

# LIGHTING IN MAYA

Malory Spicer

Naila Zaman

Sankalp Sharma

Steve Tatz

# OVERVIEW

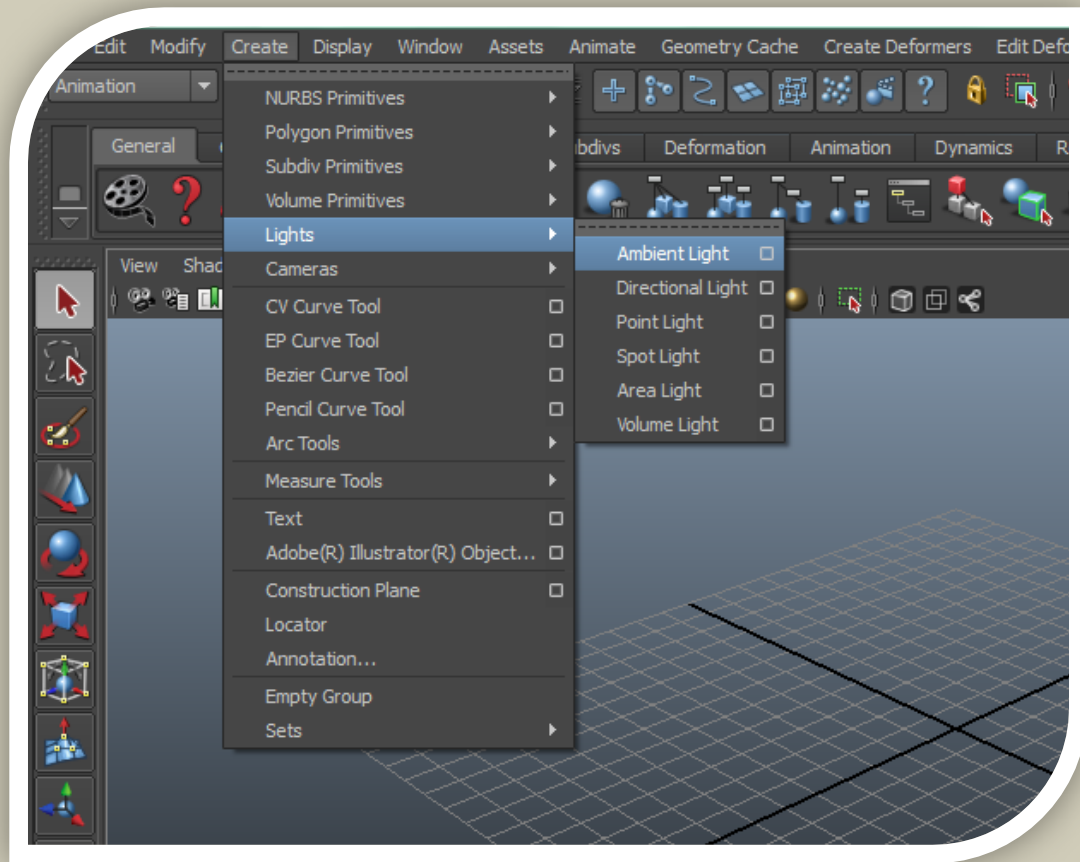
- **Six Types of Light Sources**
- **Attributes of Lights**
- **Shadows**
- **Shading**
- **Lighting Tips and Tricks**

# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume

## CREATING A NEW LIGHT



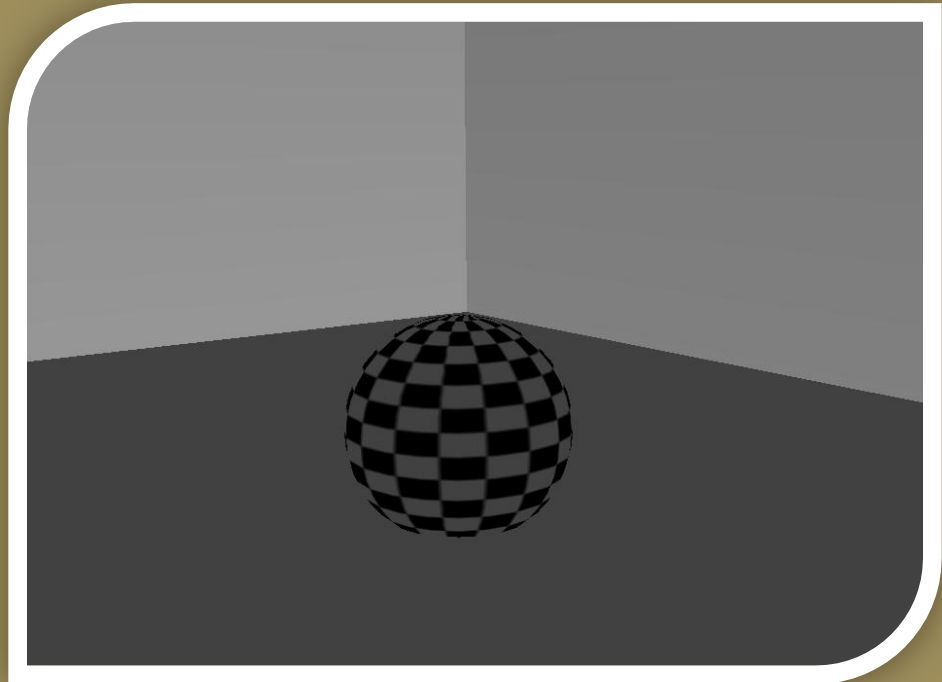
# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

### ■ **Ambient**

- Directional
- Point
- Spot
- Area
- Volume

- Brightens all parts of the scene uniformly
- Useful for: Simulating a combination of direct and indirect lighting

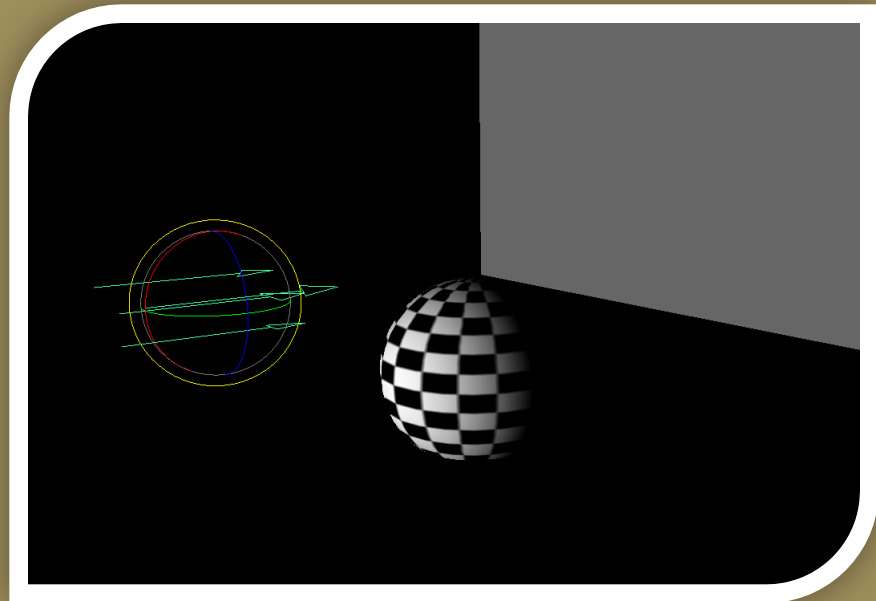


# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

- Ambient
- **Directional**
- Point
- Spot
- Area
- Volume

- Even illumination of a scene using parallel rays of light
- Useful for: Extremely far away sources
- Ex. Sunlight

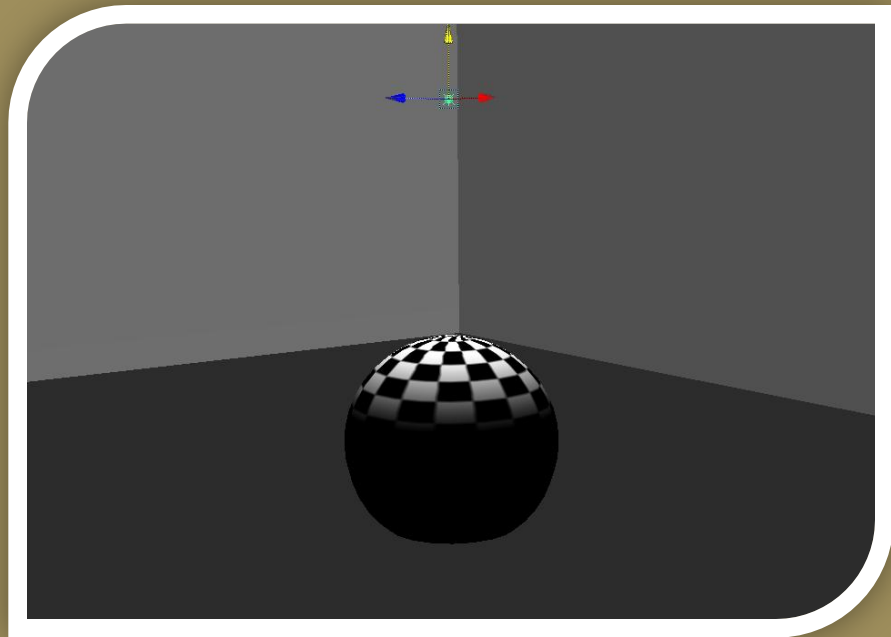


# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- **Point**
- Spot
- Area
- Volume

- Light radiates in all directions from a single point
- Ideal for: Omni-directional sources
- Ex. Lightbulb

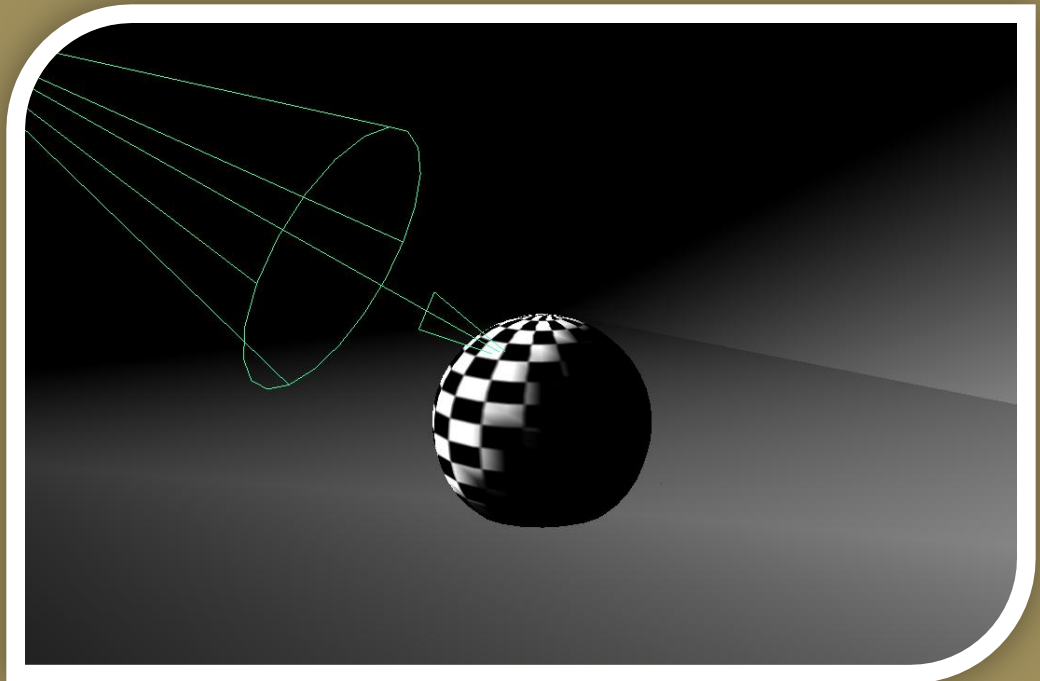


# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- **Spot**
- Area
- Volume

- Creates a cone of light in one direction
- Useful for: Beams of light
- Ex. Flashlight, Lighthouse

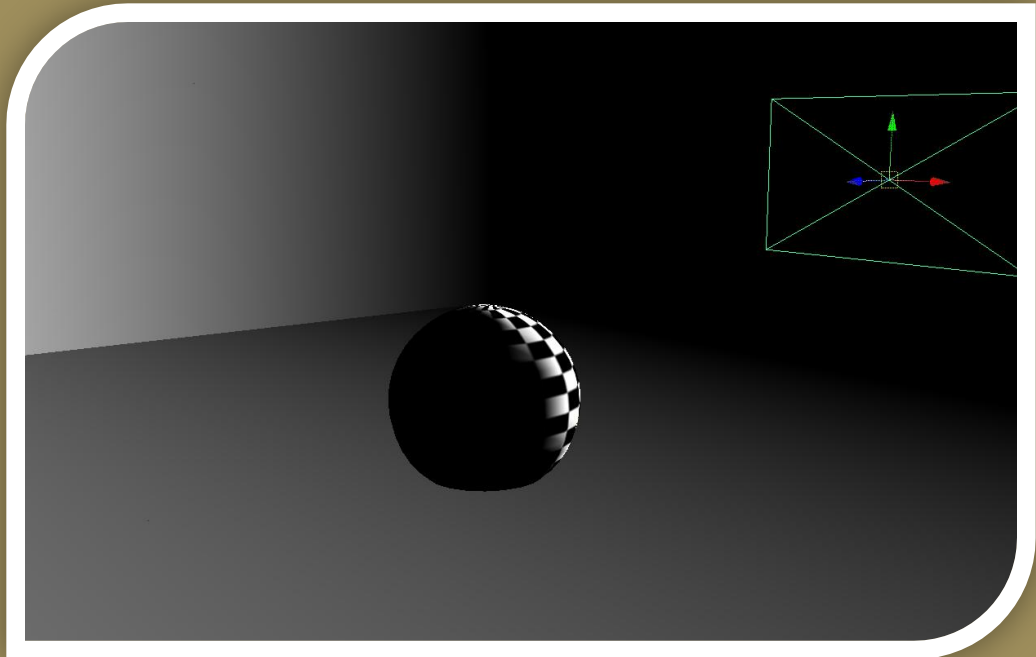


# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- **Area**
- Volume

- 2D rectangular light sources
- Useful for: Windows, Ceiling Lights
- Longer render time



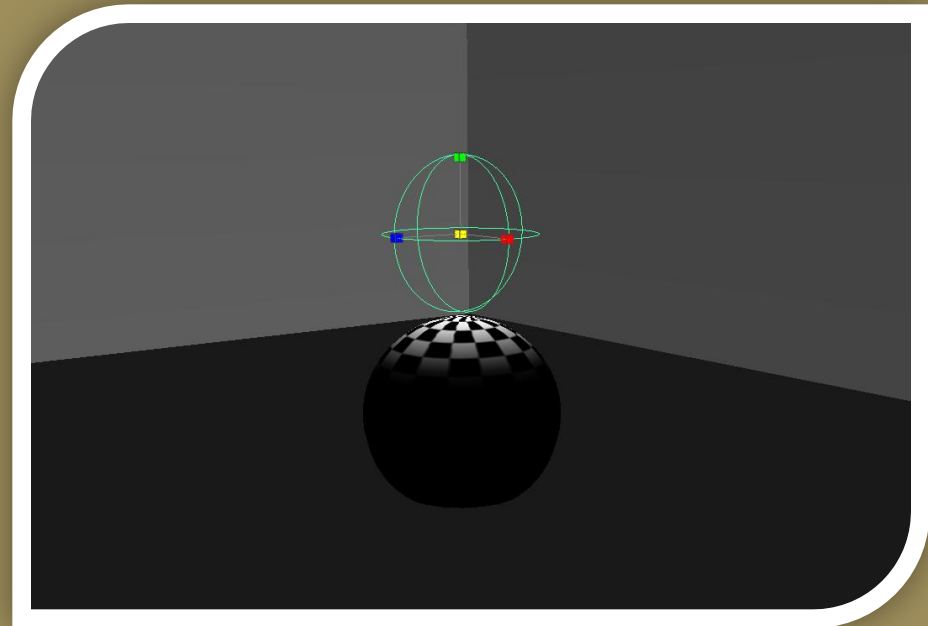


# LIGHT SOURCES

## SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- **Volume**

- Light fills a 3D shape (sphere, cylinder, etc.)
- Useful for: A visual representation of the extent of the light



# THREE POINT LIGHTING

- **Key Light** – main source illuminating the object
- **Secondary (Fill) Light** – highlights details of the object
- **Back Light** – distinguishes the object from the background

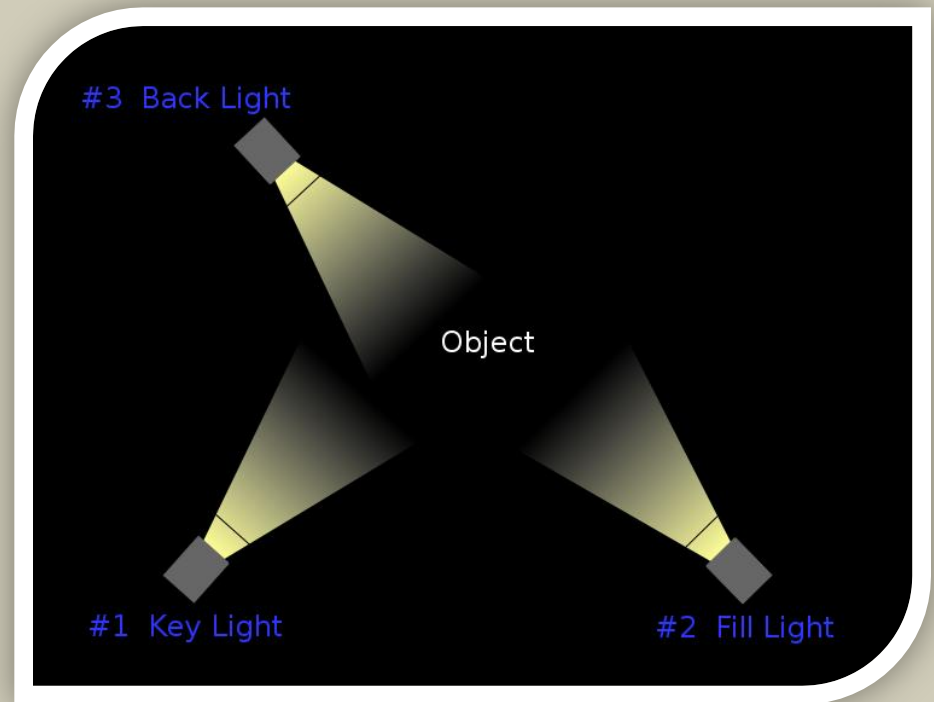
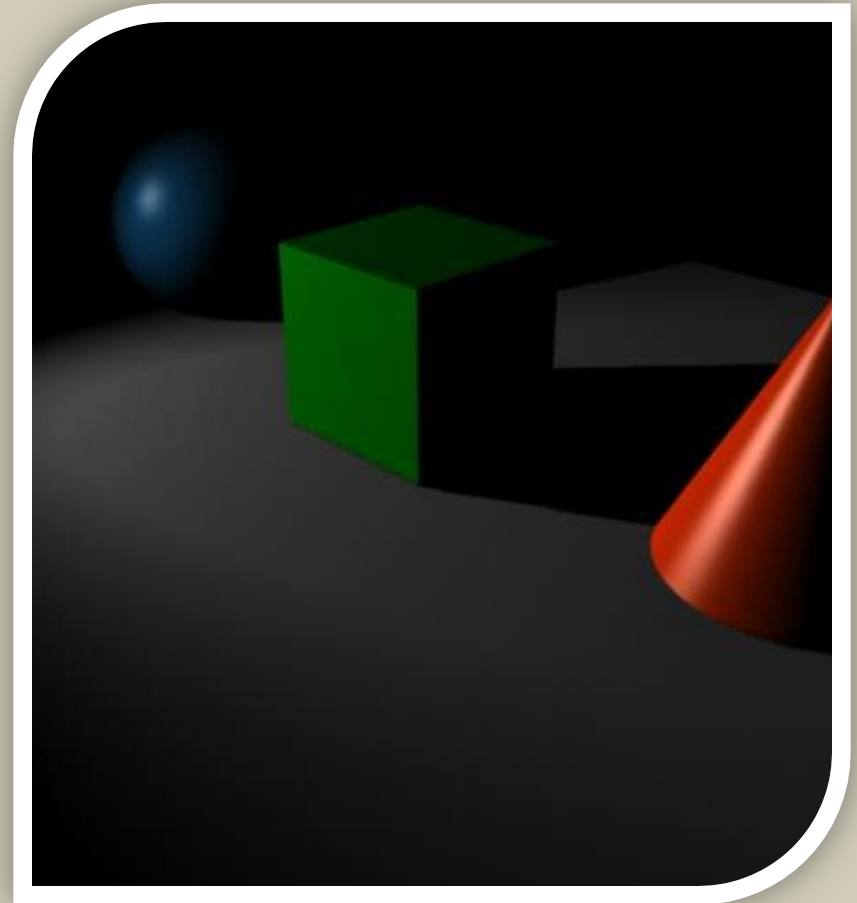


