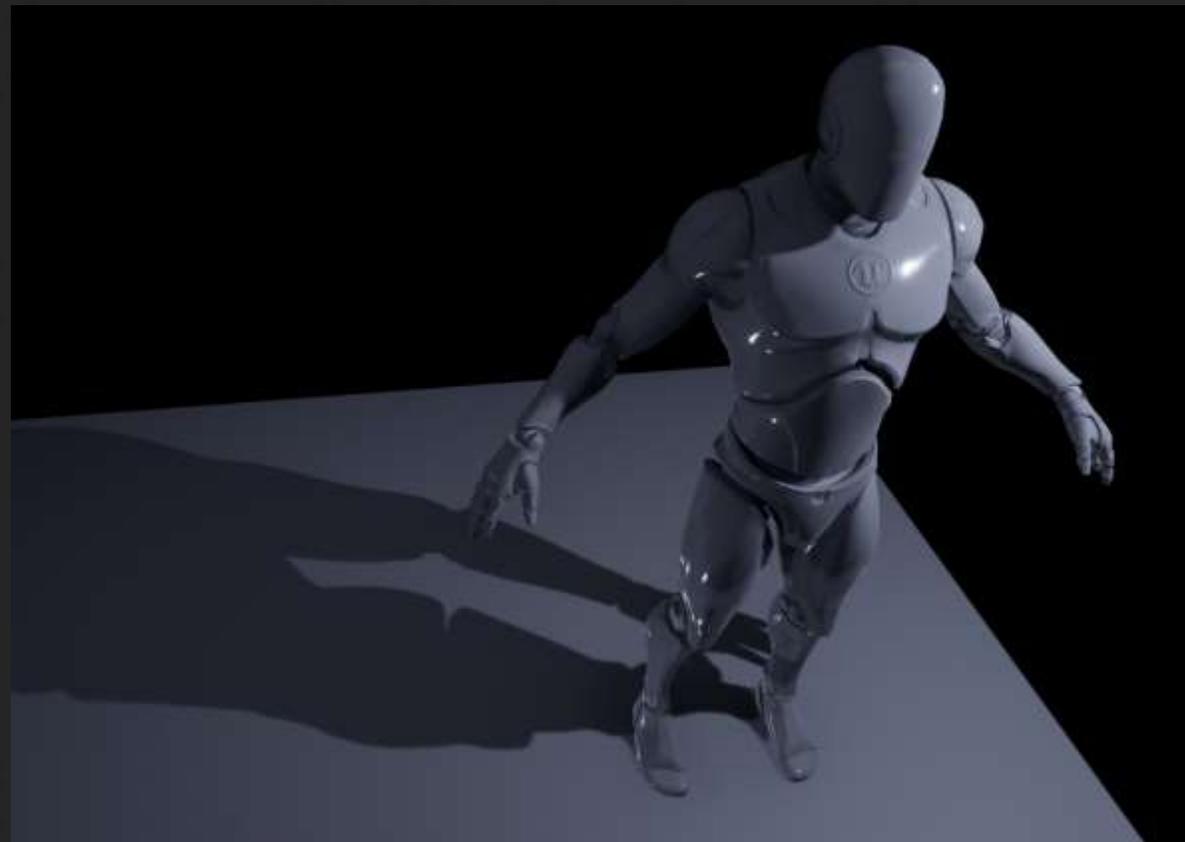
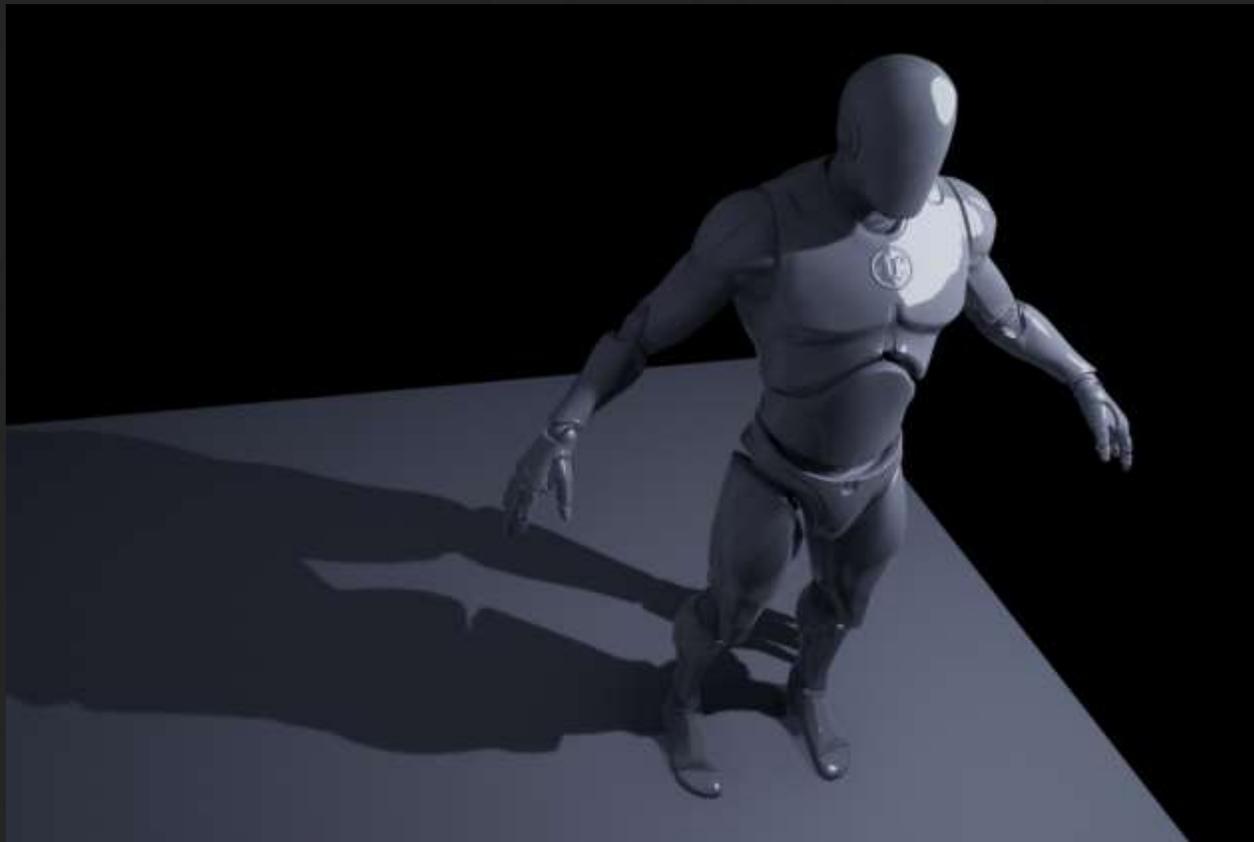


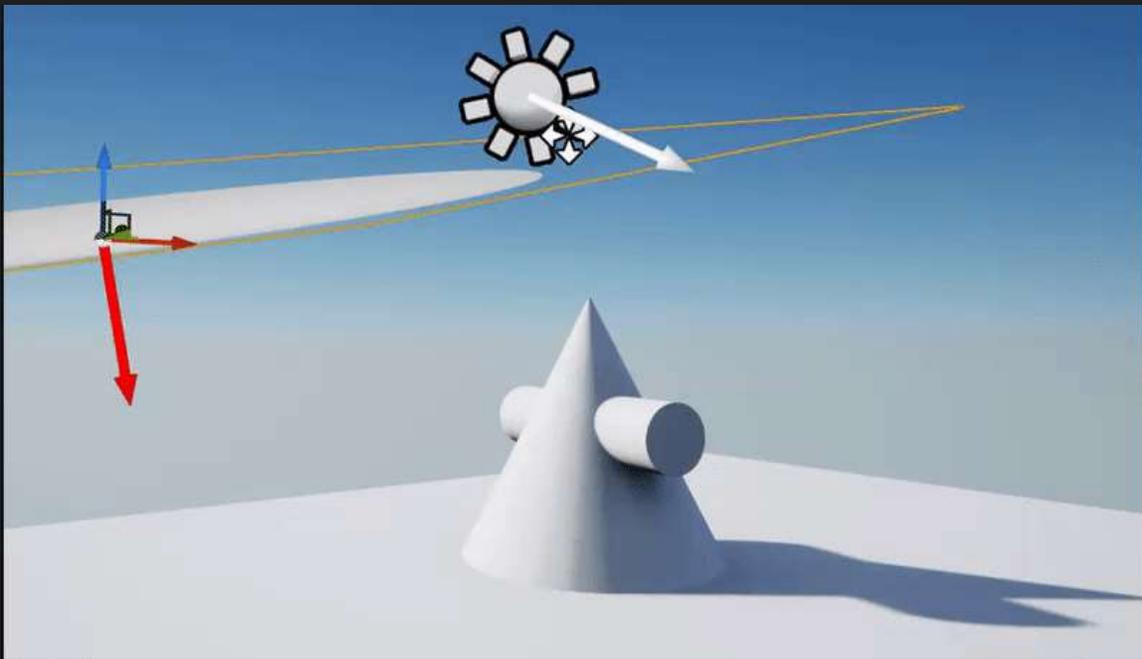
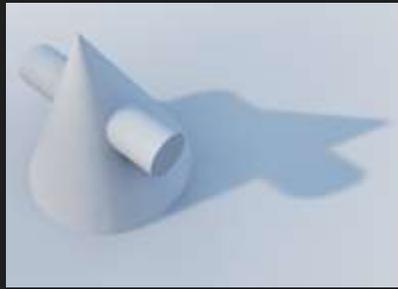




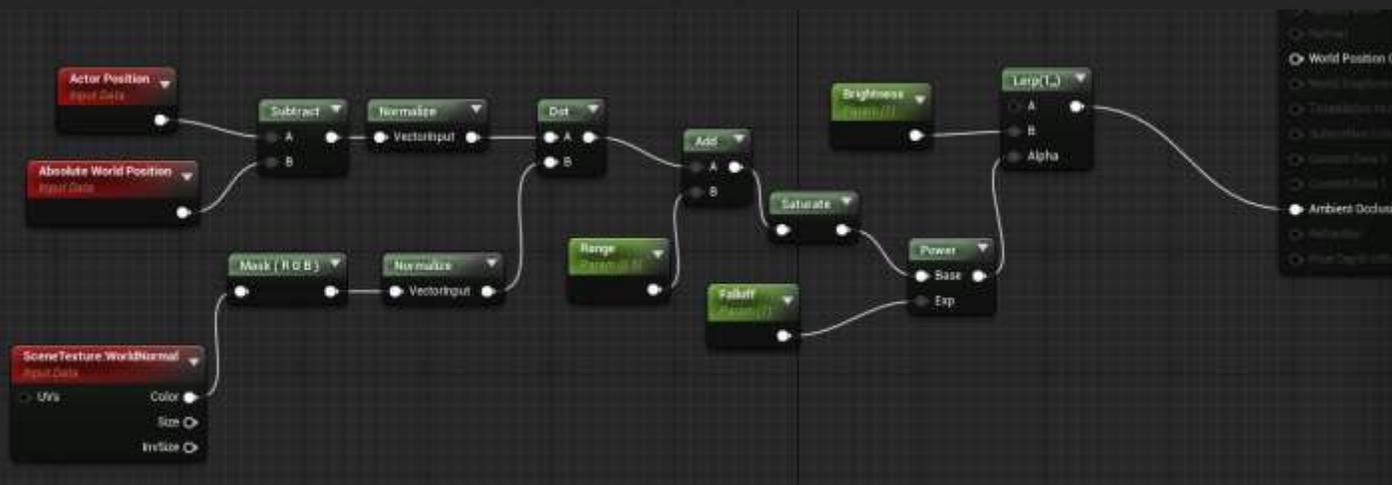
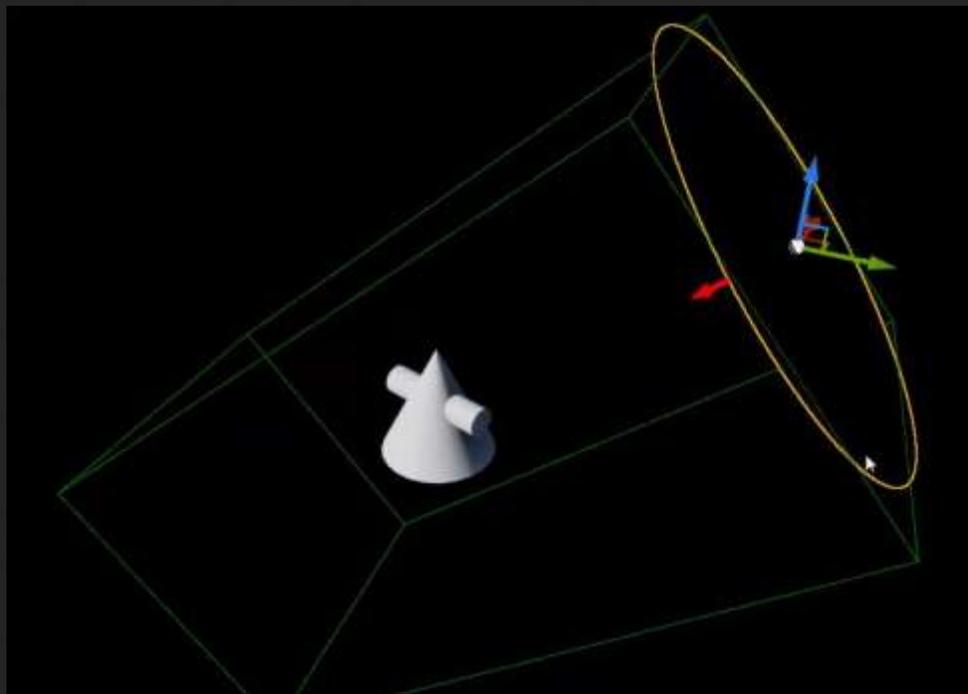
Source Radius 100.0
Soft Source Radius 50.0