Image source:

[http://en.wikipedia.org/wiki/File:3\\_point\\_lighting.svg](http://en.wikipedia.org/wiki/File:3_point_lighting.svg)

# ATTRIBUTES OF LIGHT

- Intensity
- Fall-off/decay
- Cone Angle
- Penumbra Angle
- Drop-off
- Color



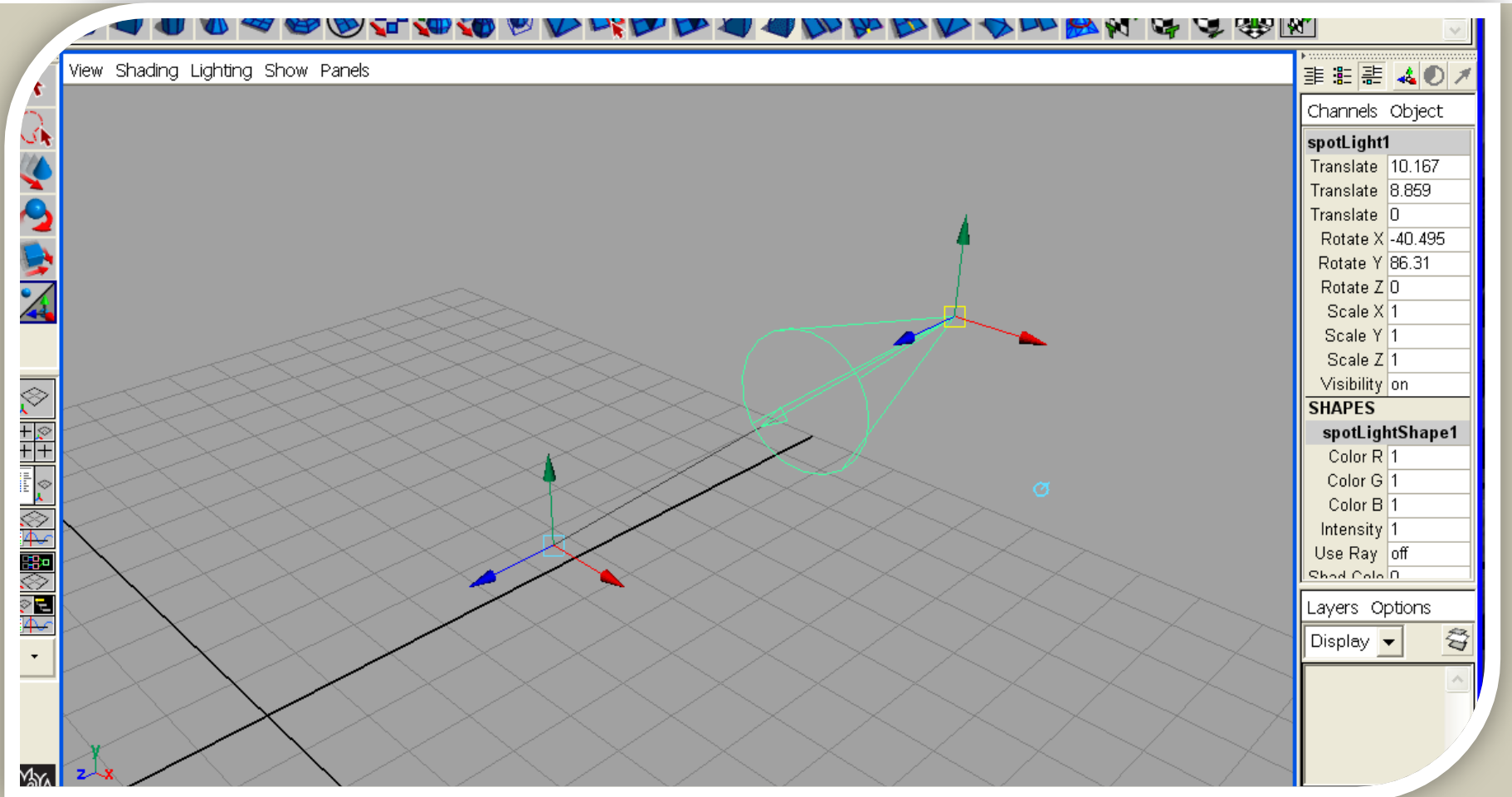
# ATTRIBUTES OF LIGHTS

- **Intensity** - how much light emitted from the light source.
- **Decay** - how much light diminishes away from the source light (fall -off)
- **Cone Angle** - width of the lights cone of influence - area outside cone not illuminated
- **Penumbra Angle** - fall off at edge of cone angle - more gives a softer edge to the light cone
- **Drop-off** - how much the light diminishes at the outer edges
- **Colour** - set an RGB colour for the light - affects colour of scene

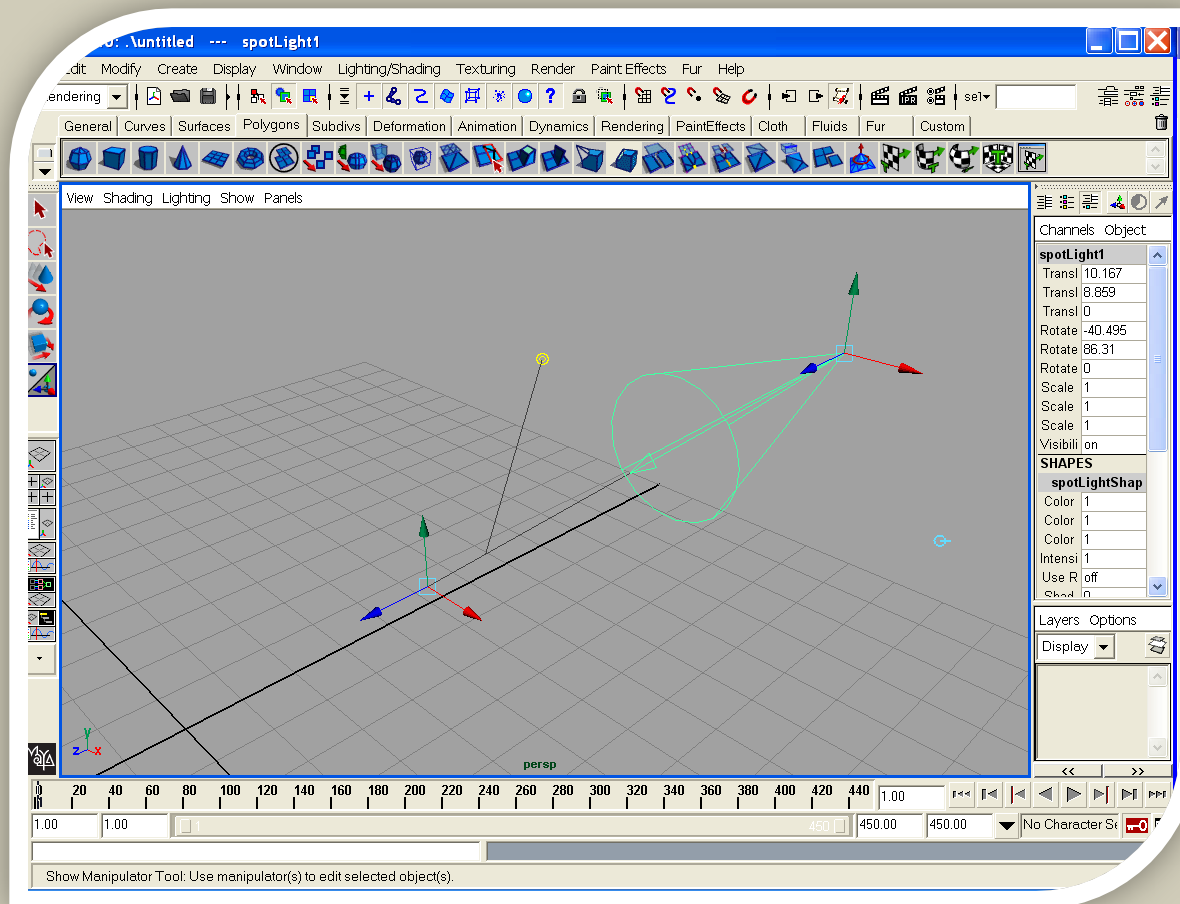
# LIGHT CONTROLS

- Aim From/Aim At
- Fall-off Rate
- Cone Radius
- Penumbra/Umbra control
- Non-linear fall-off
- All In One Control