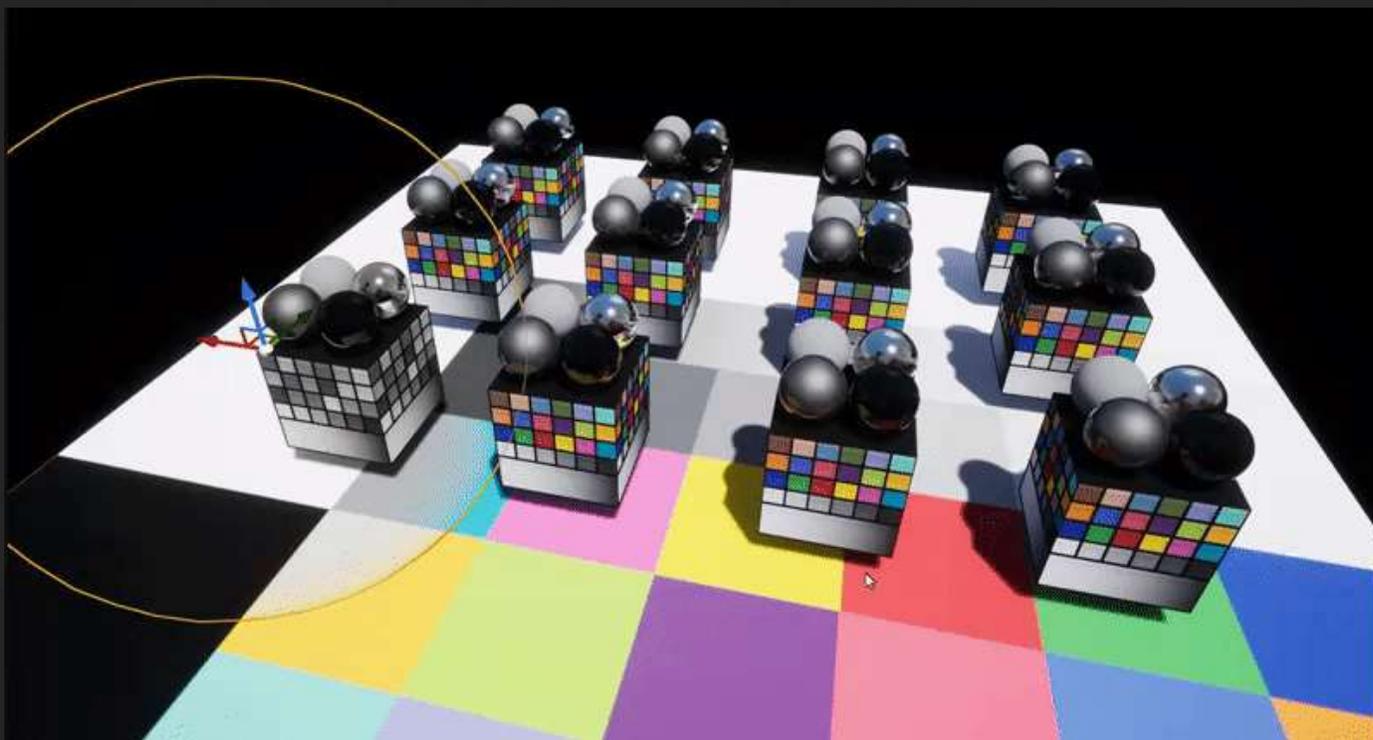


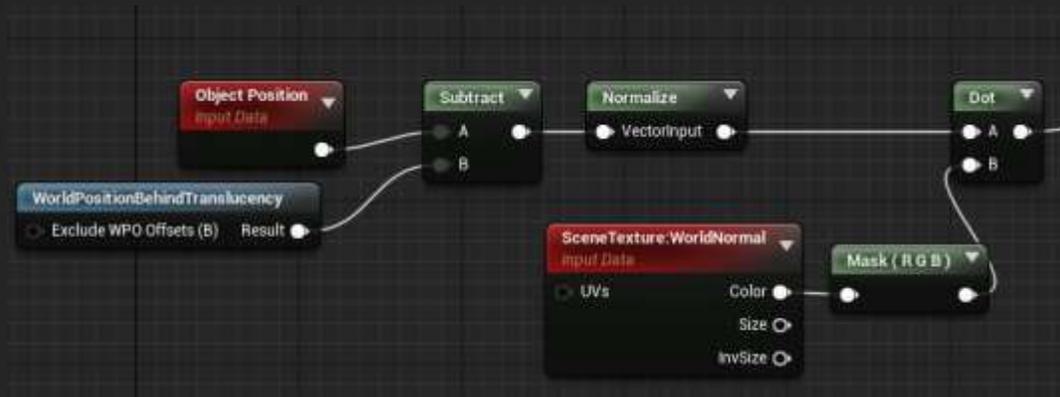
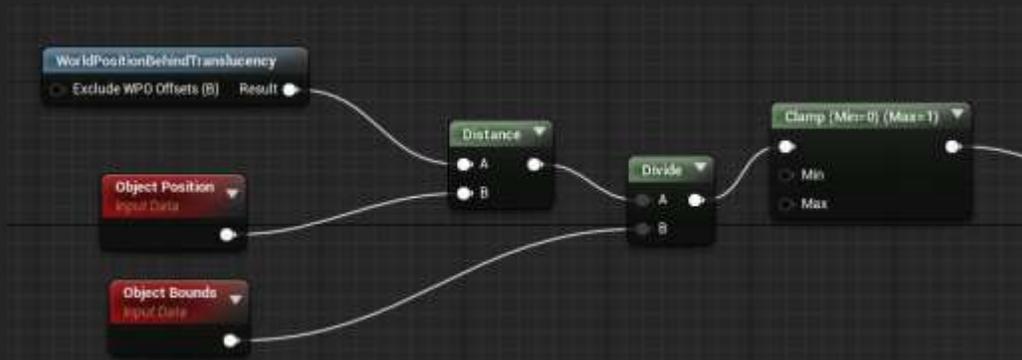
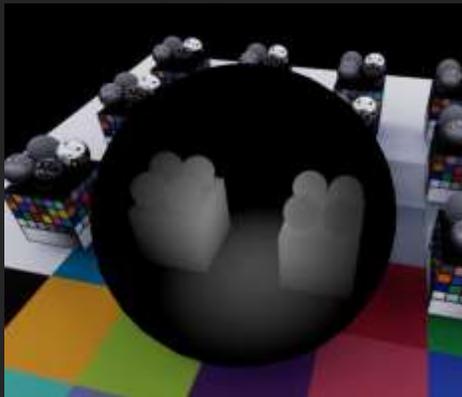


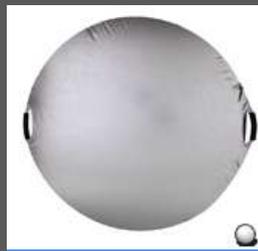
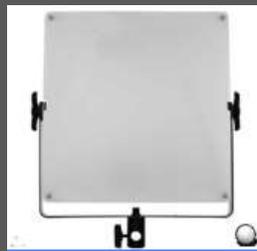
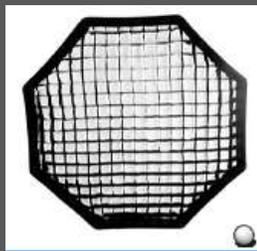


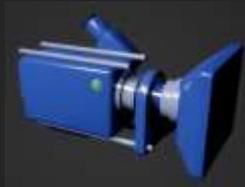
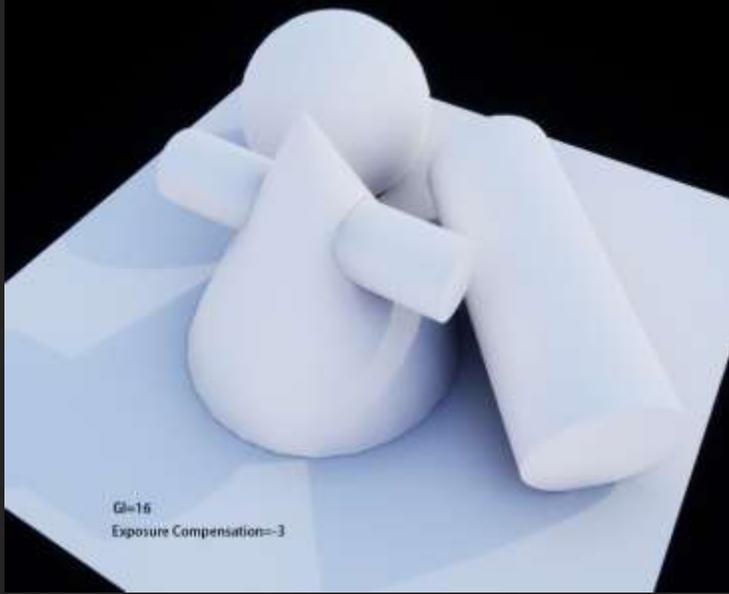










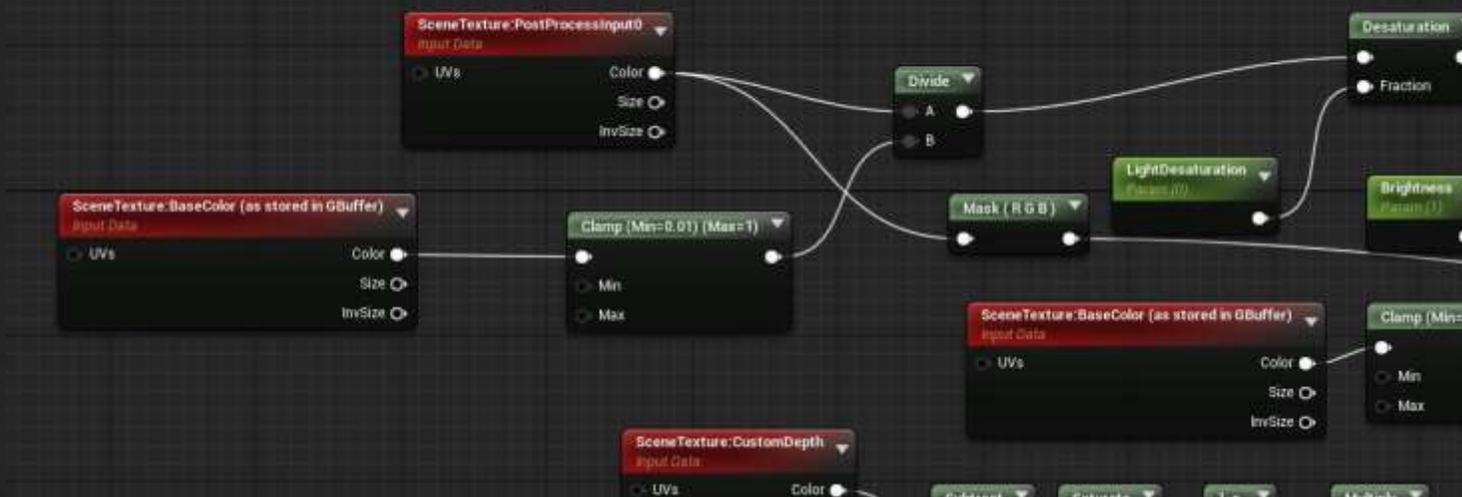
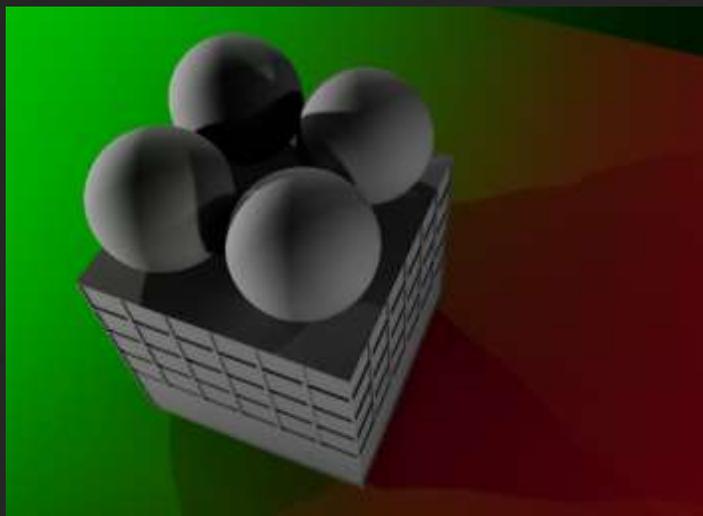