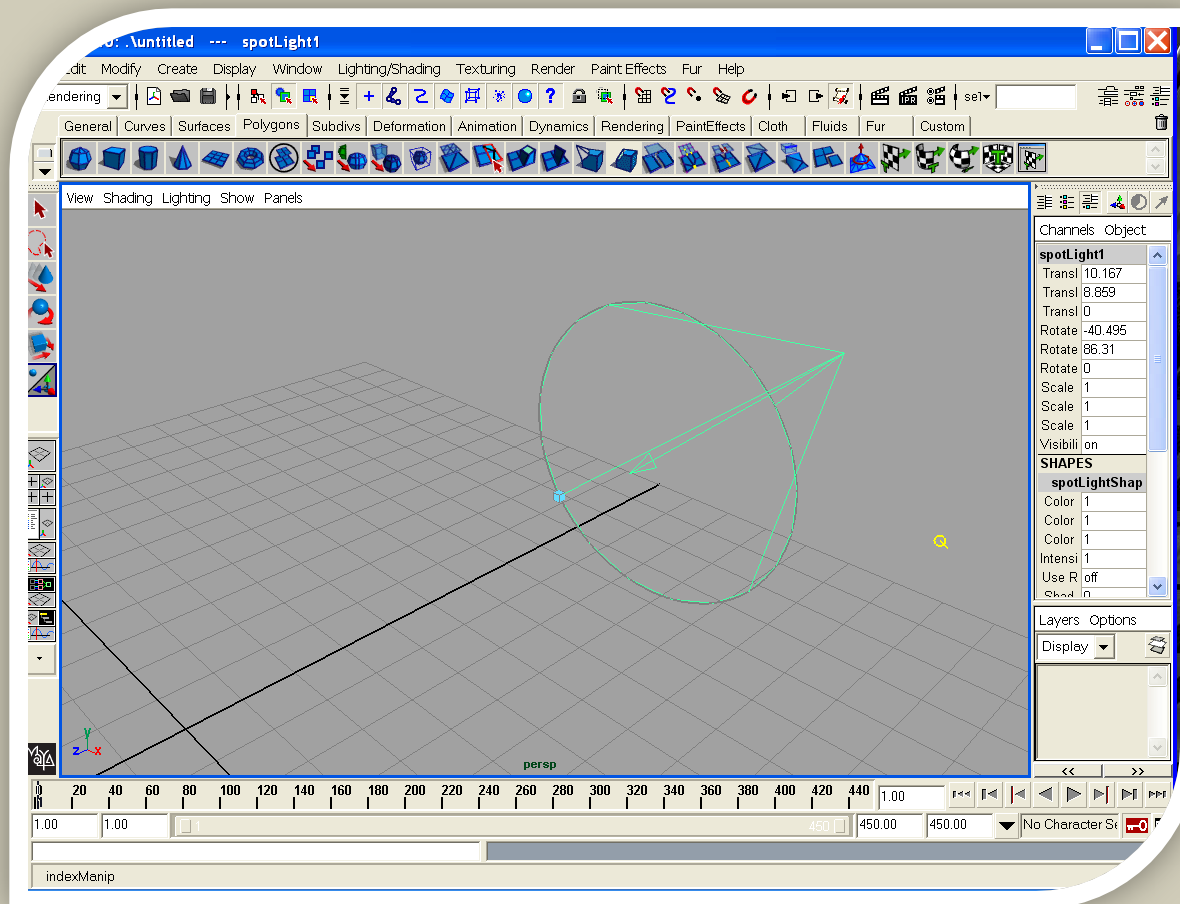
# AIM FROM/AIM AT



# FALL-OFF RATE

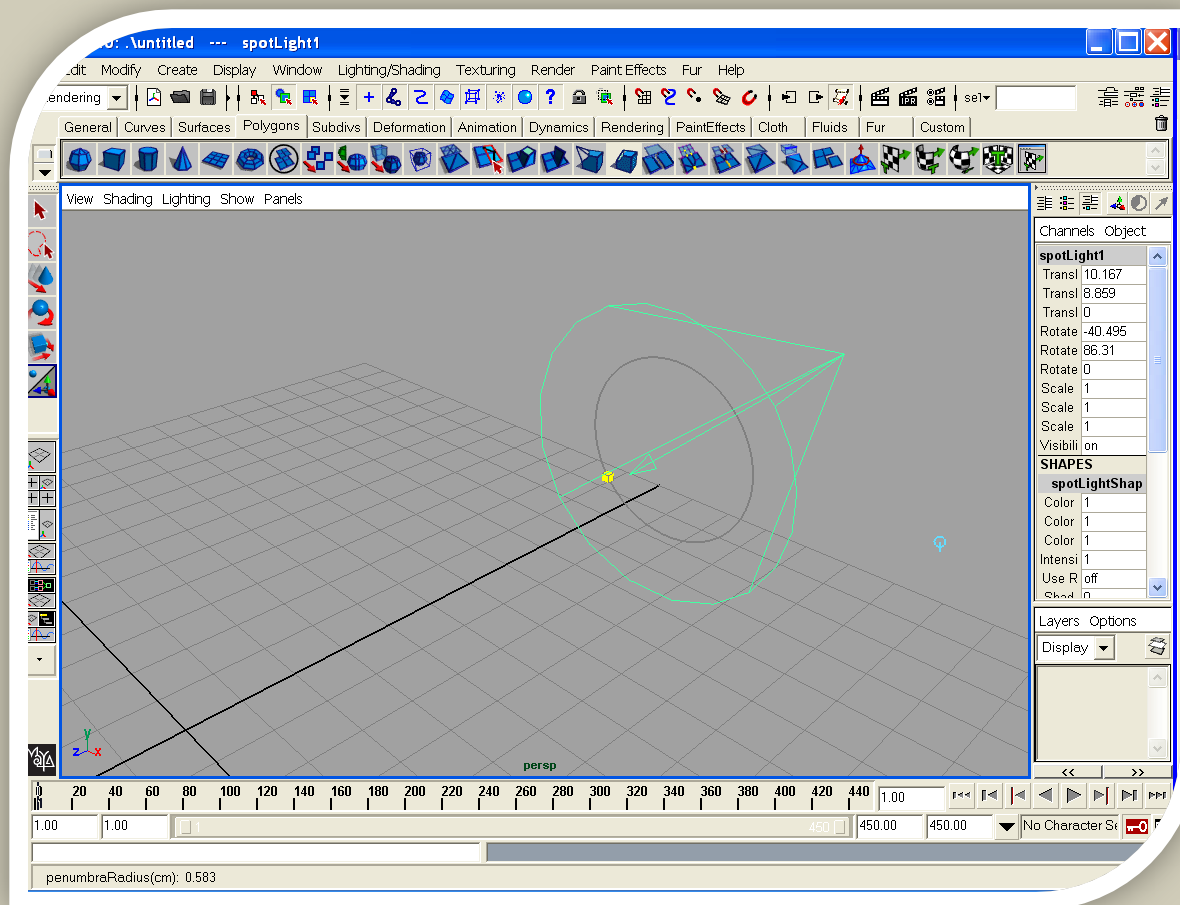


# CONE RADIUS

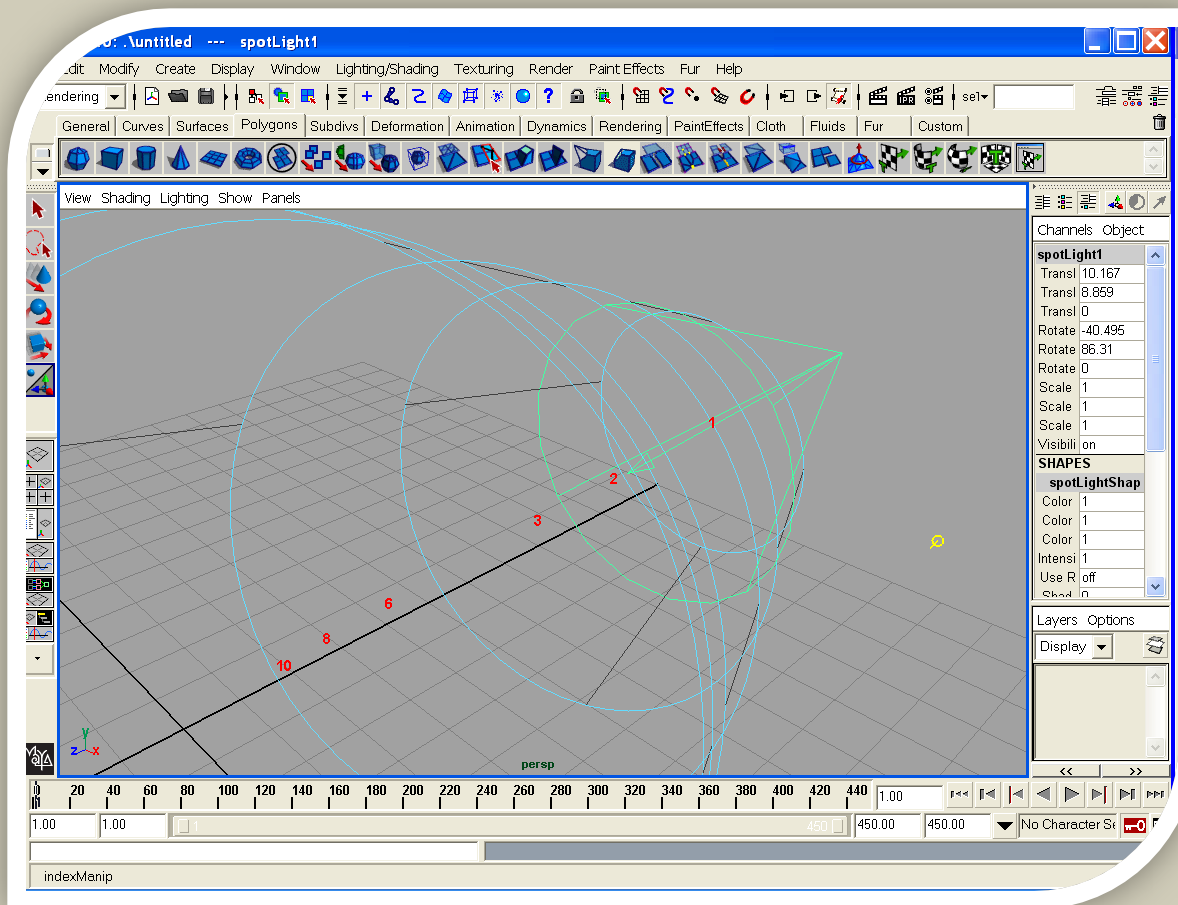




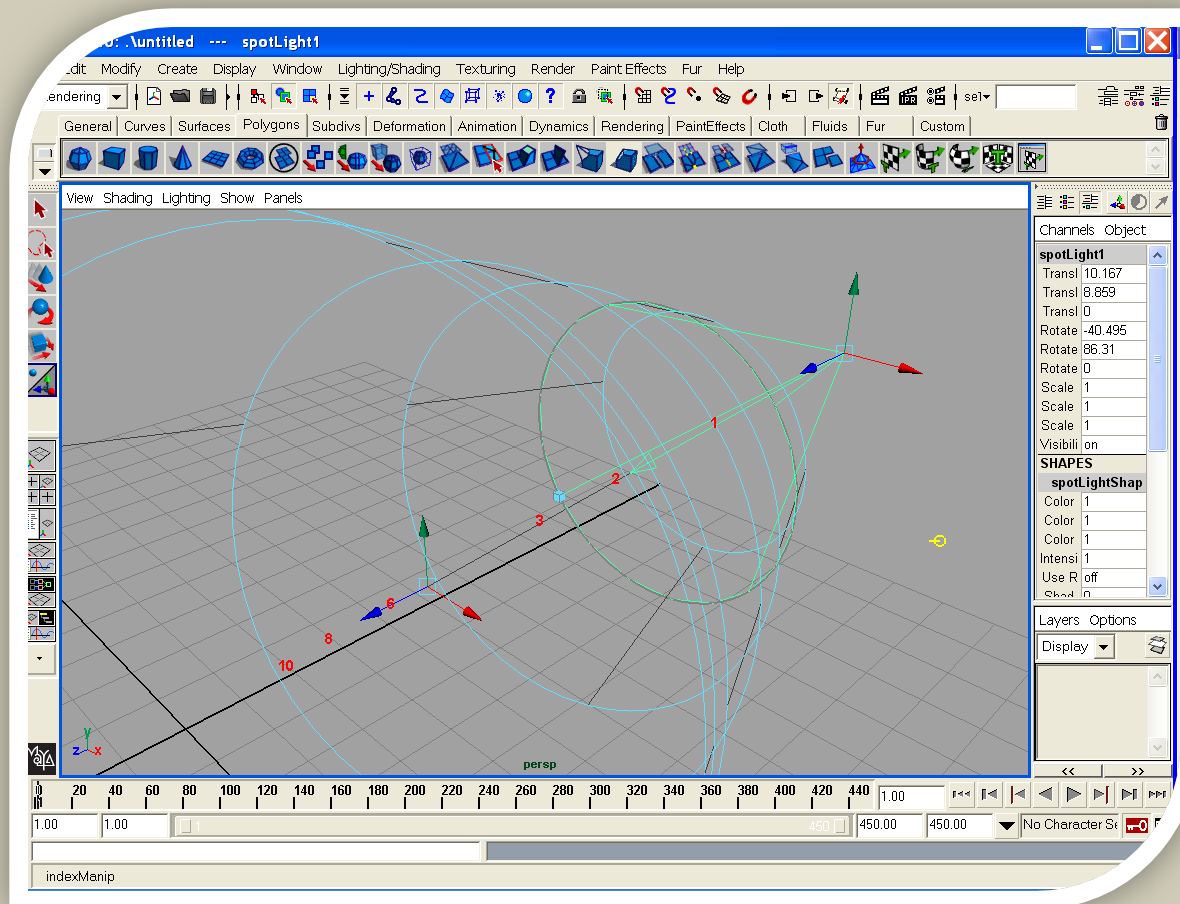
# PENUMBRA/UMBRA CONTROL



# NON-LINEAR FALL-OFF



# ALL IN ONE CONTROL

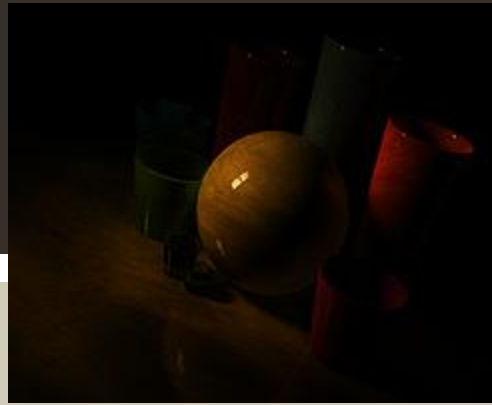


# GOOD WAYS TO USE LIGHTS

- Look to photographers for good techniques
- Think in terms of balance.
- Avoid the overly dramatic.
- Look at natural lighting.
- Avoid saturated lights and hues
- Normally only need a few lights.
- Avoid disco colors and effects.



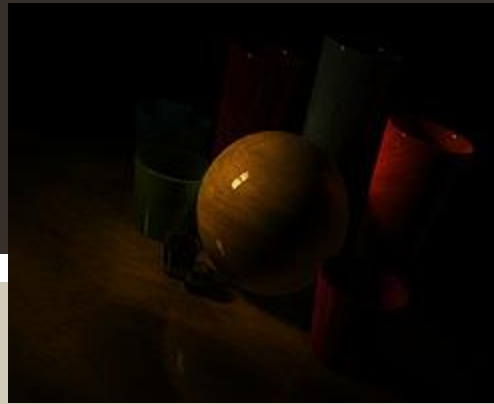


















**Light Intensity from too Dark to too bright.**

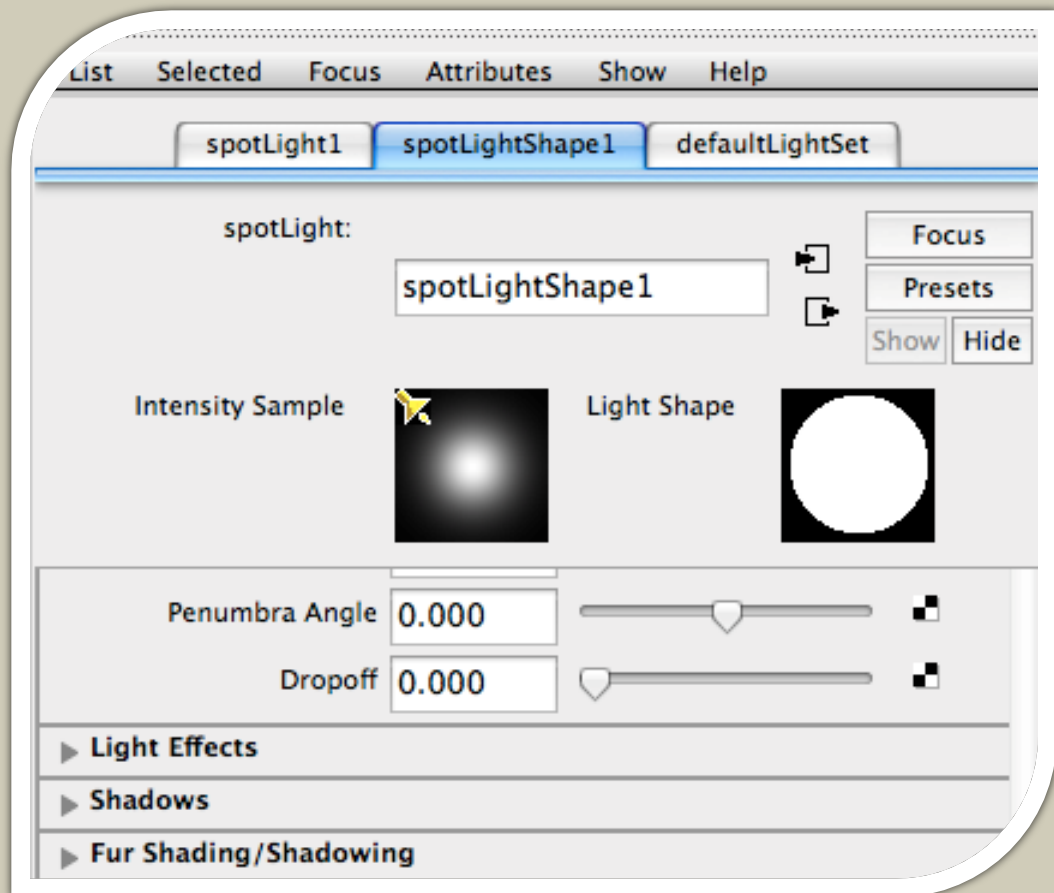


# SHADOWS

## TWO TYPES OF SHADOWS

- Depth Map
- Raytrace

## CHANGING LIGHT ATTRIBUTES

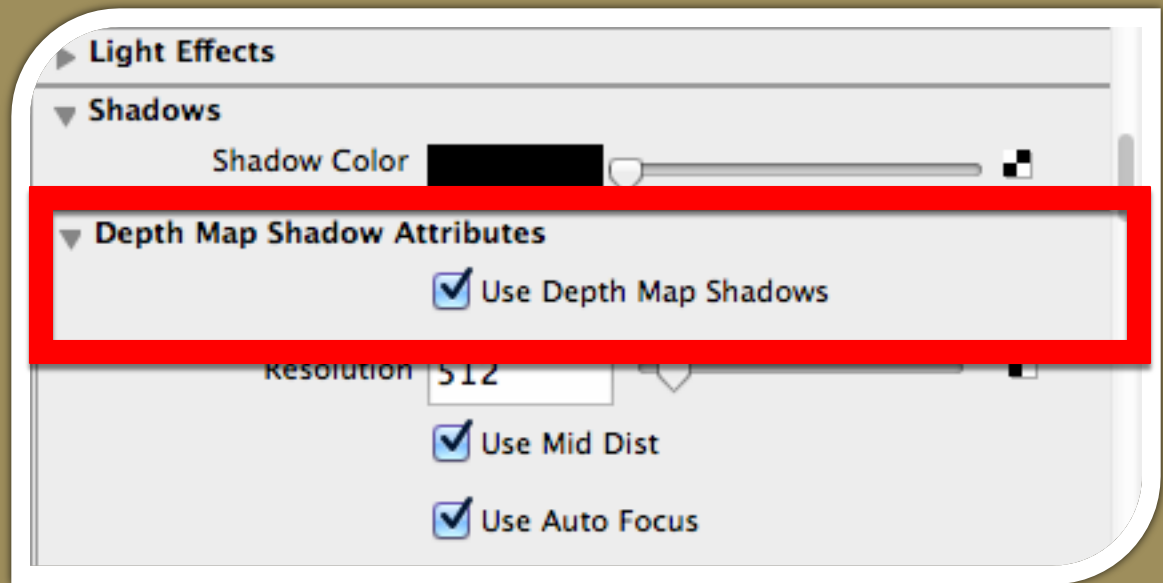


# SHADOWS

## TWO TYPES OF SHADOWS

- **Depth Map**
- Raytrace

- Under light shape attribute editor
- Less accurate shadows
- Faster render time

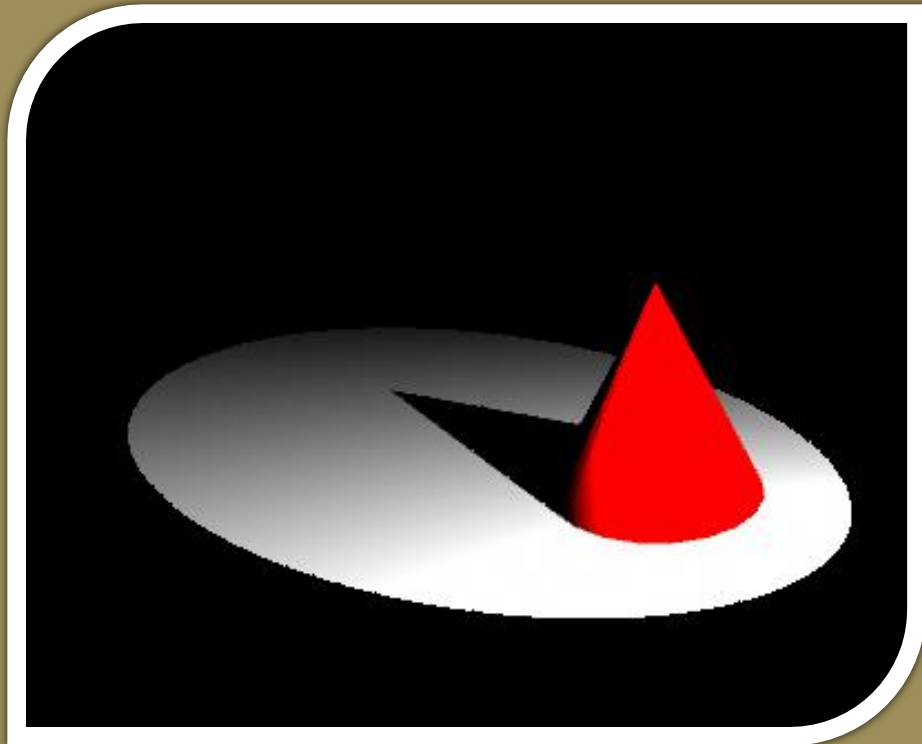


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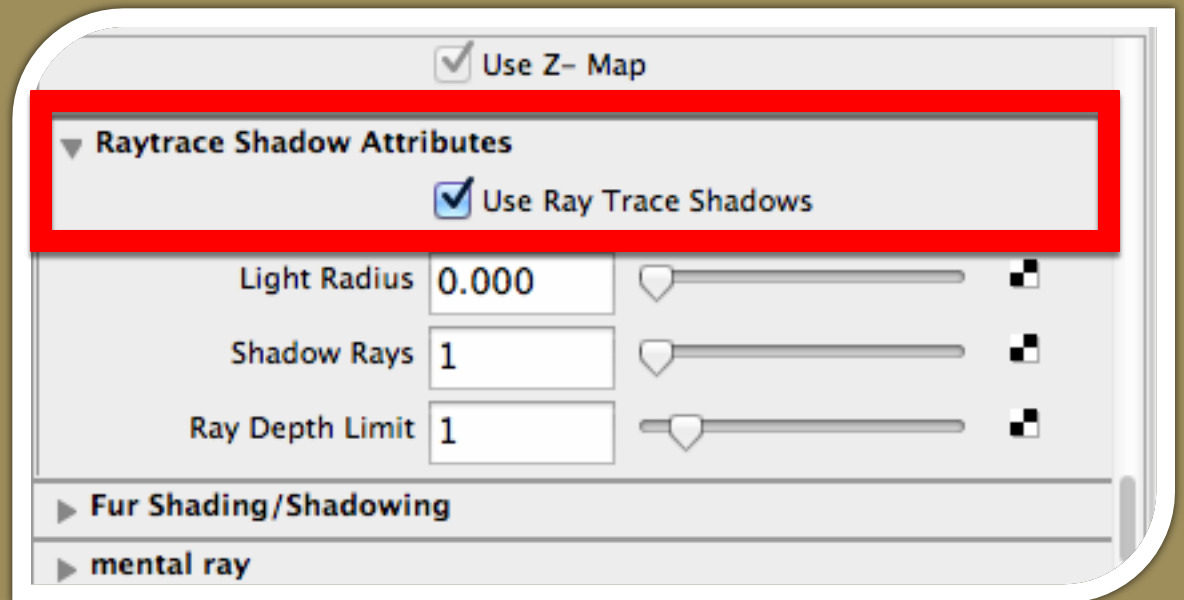


# SHADOWS

## TWO TYPES OF SHADOWS

- Depth Map
- **Raytrace**

- Under light shape attribute editor
- More accurate shadows
- Longer render time

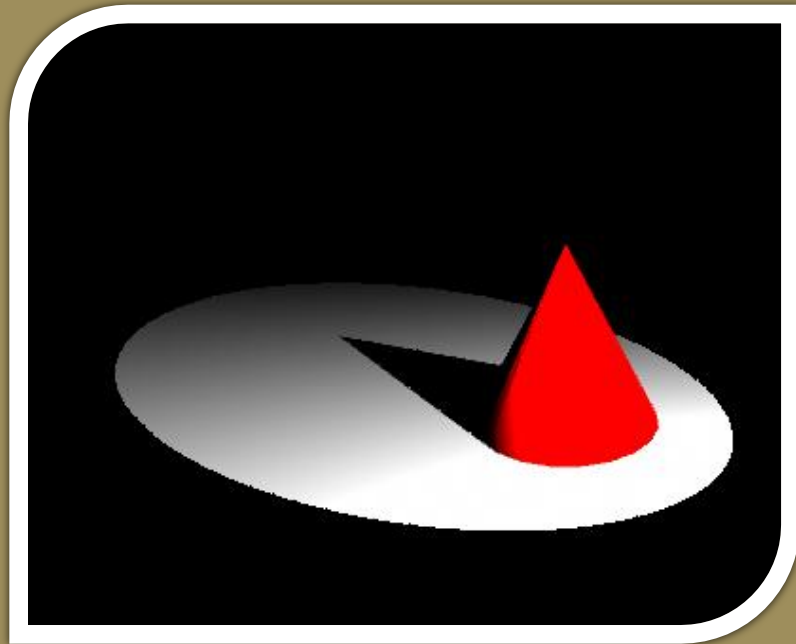


# SHADOWS

## TWO TYPES OF SHADOWS

- Depth Map
- **Raytrace**

- Slight difference from Depth Map shadows
- More accurate shadows
- Longer render time

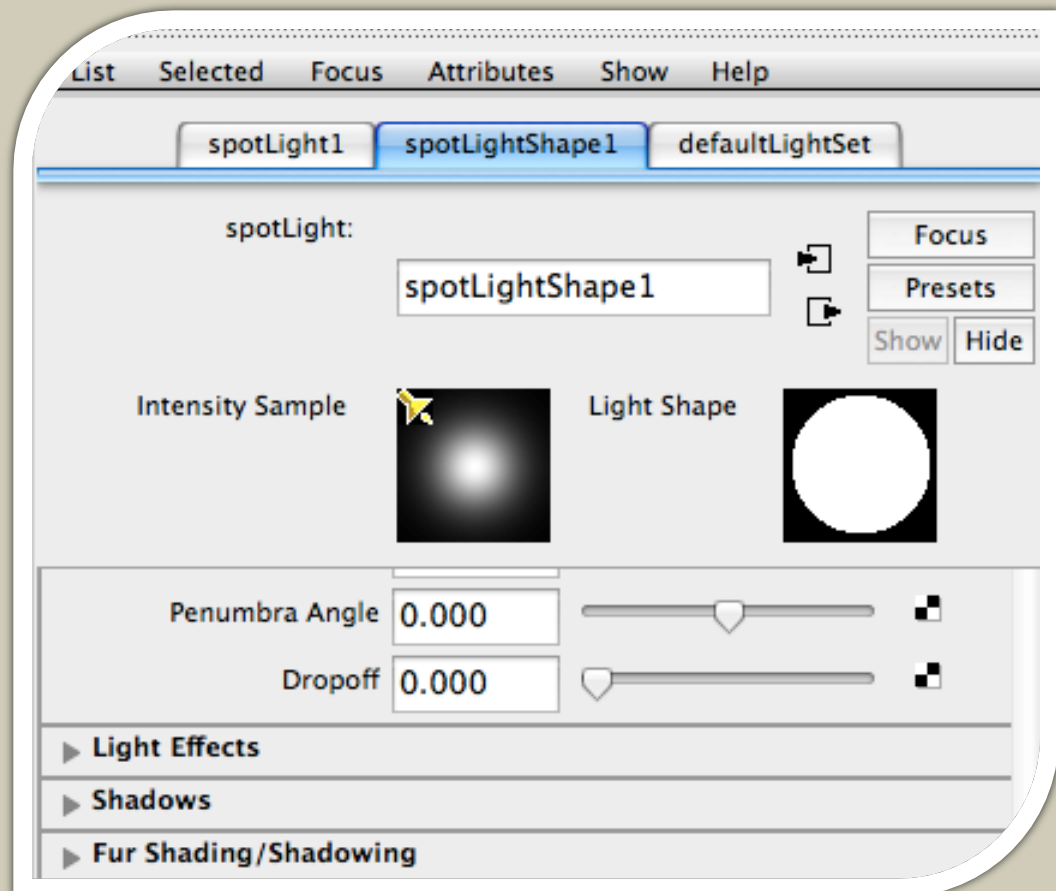


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

## CHANGING LIGHT ATTRIBUTES

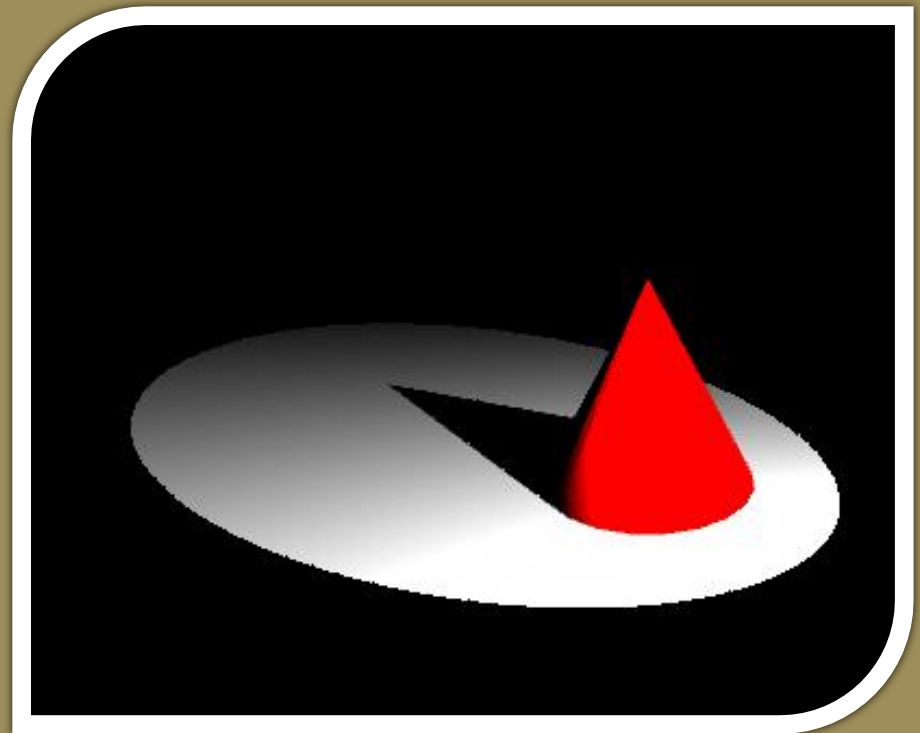


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- **Hard Shadows**
- Soft Shadows
- Fall-out