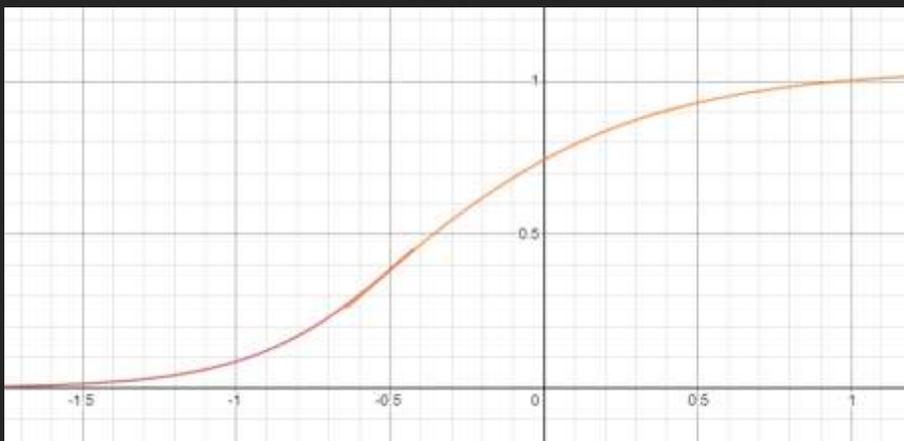
Indirect Lighting Intensity

1.0

Exposure Compensation

0.0

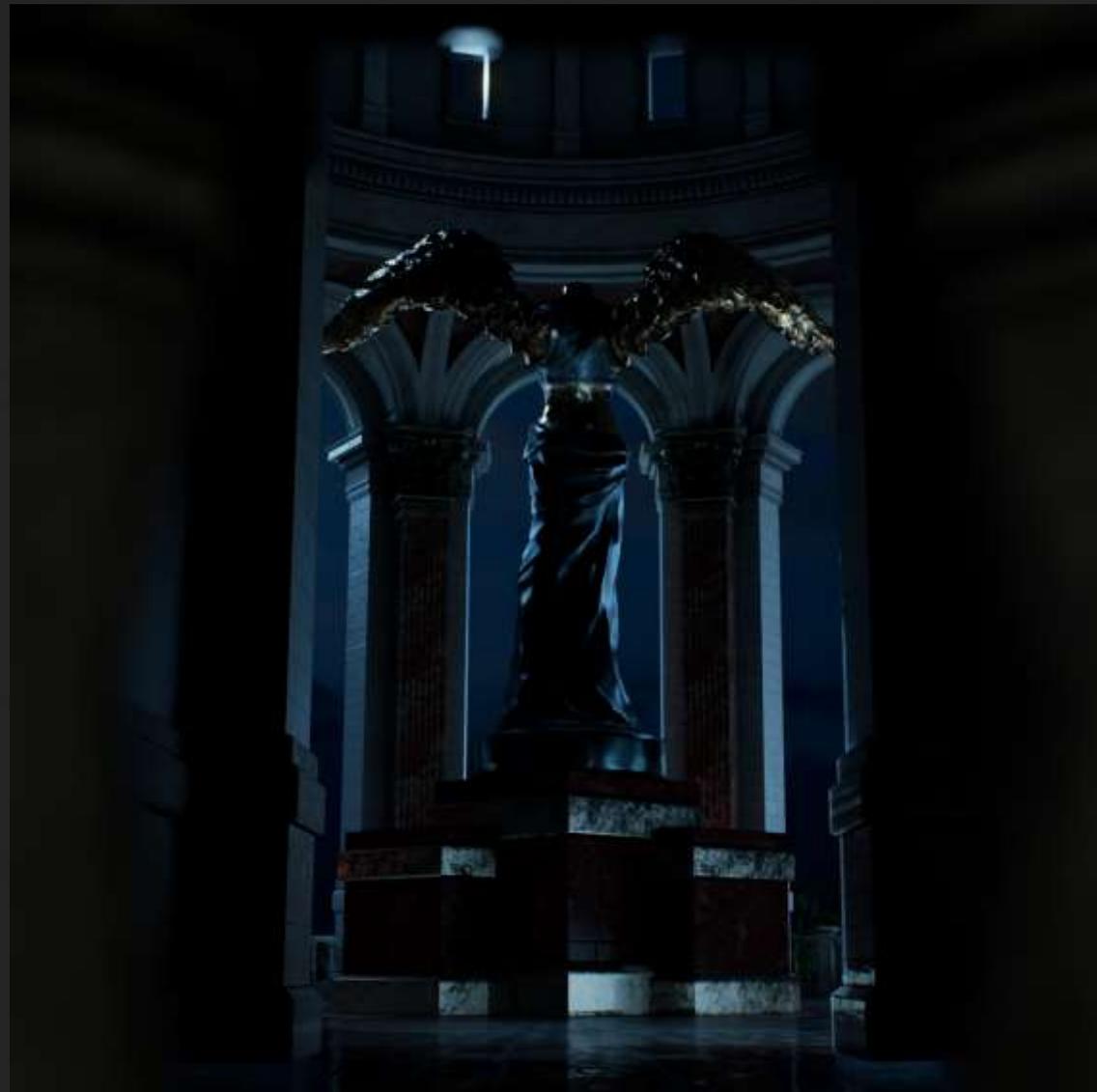




Film	
<input type="checkbox"/> Slope	0.88
<input type="checkbox"/> Toe	0.55
<input type="checkbox"/> Shoulder	0.26
<input type="checkbox"/> Black clip	0.0
<input type="checkbox"/> White clip	0.04

<https://www.desmos.com/calculator/h8rbdpawxj>





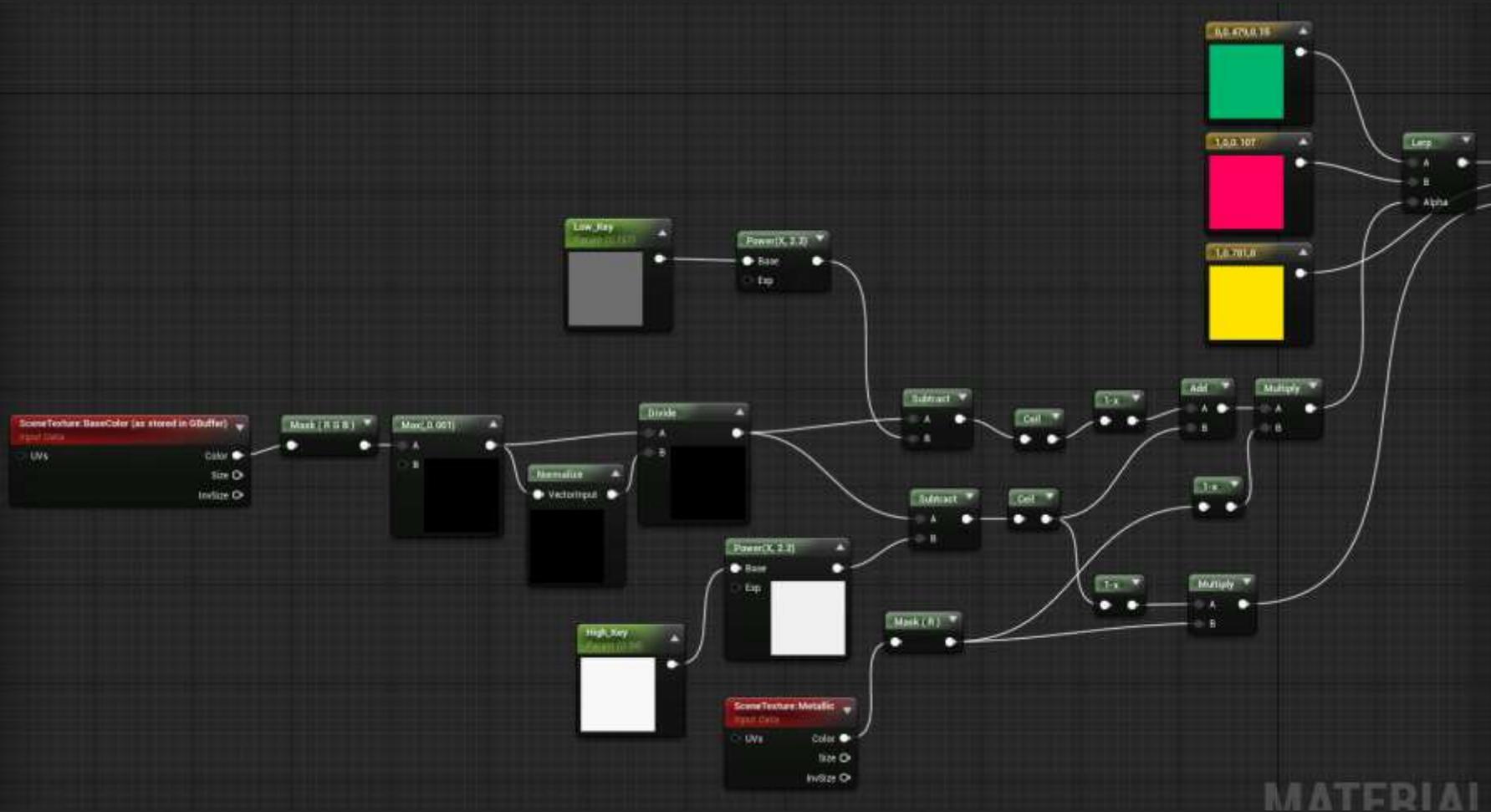
避免死黑，确保有一定的环境光，如：
动态的SKY； Reflection； ILC/VLM