- Default shadow option
- Faster render time

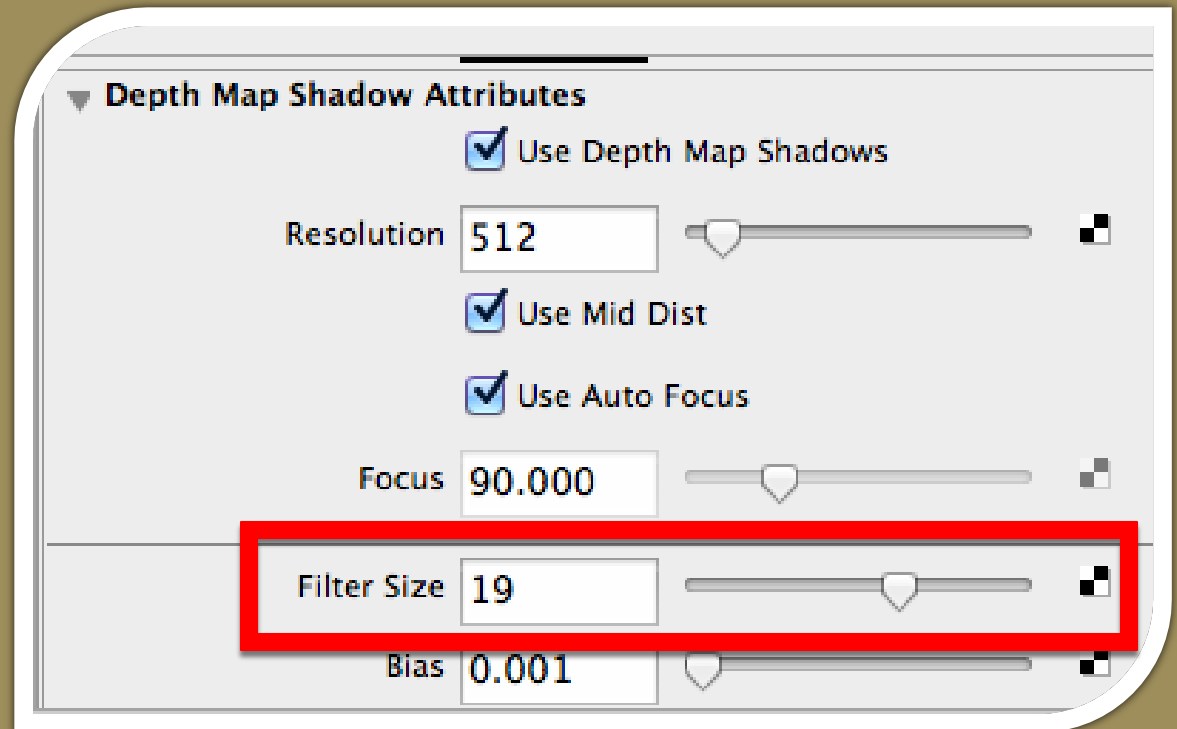


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- **Soft Shadows**
- Fall-out

- Under *Depth Map Shadow Attributes*, increase *Filter Size*

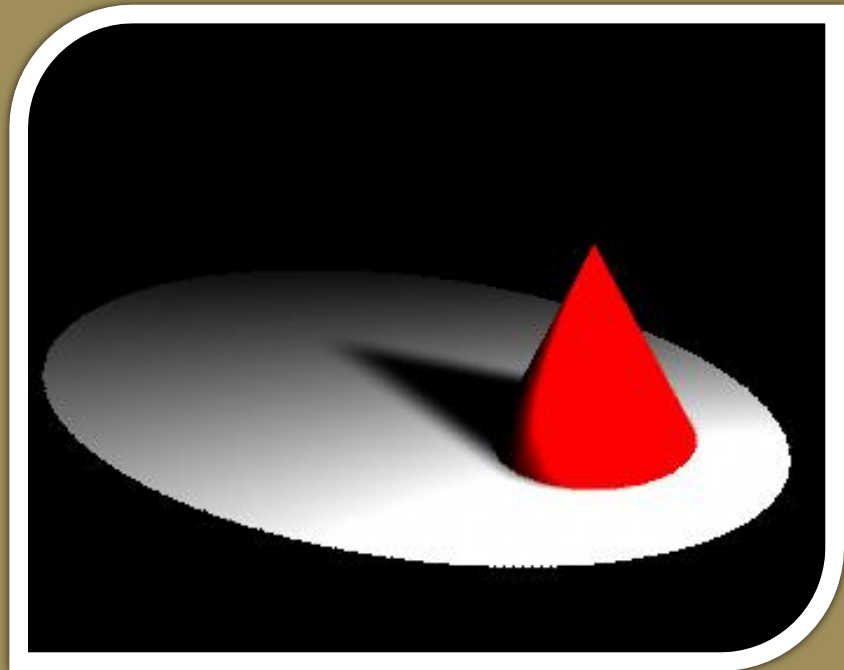


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- **Soft Shadows**
- Fall-out

- Creates soft, more realistic faded edges around shadow
- Longer render time

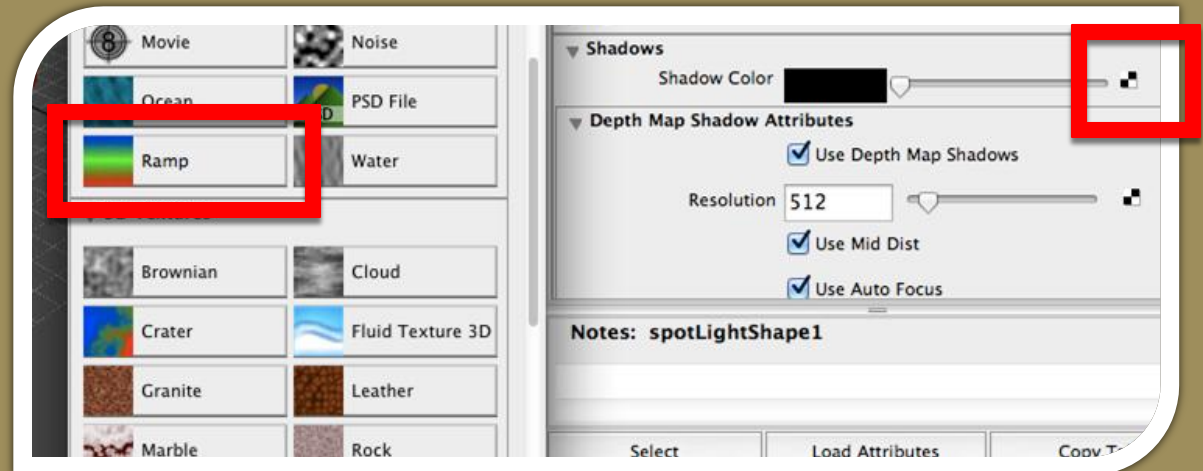


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- More natural looking shadows
- Select checkered box by *Shadow Color*
- Select *Ramp*

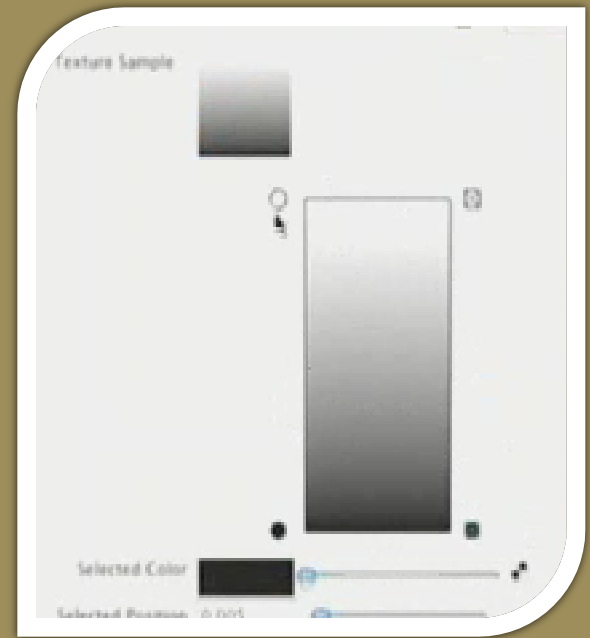
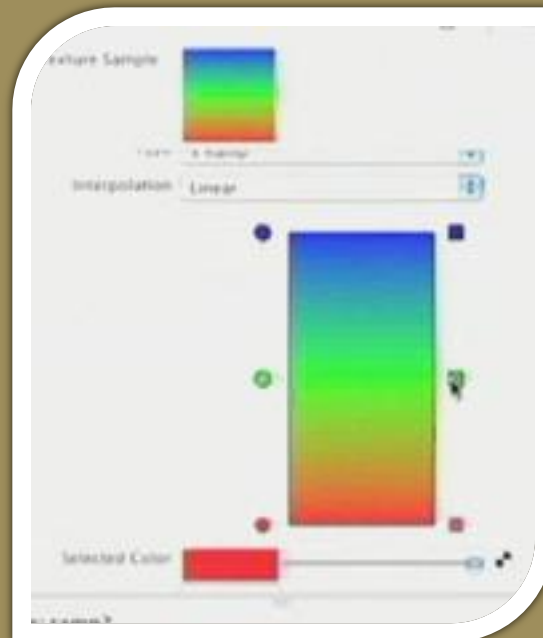


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- Remove middle color (green) by selecting [X] on right
- Select top color to be white
- Select bottom color to be black





# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- **Fall-out**

- Invert bottom and top colors by selecting colored dots on the left



# SHADOW EFFECTS

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- Hard Shadows
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- Invert bottom and top colors by selecting colored dots on the left

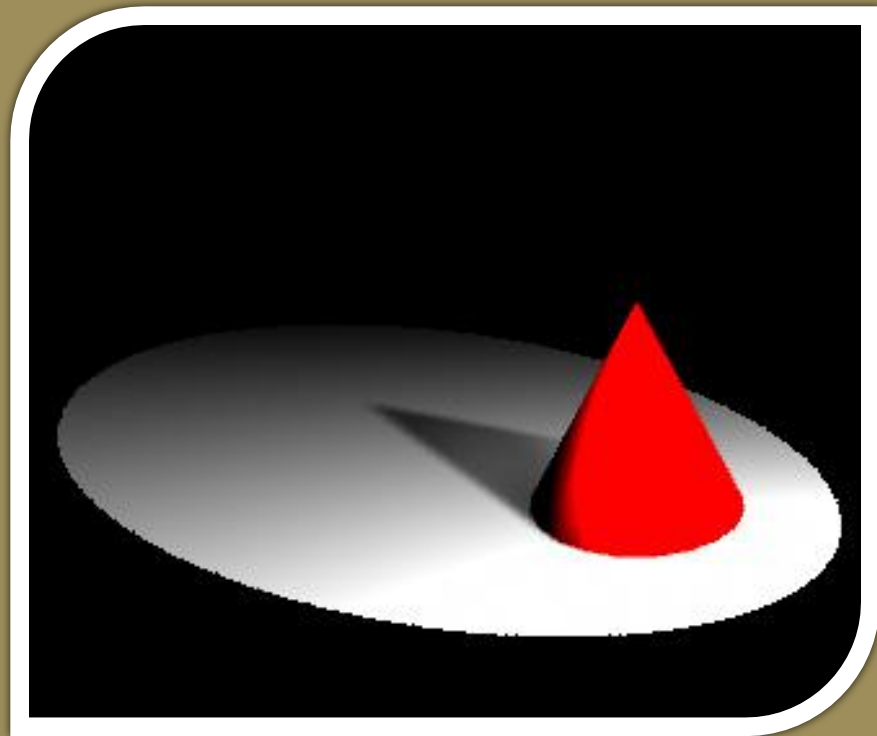


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- **Fall-out**

- Acts like a color gradient
- Shadow becomes lighter at top of shadow

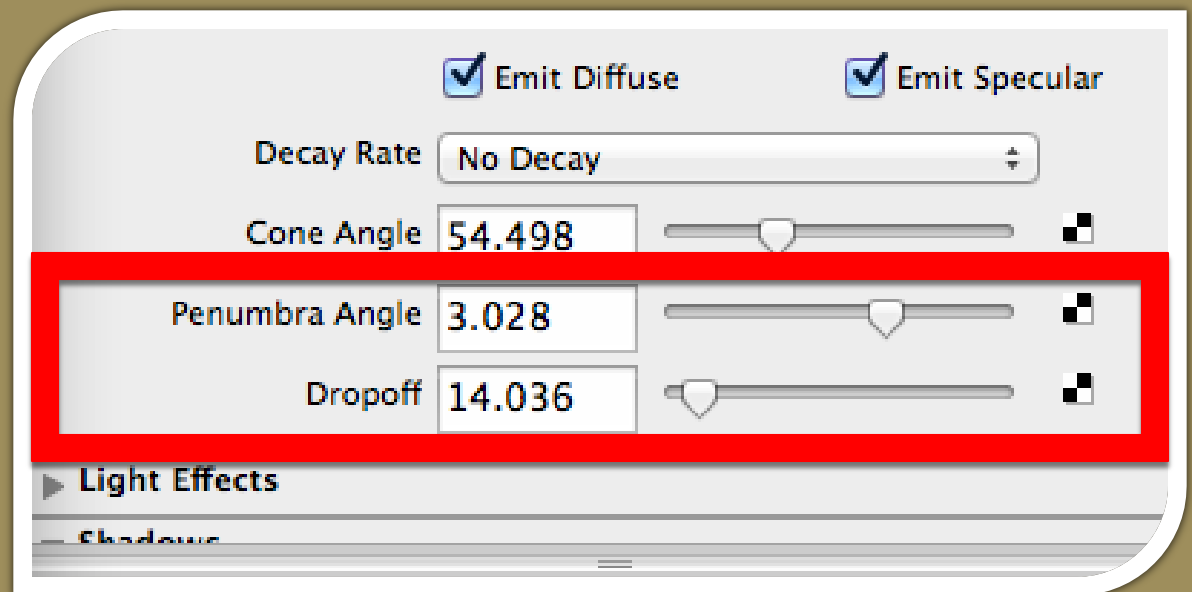


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- Can also change softness of light from top attributes
  - Penumbra angle
  - Dropoff

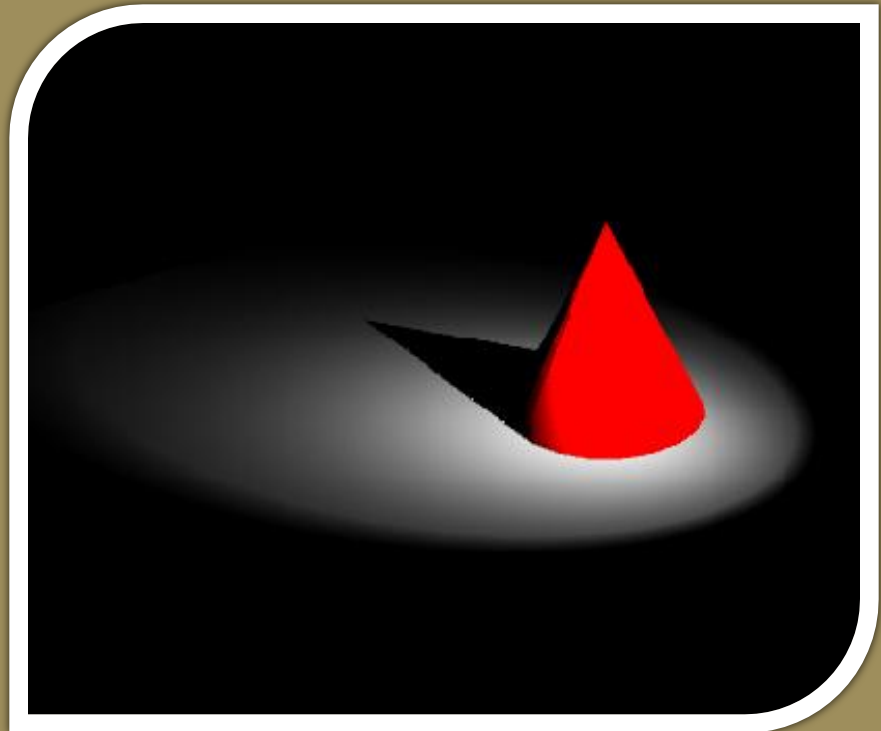


# SHADOW EFFECTS

## THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- Makes spotlight softer and more realistic



# SHADING

*Shading* is a combination of the basic material of an object and any textures that are applied to it



*In our presentation, we will discuss Materials. Textures will be covered by the Modeling group.*

# SHADING

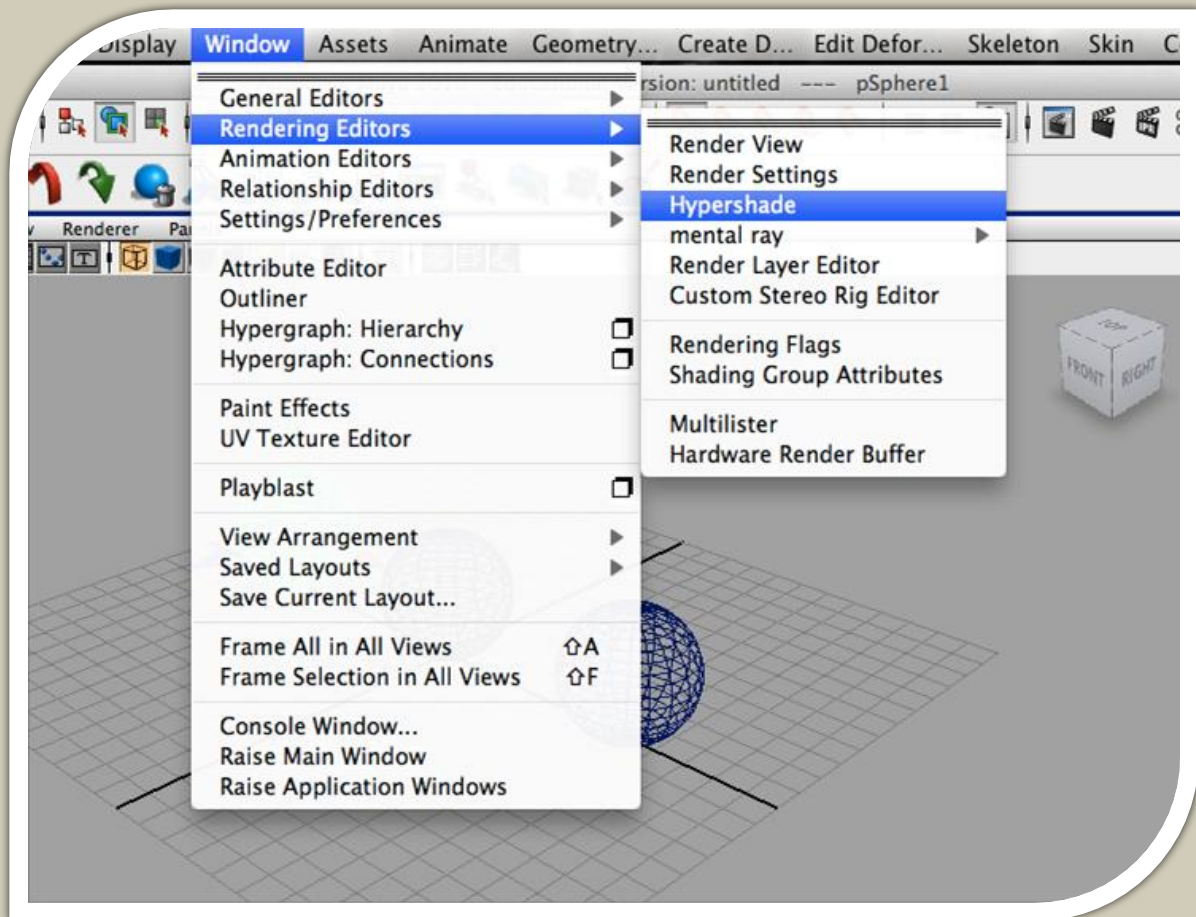
## MANY TYPES OF MATERIALS

- Blinn
- Lambert
- Phong
- Etc.

Go to:

Windows->Rendering  
Editors-  
>Hypershade

## USING HYPERSHADE

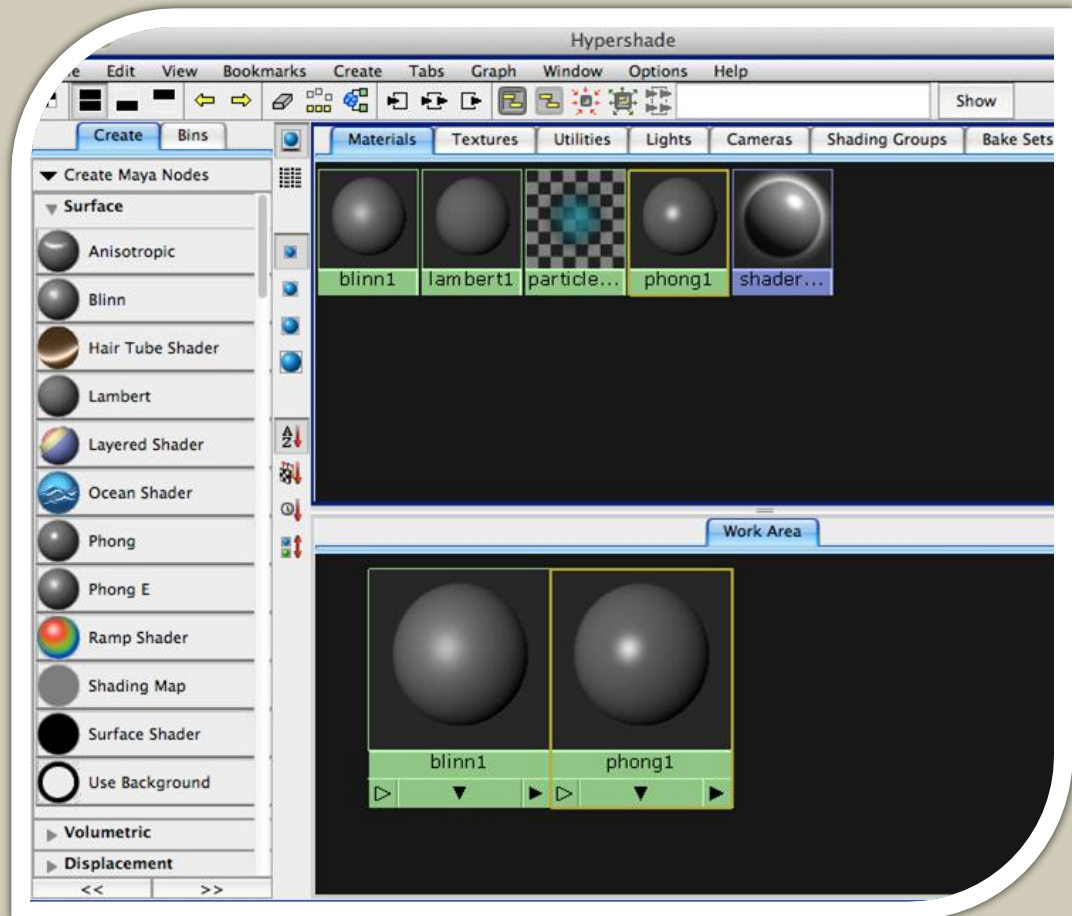


# SHADING

## USING HYPERSHADE

Select desired  
Material type from  
left-hand panel

or from the  
Create -> Materials  
menu





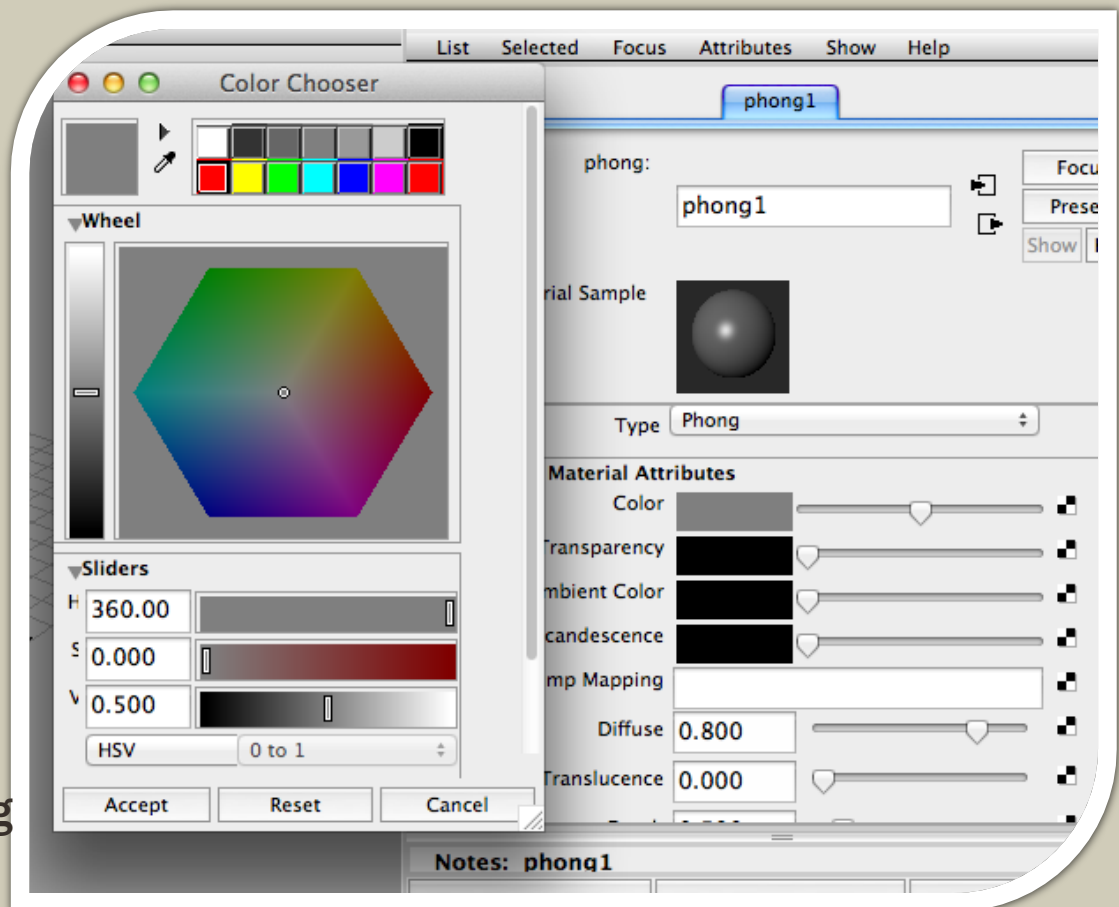
# SHADING

Double click on the Shader to open Attribute Editor

Modify attributes such as color, transparency, shine, etc.

Factors beyond these basic attributes that determine the appearance of an object's surface are defined by textures (discussed in the Modeling presentation)

## ATTRIBUTE EDITOR

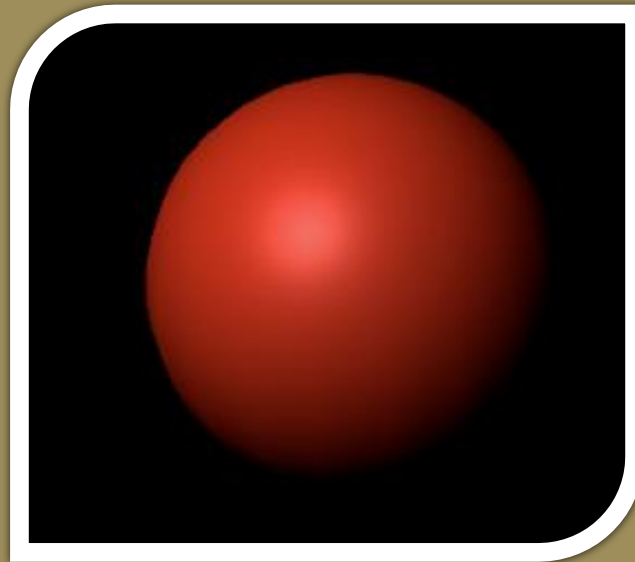


# SHADING

## MANY TYPES OF MATERIALS

- **Blinn**
- Lambert
- Phong
- Etc.

- Simulates diffuse reflection and soft specular highlights
- Takes into account viewing angle for specular highlight (Phong does not)
- Used for: metallic surfaces



# SHADING

## MANY TYPES OF MATERIALS

- Blinn
- **Lambert**
- Phong
- Etc.

- Simulates diffuse reflection, no specular highlights
- Used for: matte surfaces

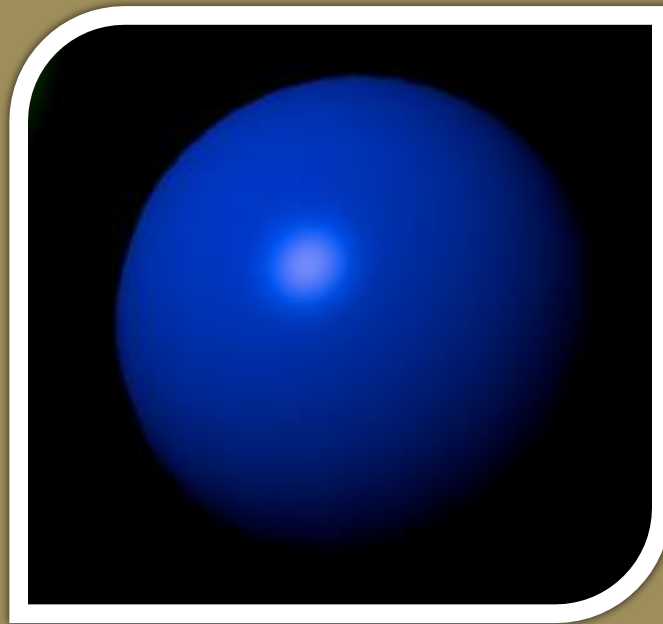


# SHADING

## MANY TYPES OF MATERIALS

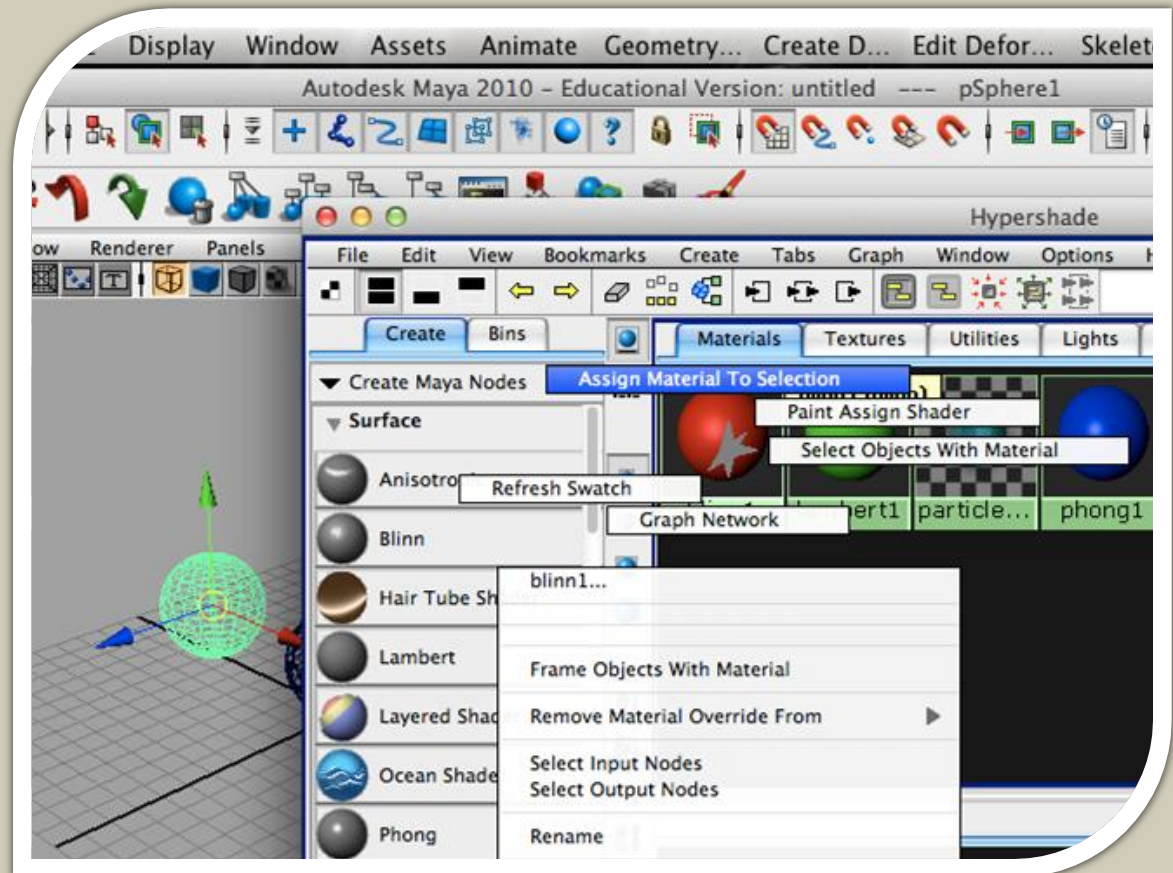
- Blinn
- Lambert
- **Phong**
- Etc.

- Simulates diffuse reflection and hard specular highlights
- Faster render time than Blinn
- Used for: shiny surfaces



# ASSIGNING A MATERIAL

Select desired object from scene, hold right-click on modified material, and select *Assign Material To Selection*



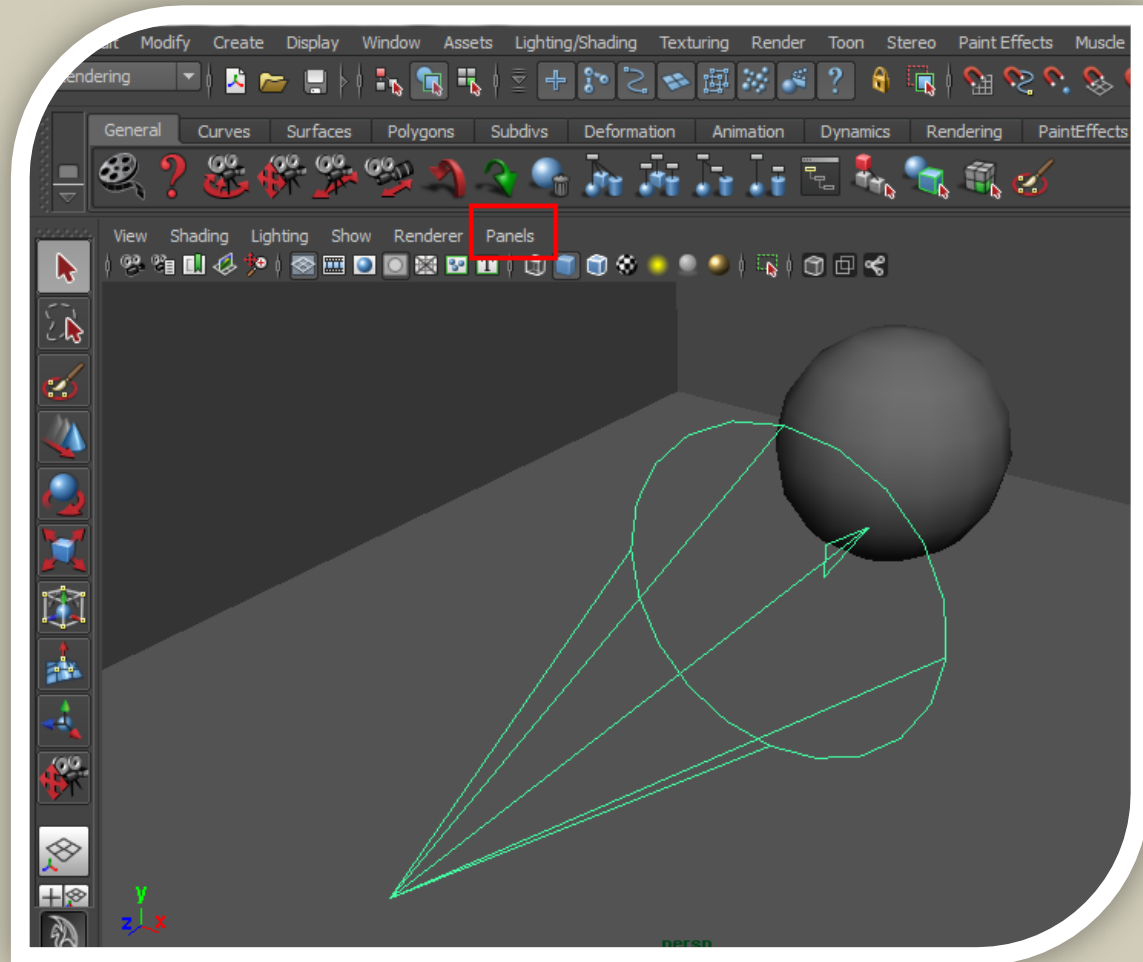
# TIPS AND TRICKS : LIGHTING IN MAYA

- Placing Lights
- IPR Rendering
- Going Beyond Slider Values
- Breaking Connection
- Light Glow
- Lens Flare
- Light Fog
- Decay Regions
- Color Mapping
- Intensity Mapping
- Point Light Fog - Force Field



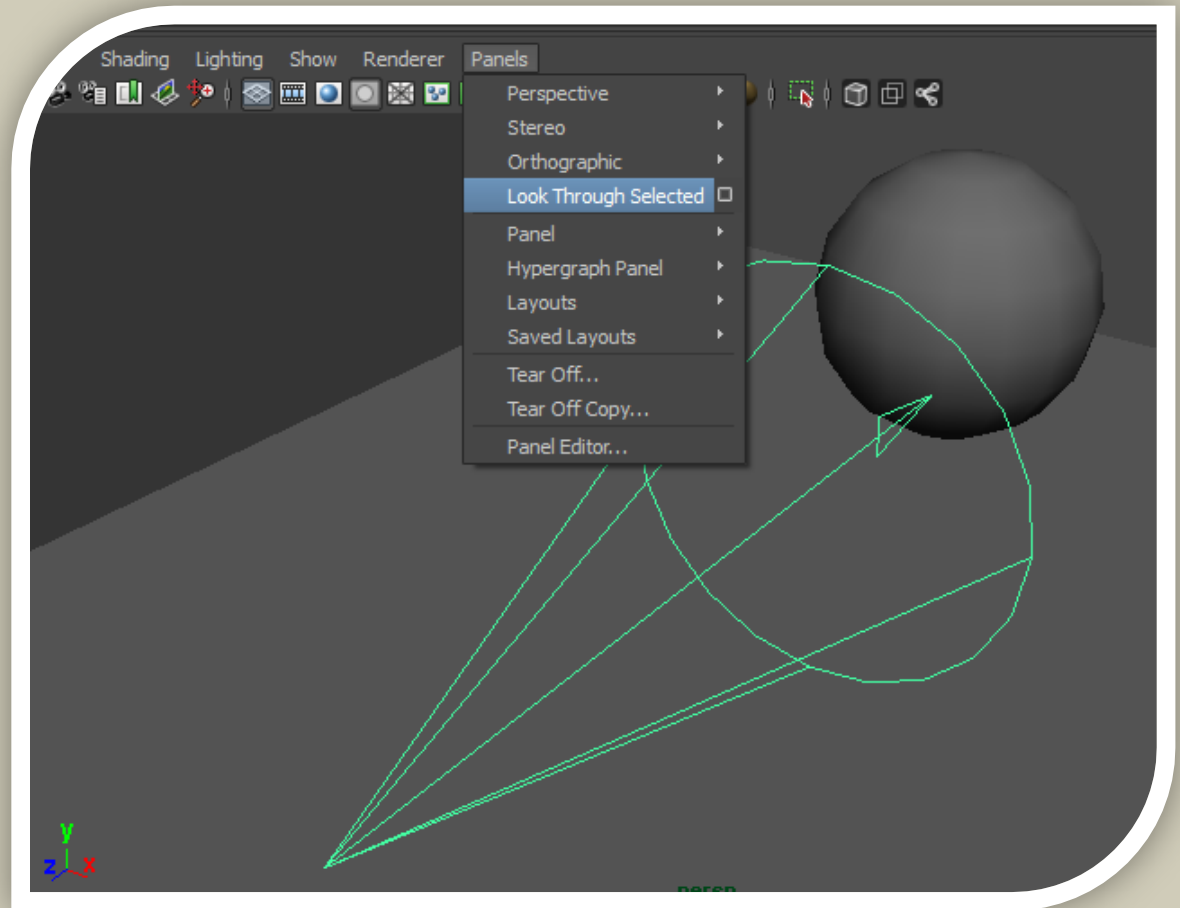
# PLACING LIGHTS AND CAMERAS

- Create a new camera or light from Create drop menu
- Panels > Look Through Selected
- Panels > Perspective > persp