金属



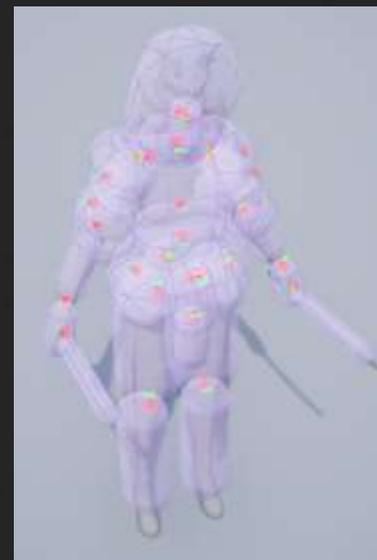
非金属

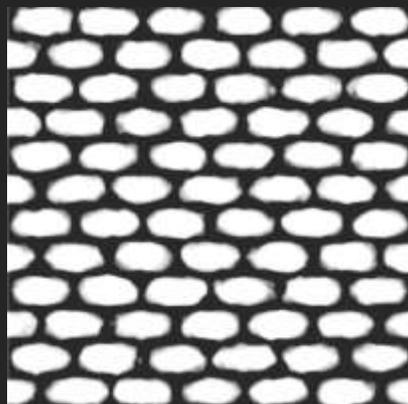






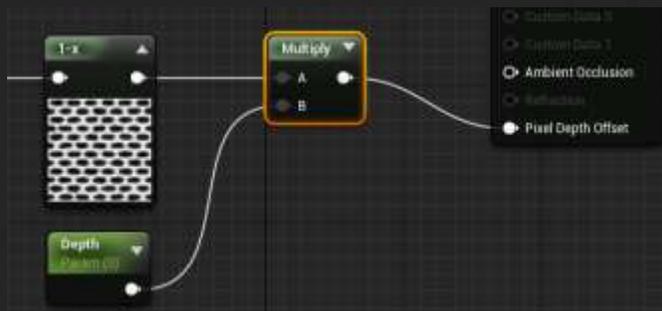






Light

Contact Shadow Length 0.05



间接光的遮蔽

Material AO

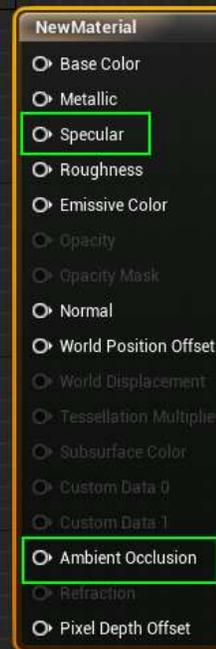
Material Specular

Bent Normal

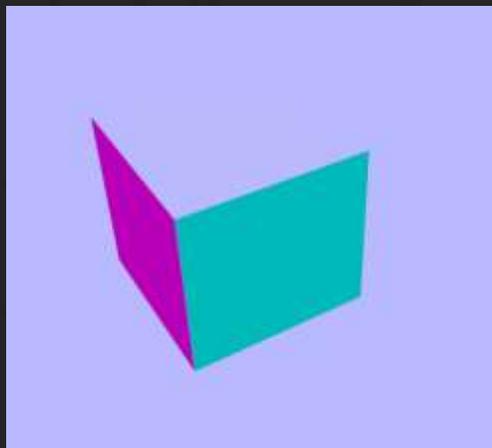
DF Indirect Shadow

Capsule Indirect Shadow

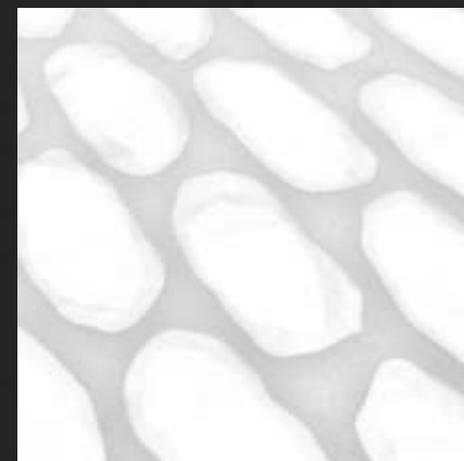
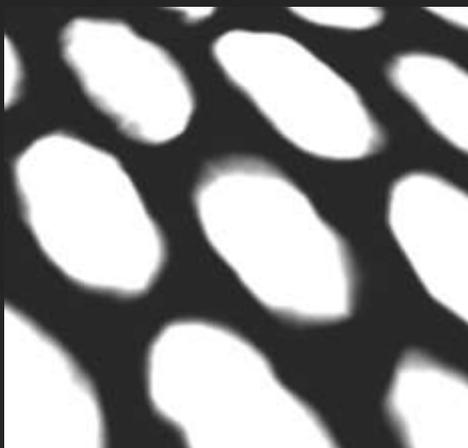
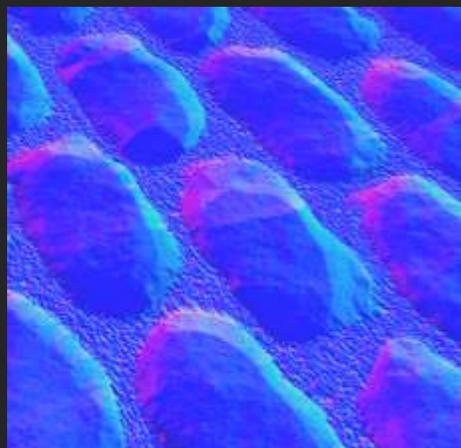
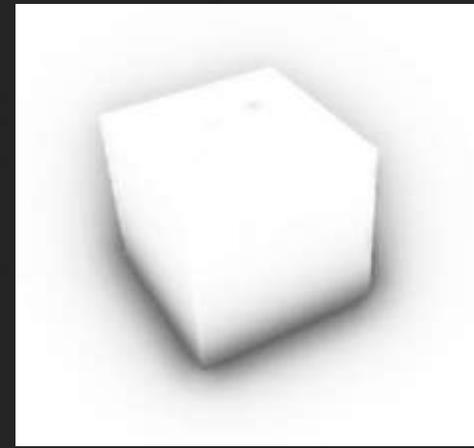
SSAO