# PLACING LIGHTS AND CAMERAS

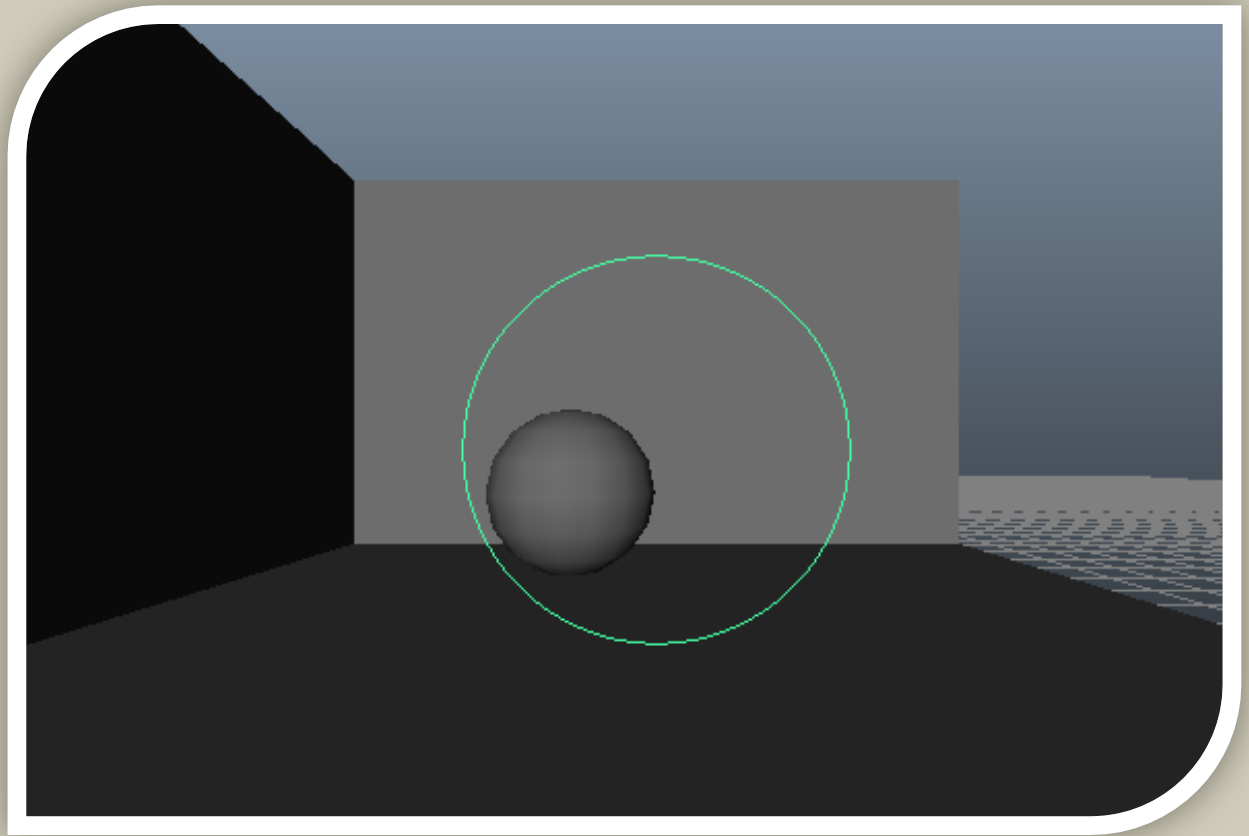
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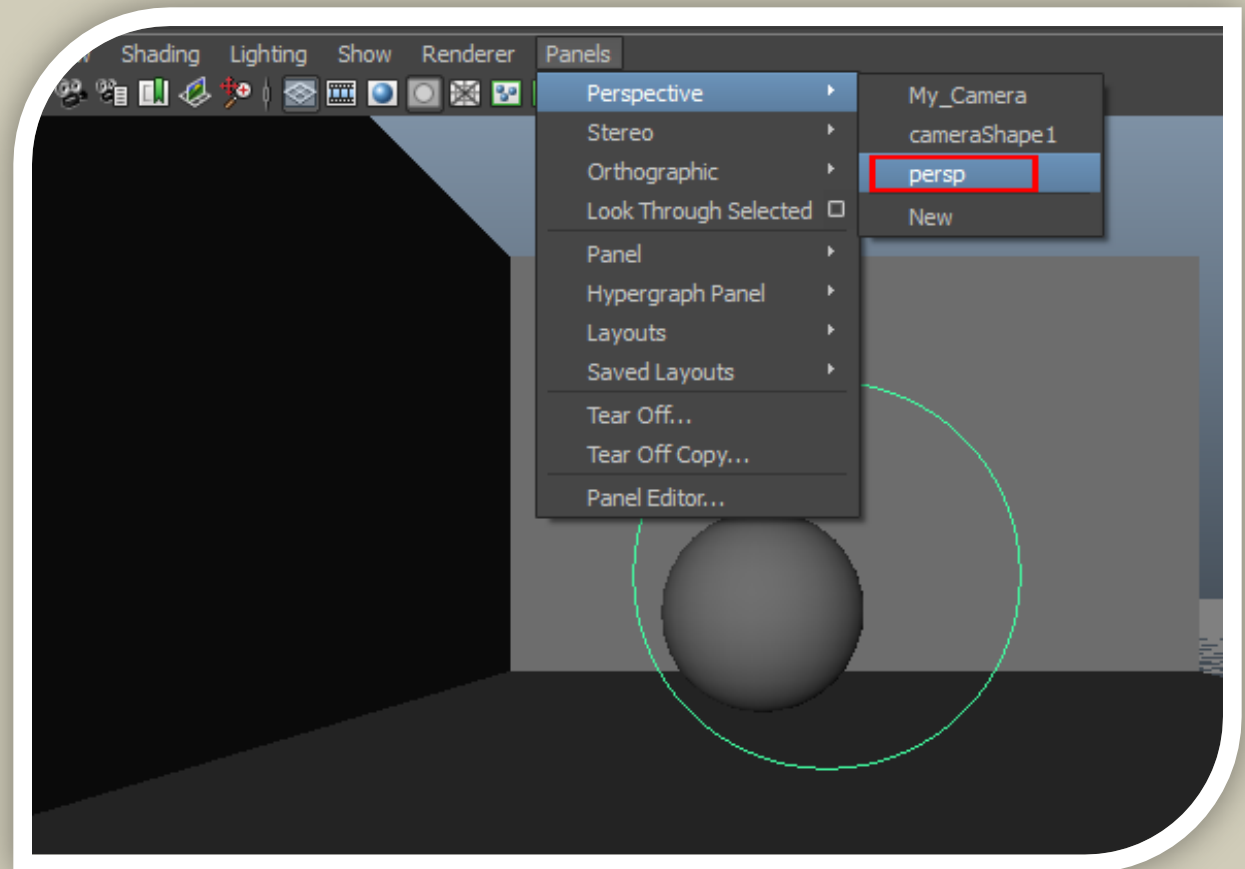
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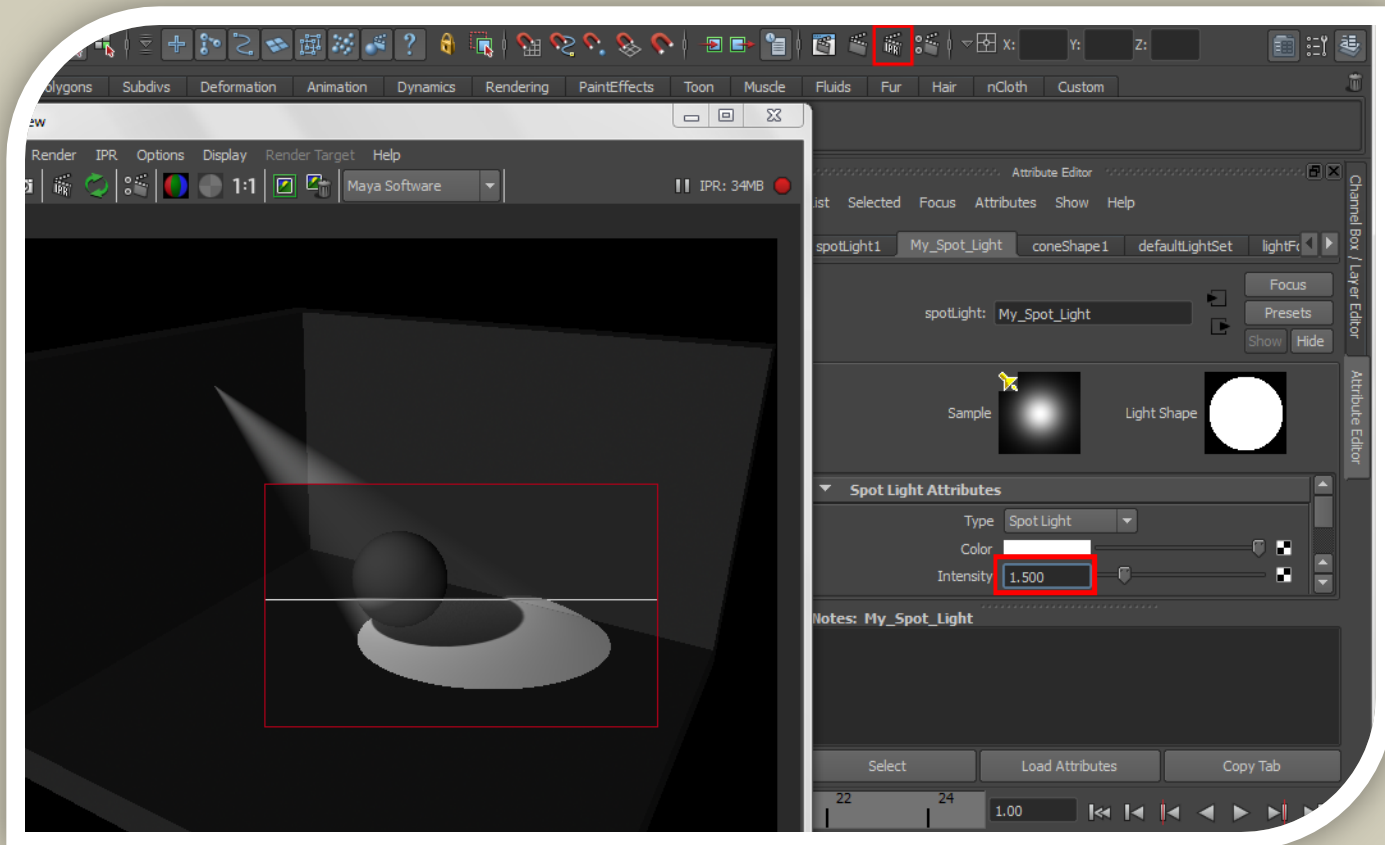
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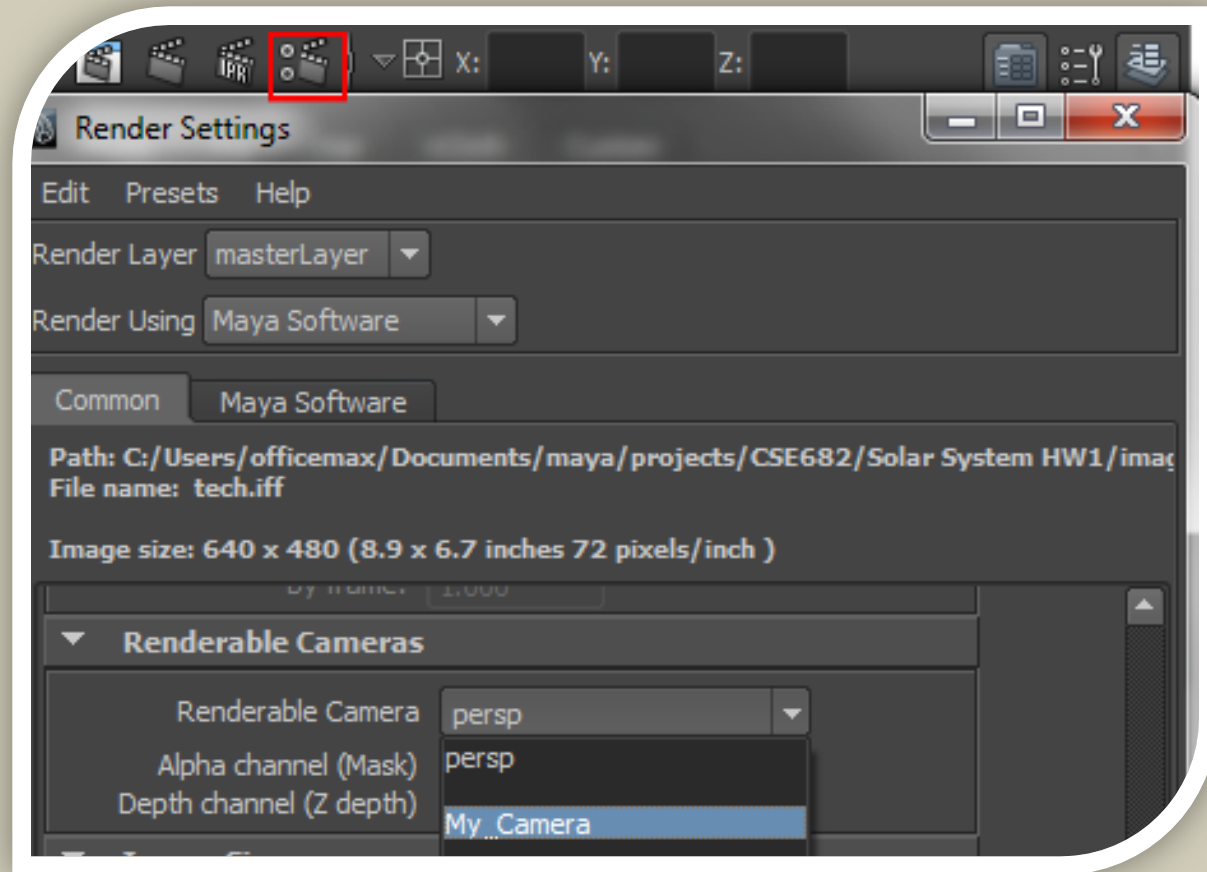
# QUICK NOTE: IPR RENDERING

- Use IPR rendering to get quick feedback on changes to fine tune effects



# RENDER SETTING - CAMERA

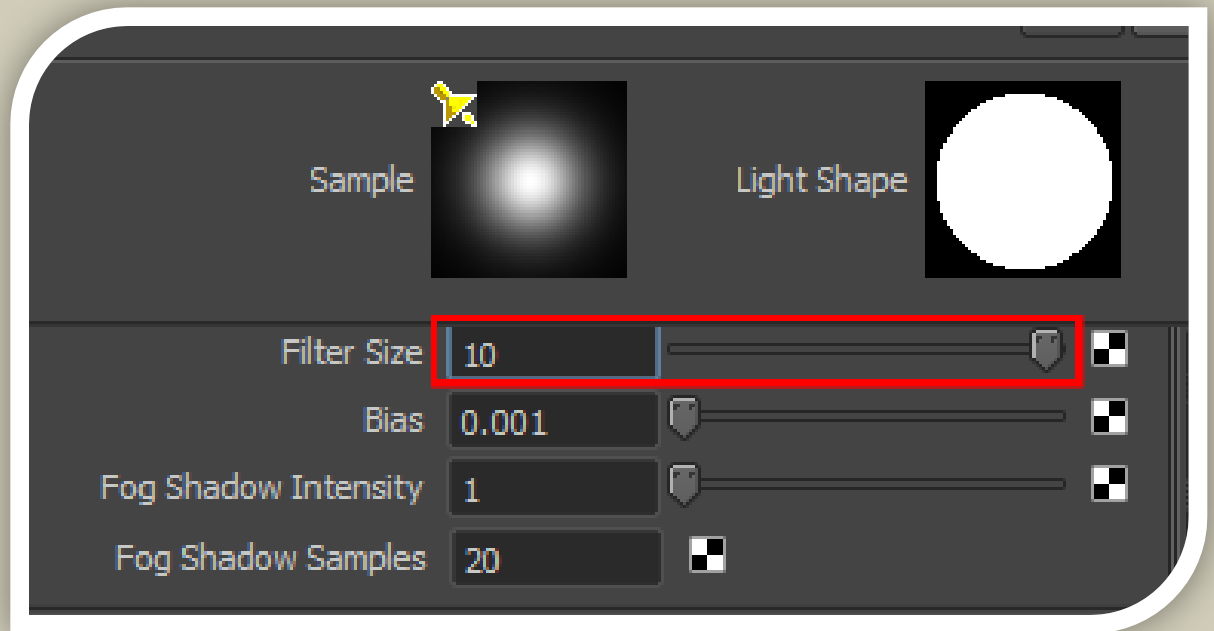
- Pictures will be rendered according to selected camera



# GOING BEYOND SLIDER VALUES

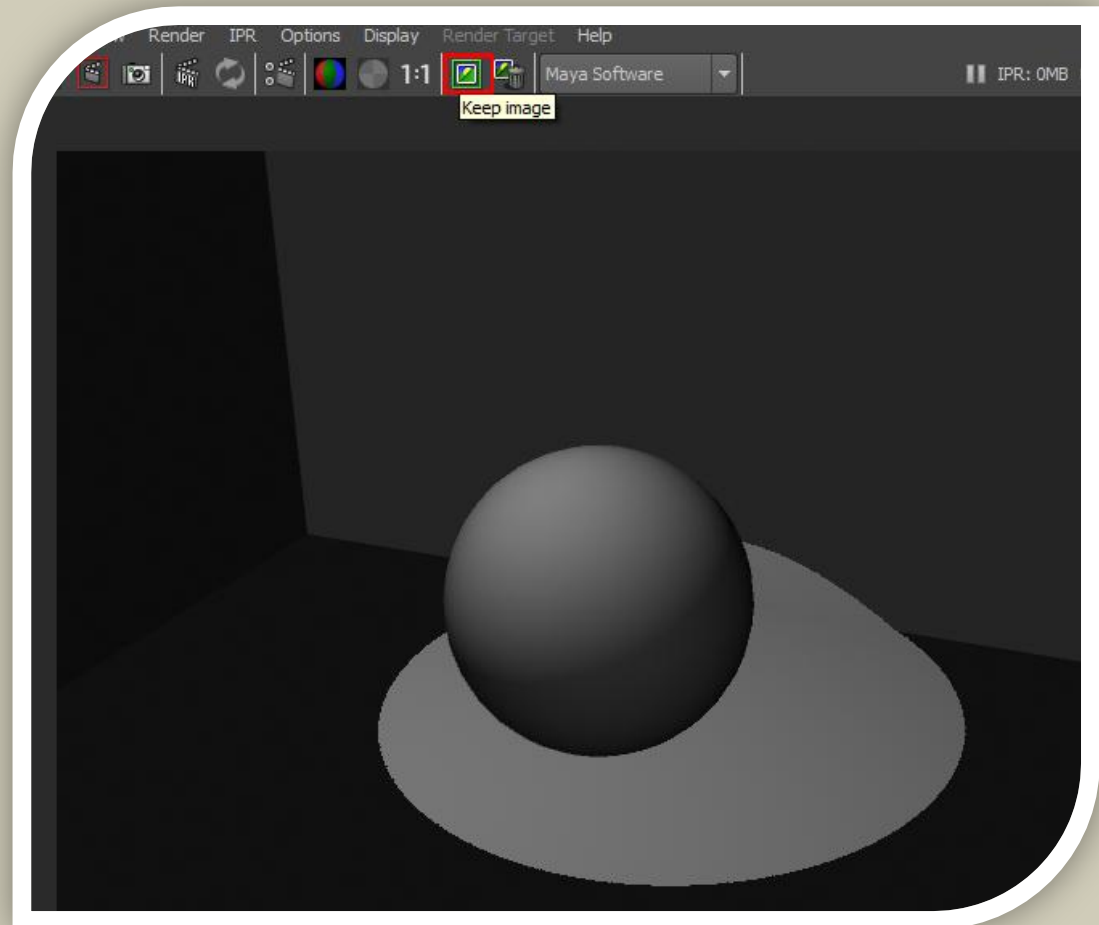
- You can manually enter values outside the range of the slider

- Examples:
  - Softer shadows  
filter size  $> 5$
  - Negative lights  
intensity  $< 0$



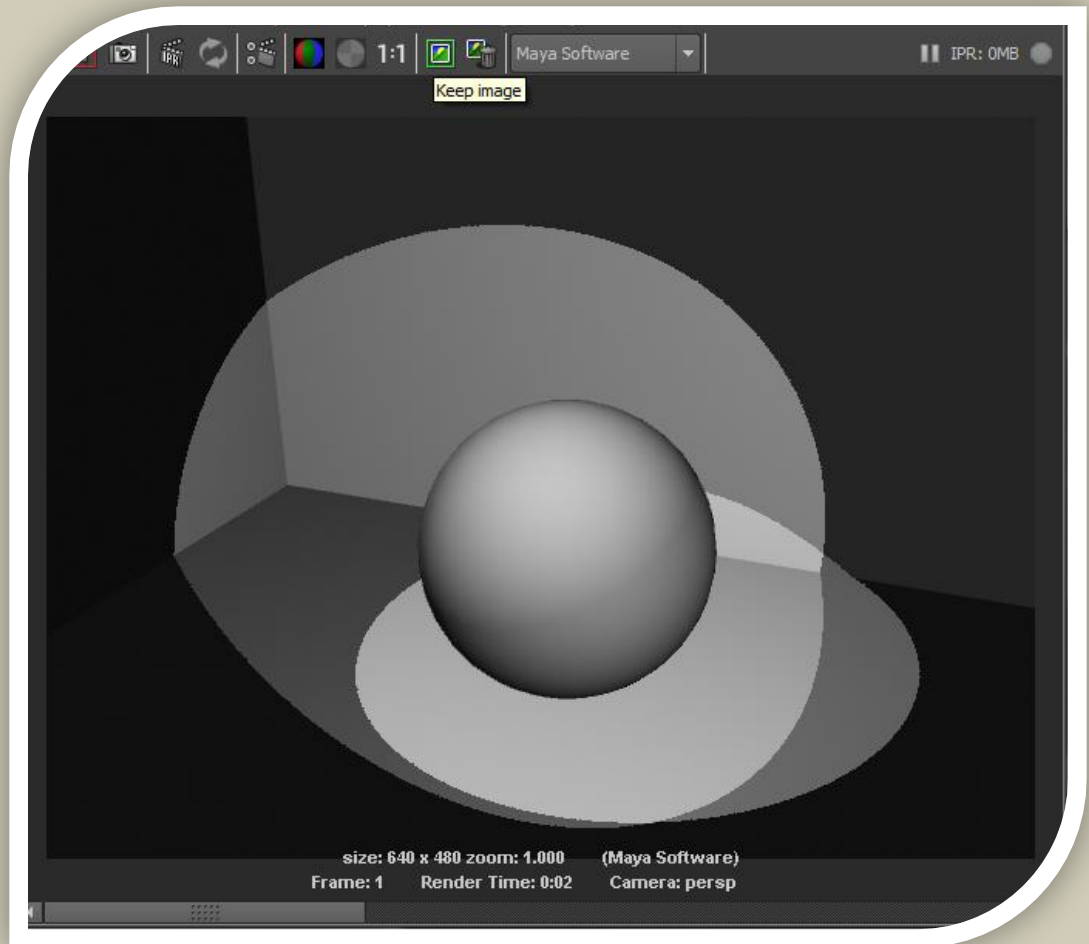
# BREAKING CONNECTIONS

- Click “Keep Image” to store pictures
- Lighting/Shading -> Break Light Links
- Lighting/Shading -> Break Shadow Links



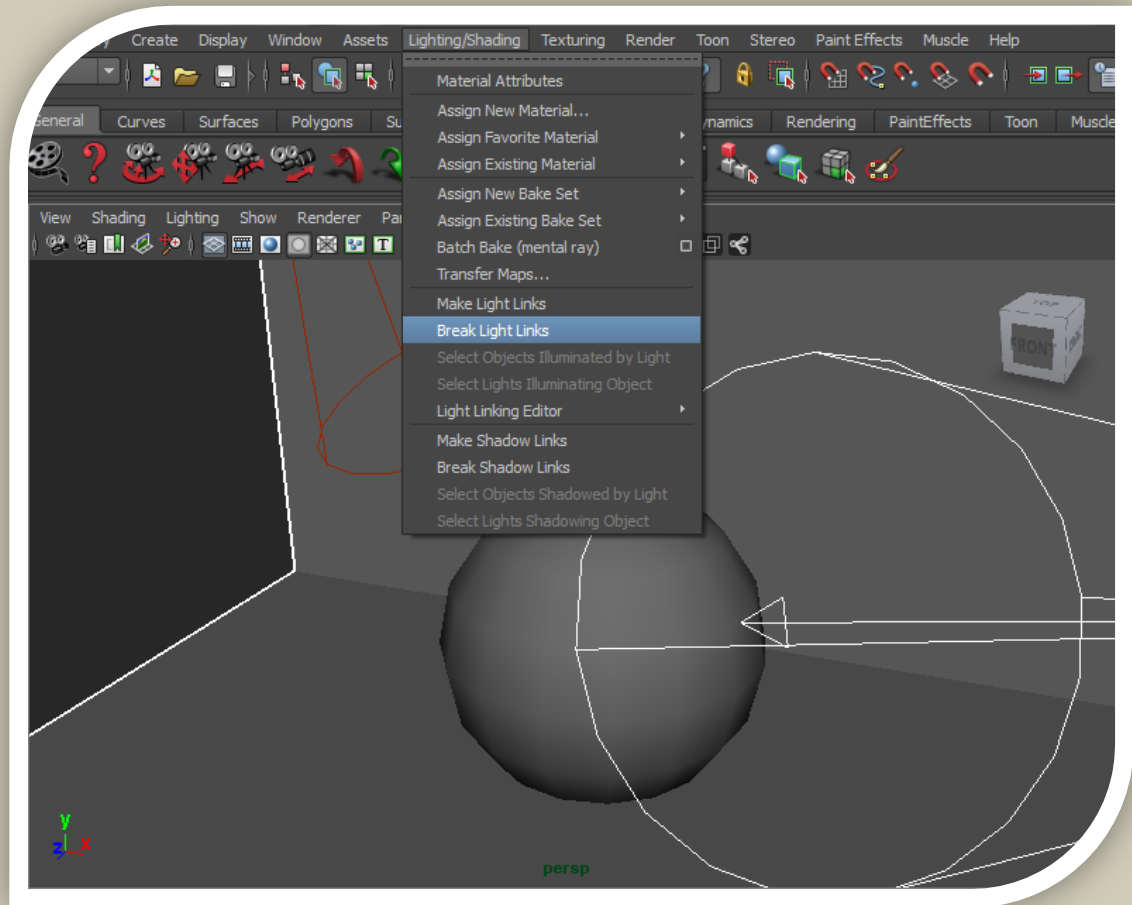
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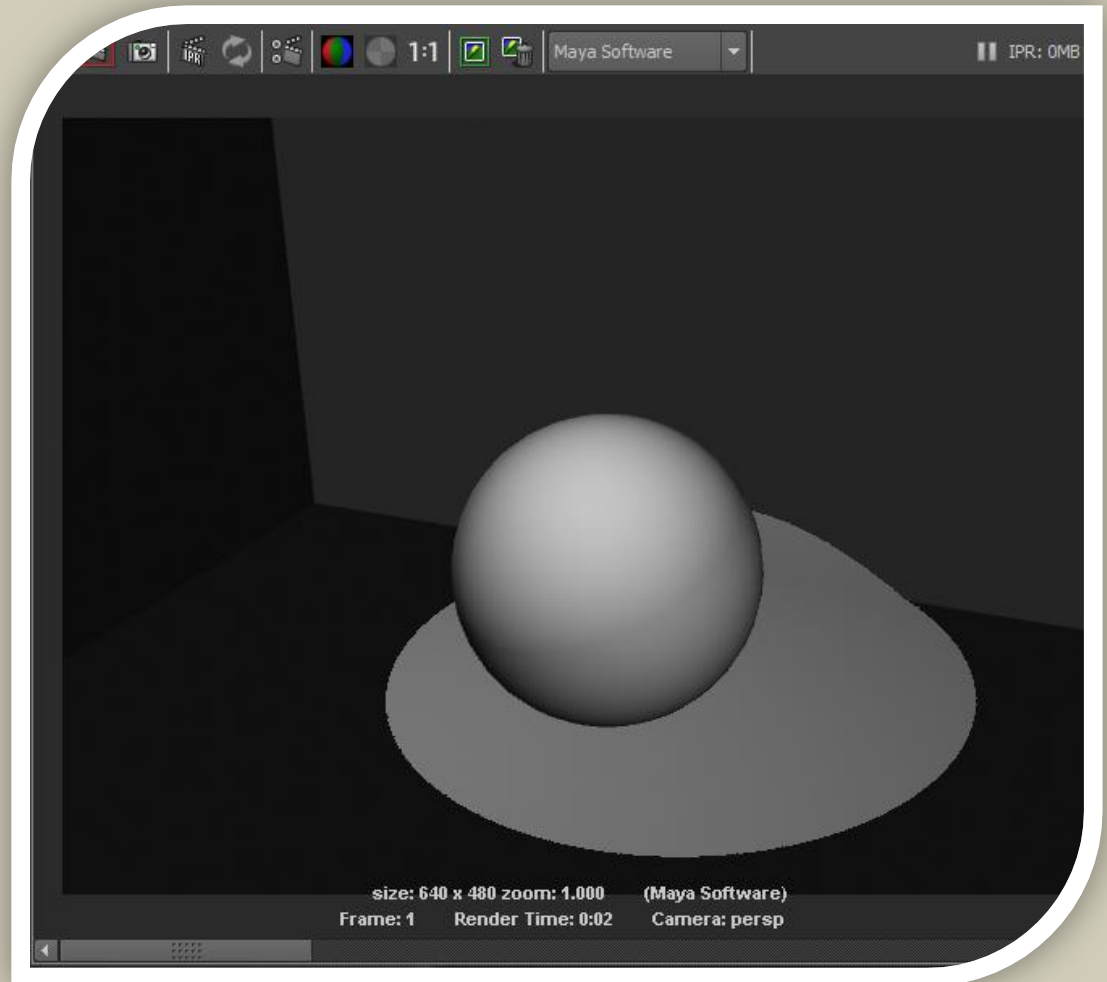
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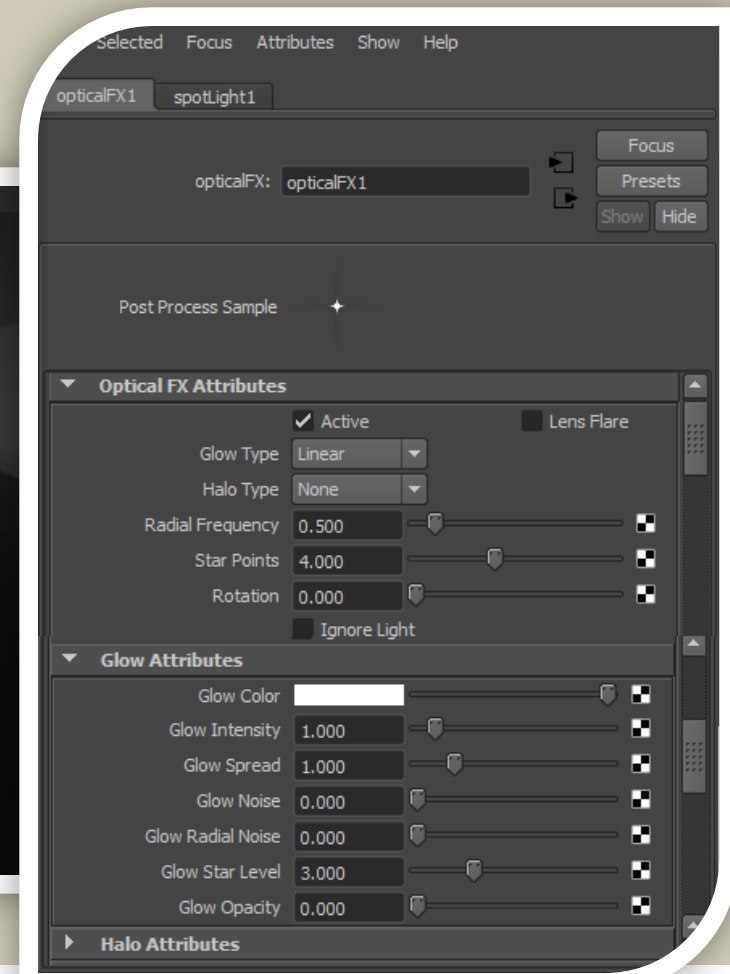
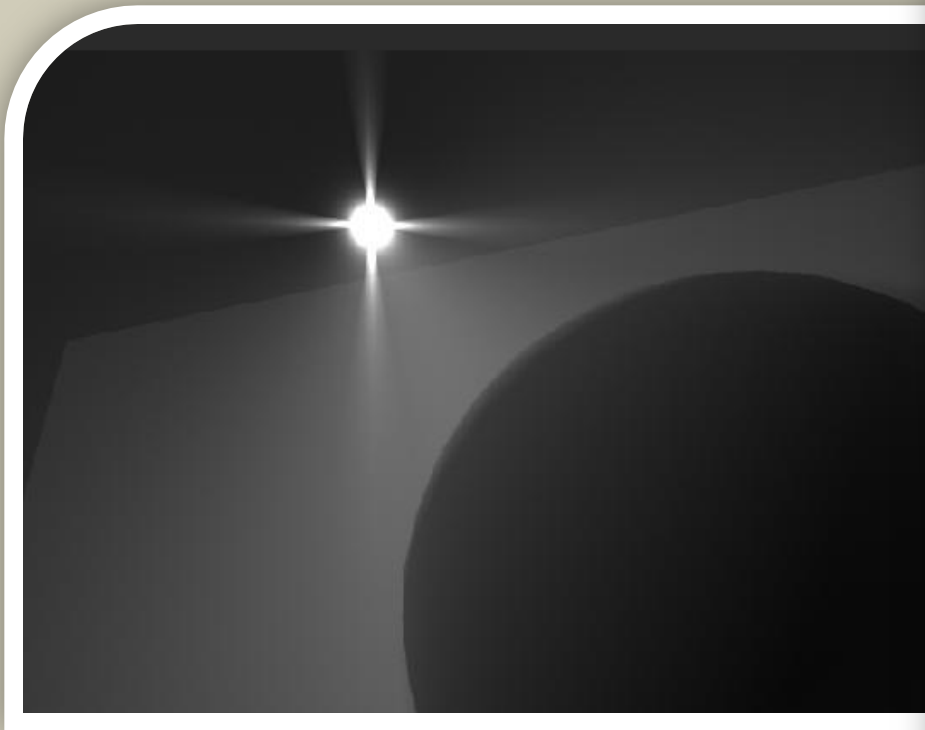
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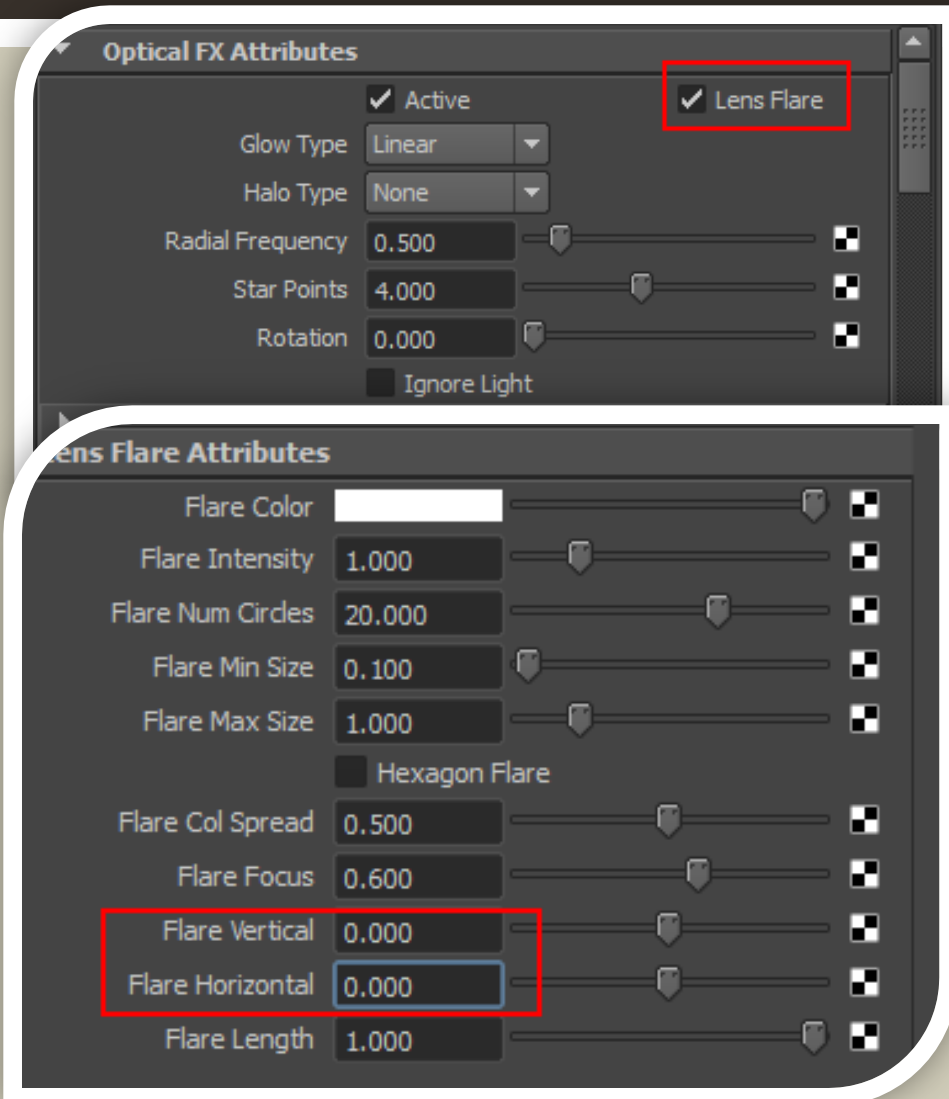
# LIGHT GLOW

- In Light Effects, under Light Fog, you can add Light Glow - only seen when looking into light