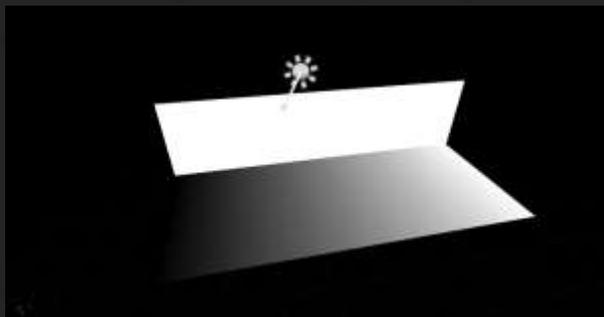


SSAO



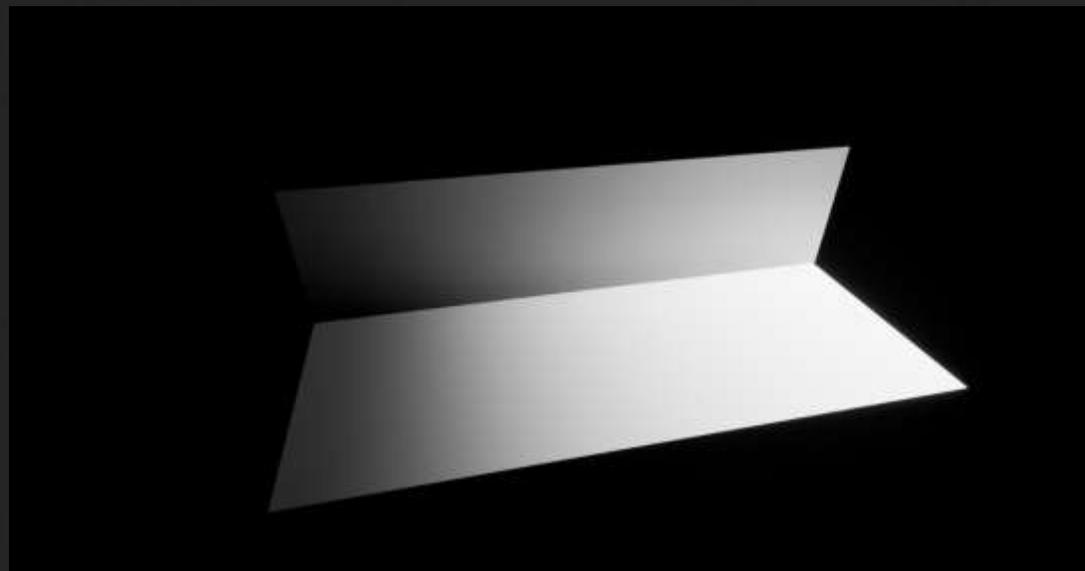
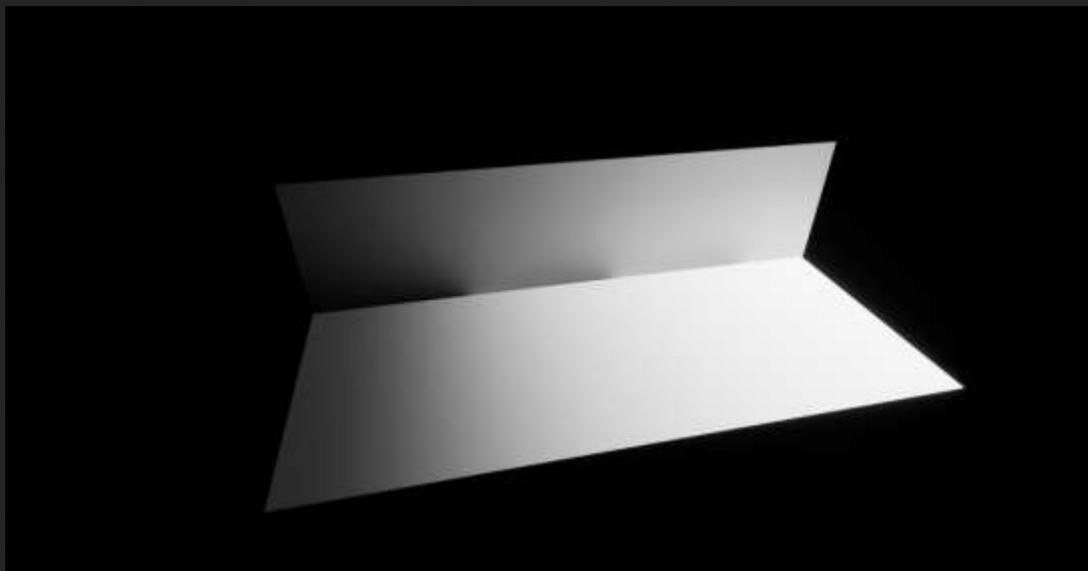
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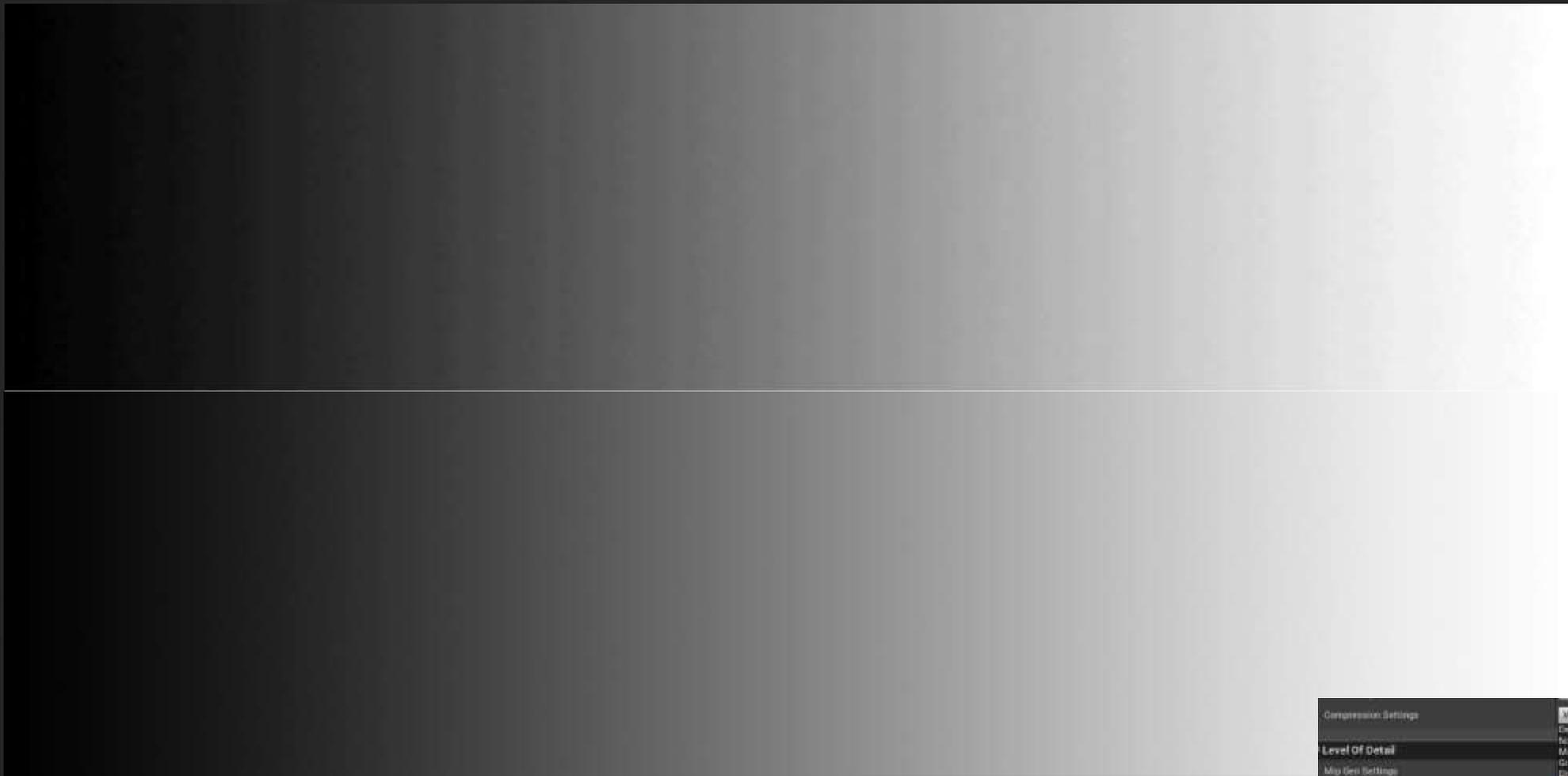


Export Resolution Scale 10.0

Static Lighting Resolution 8.0

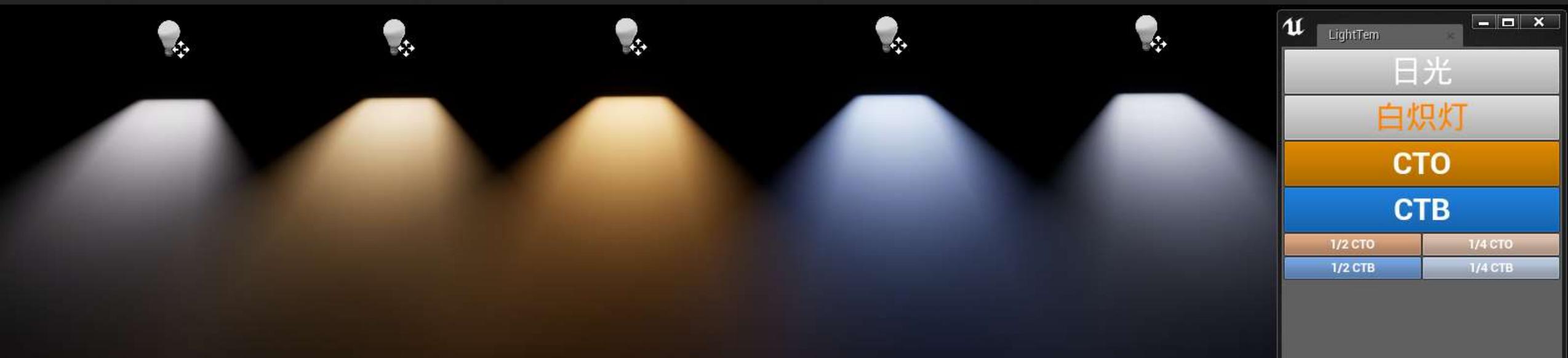




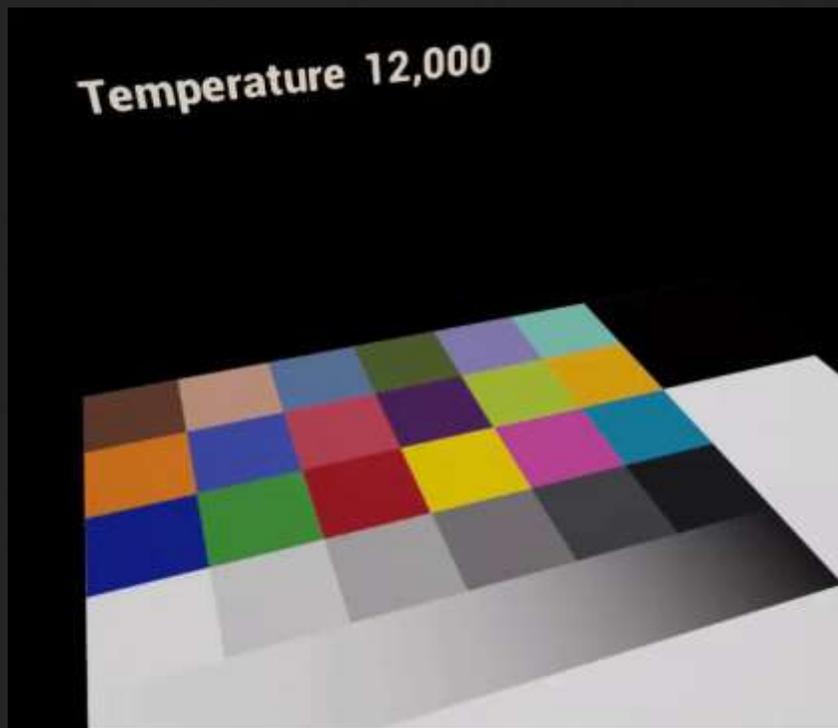


Compression Settings	Vector Displacementmap (RGBA8)
Level Of Detail	Default (DXT1/S, BC1/S on DXT1)
Mip Gen Settings	Normalmap (DXT1, BC5 on DXT1)
LOD Bias	Masks (no sRGB)
Texture Group	Grayscale (R8, BC5, sRGB)
Texture	Displacementmap (R11G11)
	Vector Displacementmap (RGBA8)
	Normal (F32, no sRGB)
	UserInterface2D (RGBA)
	Alpha (no sRGB, BC4 on DXT1)
	DistanceFieldFont (R8)
	PCNCompressed (RGB, BC6A, DXT1)
	BC7 (DXT1, optional A)

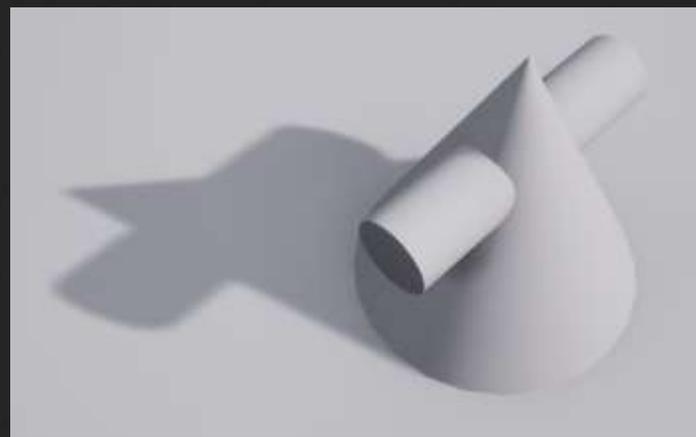
平衡灯光颜色



在不同色温（或颜色）灯光下观察色版的显色性



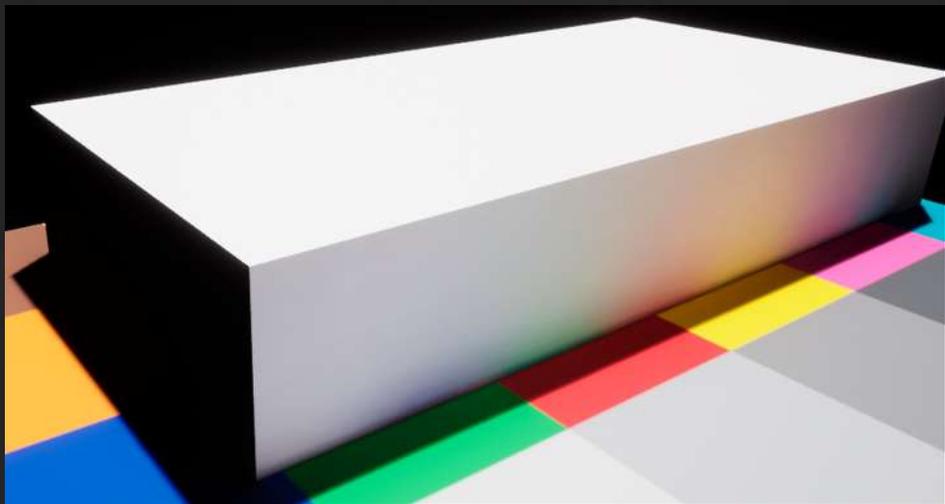




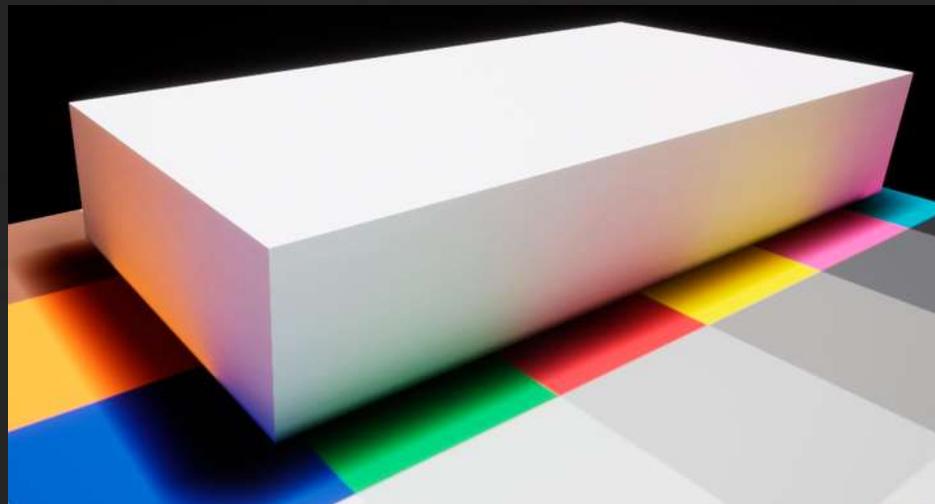
默认设置



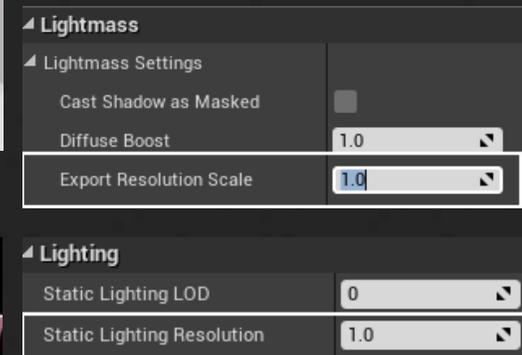
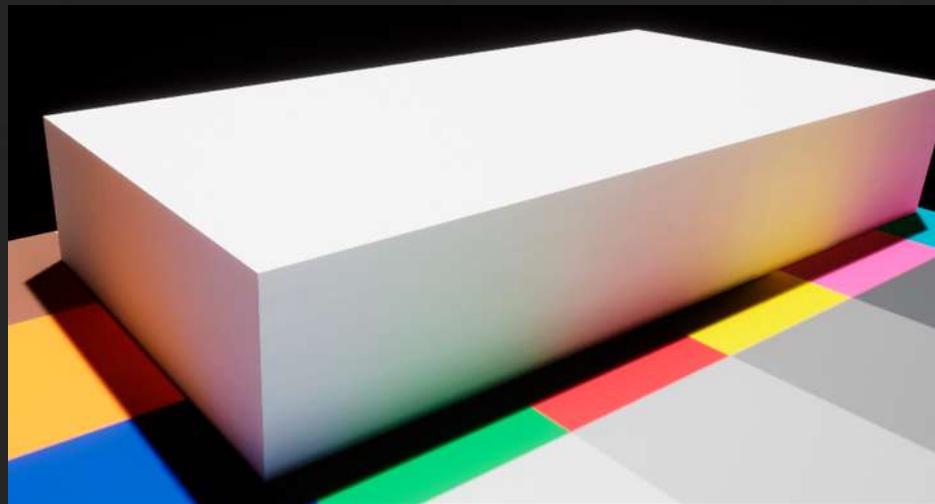
Export Resolution Scale 默认/地面LightmapRes 高

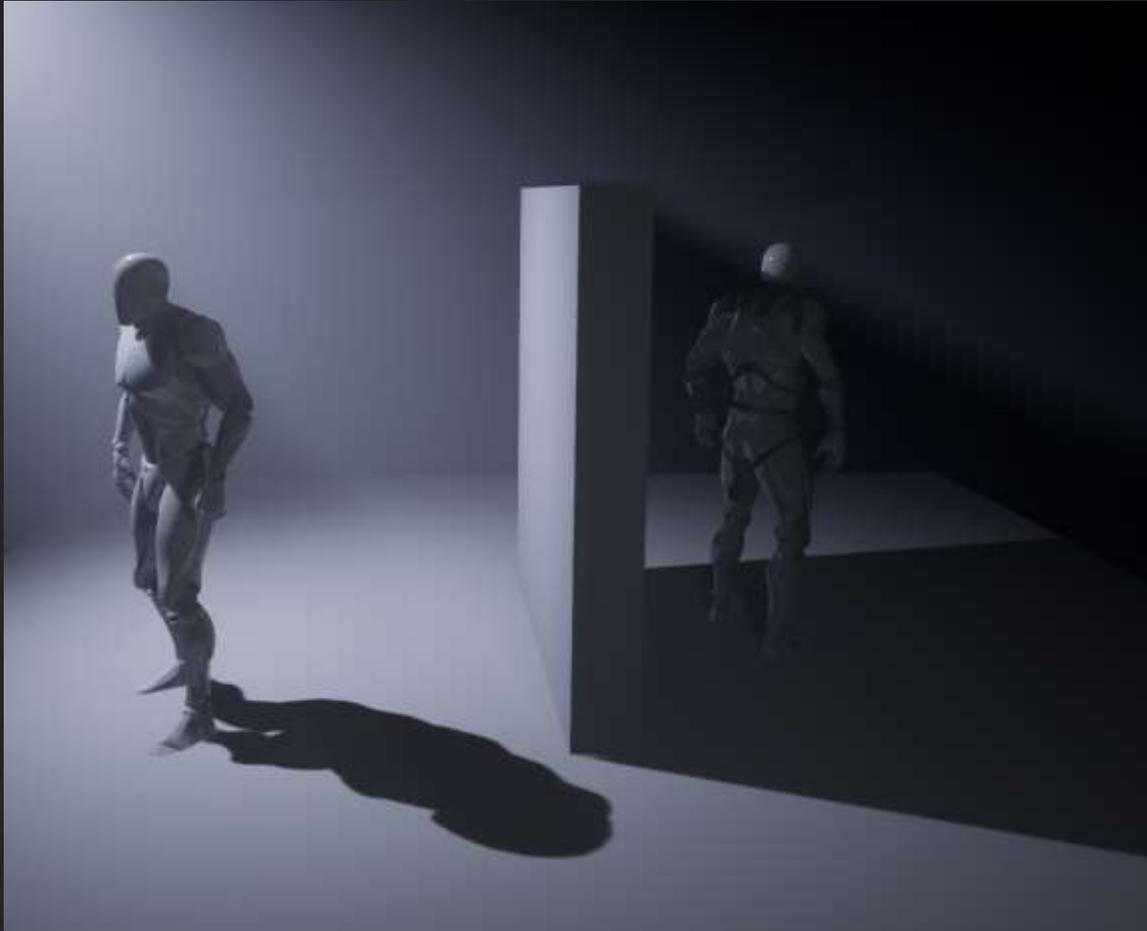


Export Resolution Scale 高



Export Resolution Scale/地面LightmapRes 都高







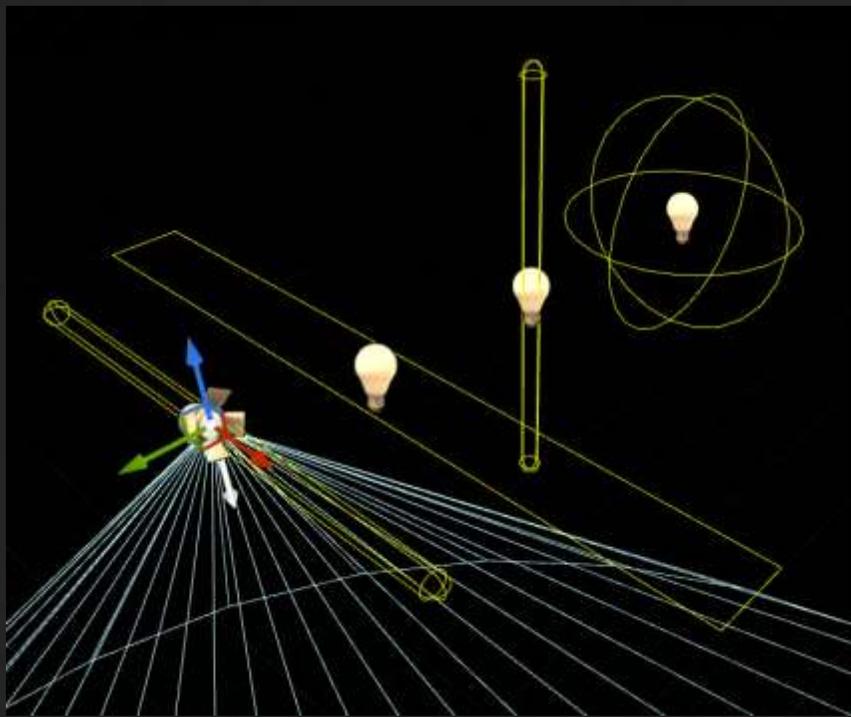




Default

Intensity	0.3
Color	
Size	1.3
Caustic Intensity	-0.00036
Emissive	0.89021
Offset Left	0.662239
Offset Right	14.057077





材质质感

小光源，方向性强的光，逆光，反射源高反差

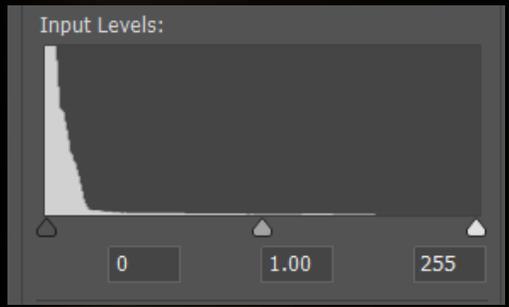




EPIC
GAMES



PIC
AMES



PIC
AMES





PIC
GAMES





PIC
GAMES

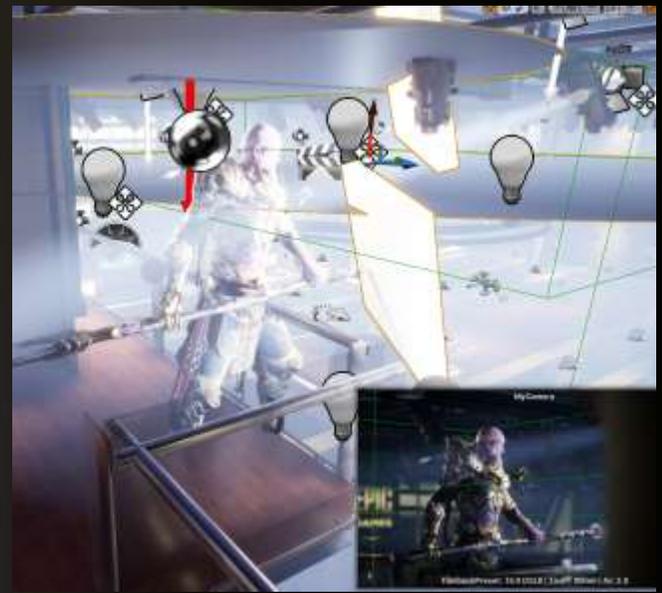


PIC
GAMES





PIC
GAMES



EPIC
GAMES





EPIC
GAMES



从美术角度看UE4混合渲染带来的意义

光栅化+光线追踪

- 带来精确的动态阴影 层次
- 带来精确的动态反射(解决反射漏光) 层次
- 带来精确的动态软阴影 频率: 光质
- 间接光阴影 层次
- 带来精确的动态GI 层次及色彩
- 解决透明的排序

人工方式干预的自由度
现阶段高效的实现方式



提升Lightmass烘焙速度

影响因素

- 灯光数量;
- 物件的数量;
- 物件模型的复杂度(交错);
- lightmap的分辨率;
- Quality mode(lightmass solver);
- Lightmass 参数设置
- 是否有lightmass importance volume;
- Size of Level;

重要的几个因素和改进方式

- Lightmap的分辨率和物体的大小：拆分module，减小分辨率，尤其非高频区域
- Lightmass Importance volume的设置，尤其对于大地图，仅设置在玩家走的到的地方；
- 大都时候使用预览品质先build，然后每天使用Production quality build一次，可以build only visible level 来预览，但不准确
- 草可以不使用lightmap
- 几个重要的参数影响build时间； Static lighting level scale； Indirect lighting Quality； 其他Bounce的数量没有必要超过3次；
- 使用lighting build Info来检查哪些物件占据了主要时间，优化之（拆分或者减小分辨率）
- 排除一些不需要烘焙物件，比如天空



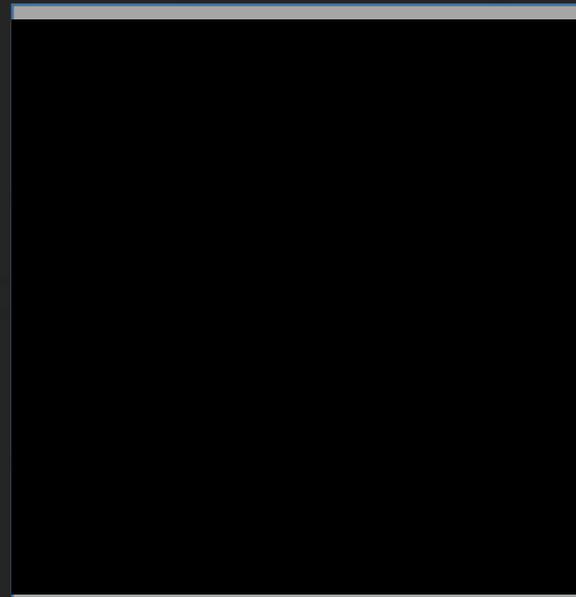
egc-support@epicgames.com



Wenlei Li

Senior Developer Support Artist

R4109-4111 HKRI Taikoo Hui Tower 1
288 Shimen Yi Road
Jing'an District, Shanghai, China



谢谢😊