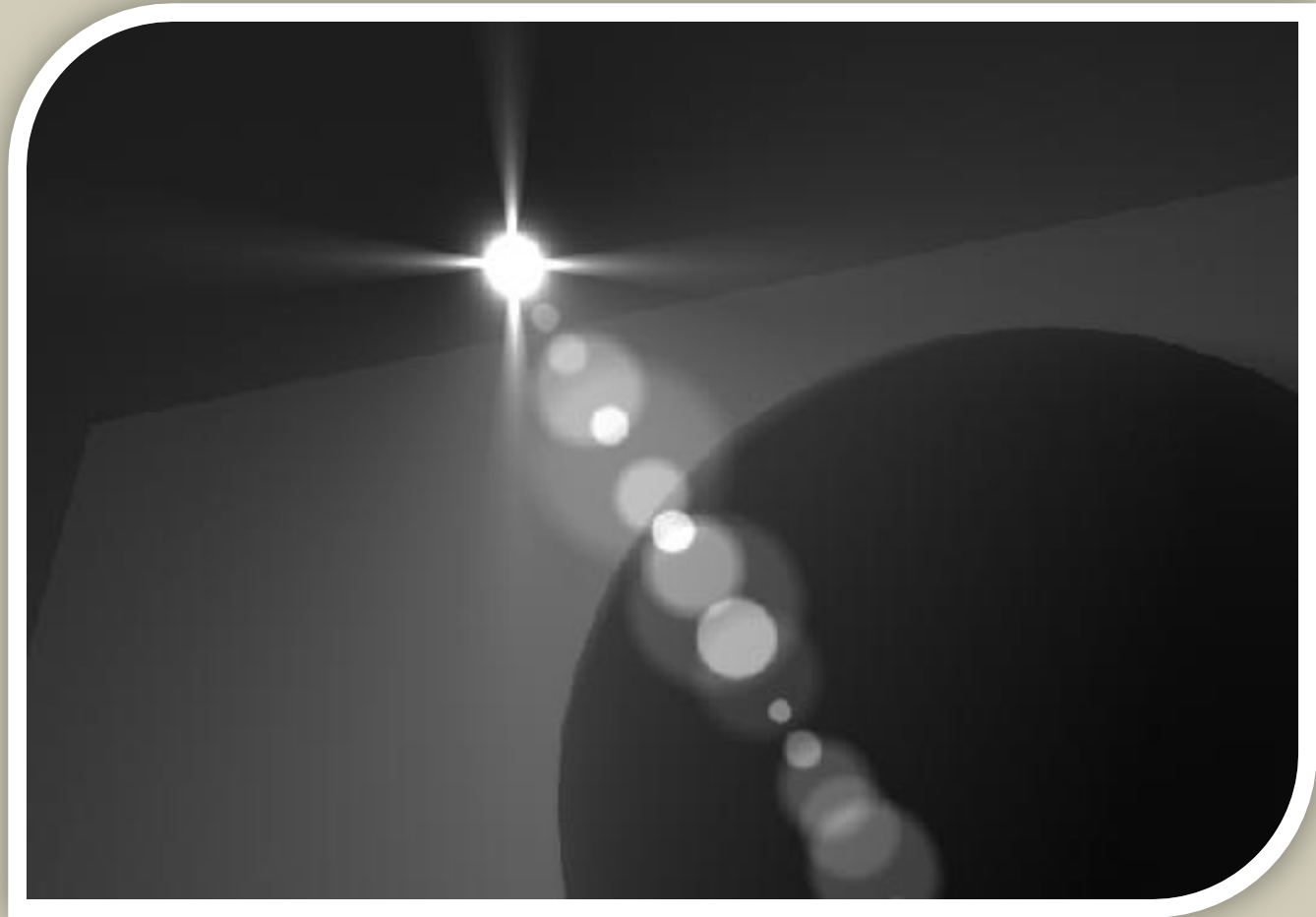
# LENS FLARE

- Once you enable Light Glow, you will be able to edit attributes - like adding lens flare



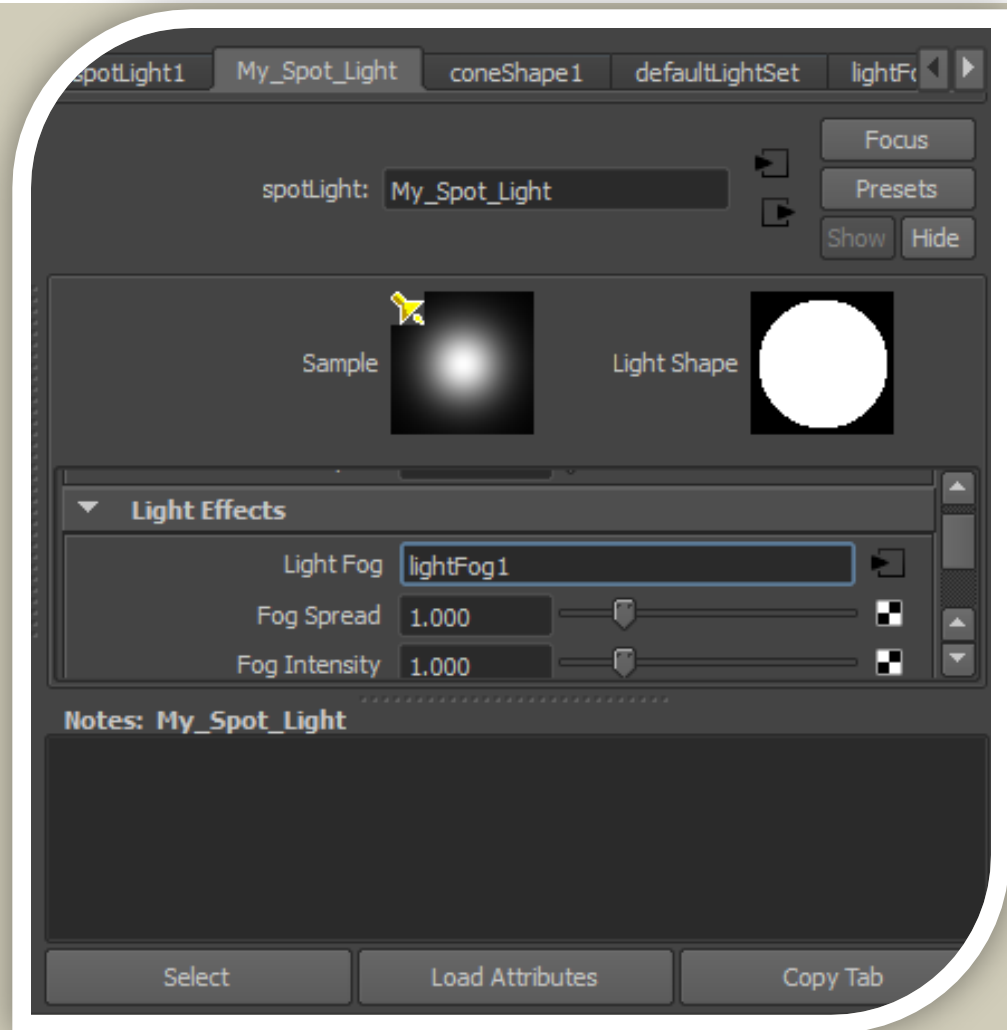
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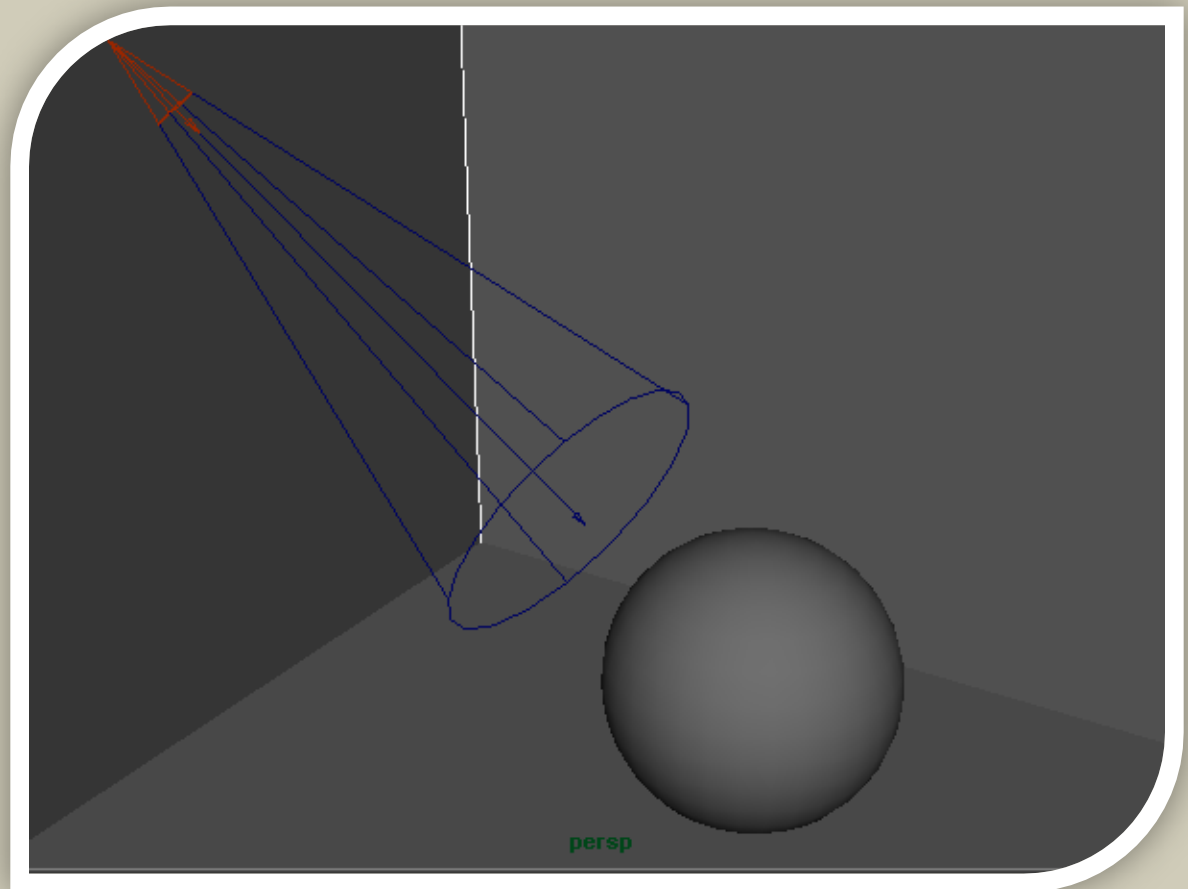
# LIGHT FOG

- Add Light Fog under Light Effects
- Fully extend range by scaling up the light
- Can change color, intensity and many other attributes – use IPR rendering for quick results



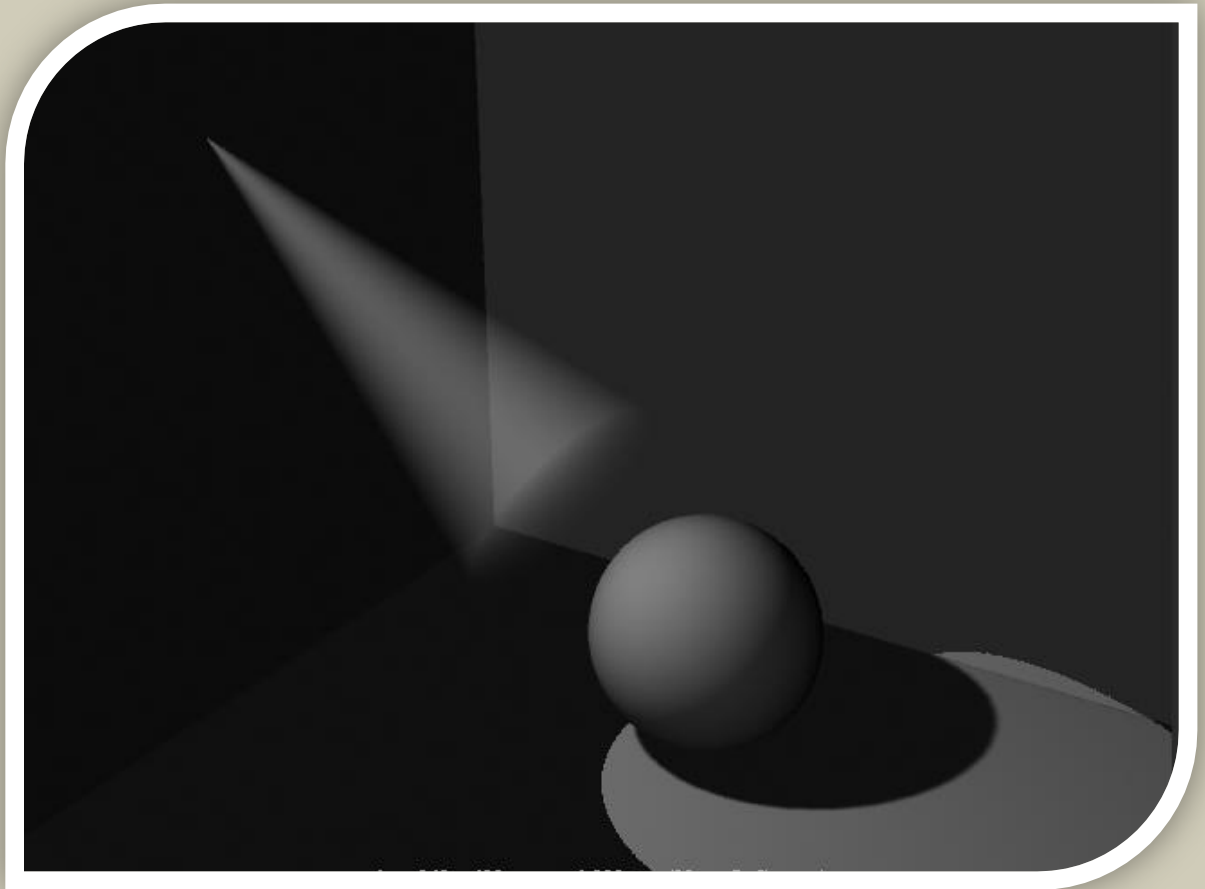
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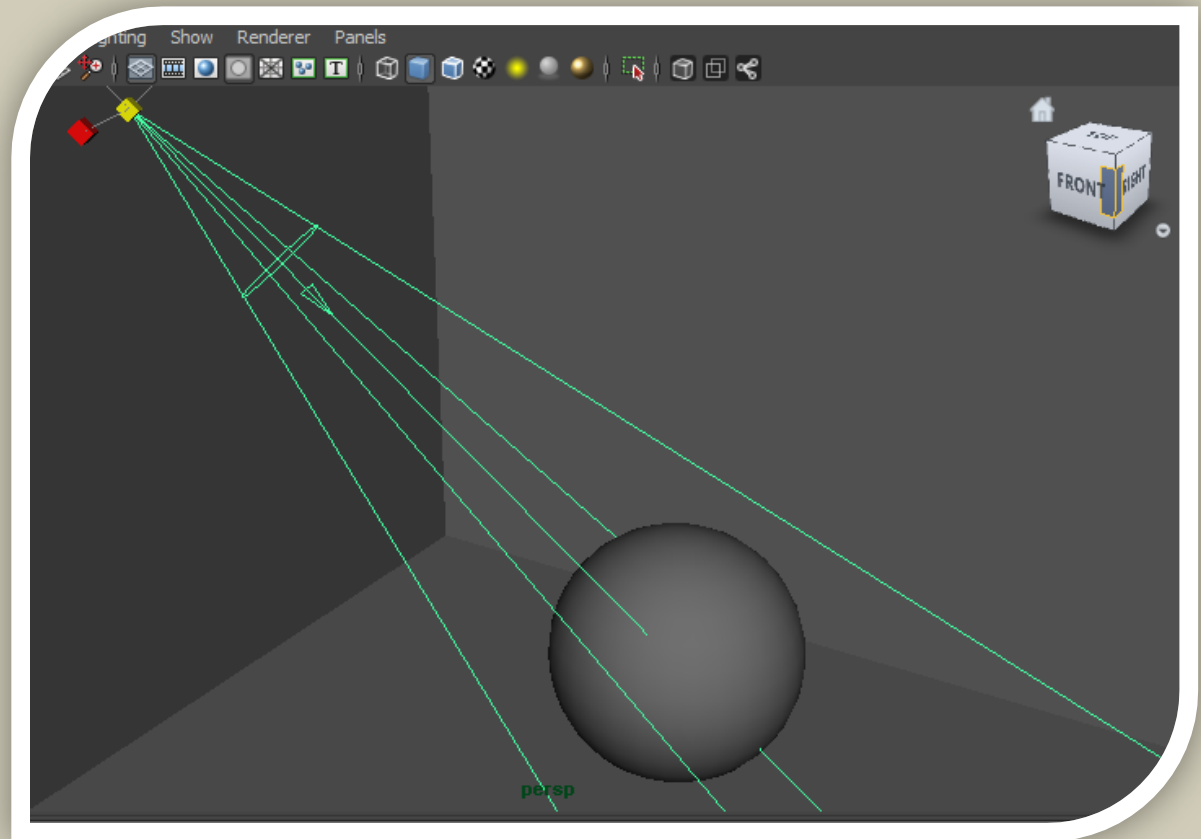
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- Fully extend range by scaling up the light
- Can change color, intensity and many other attributes – use IPR rendering for quick results



# LIGHT FOG

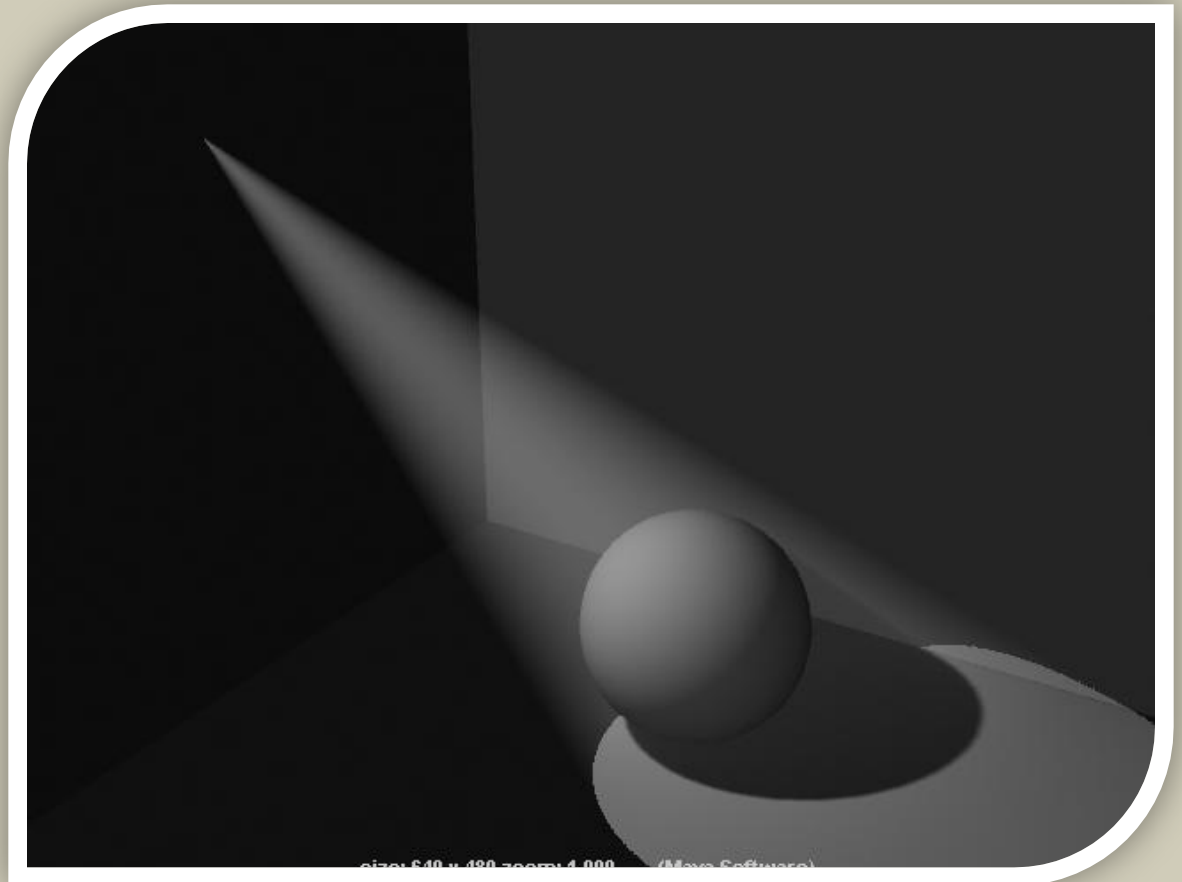
- Add Light Fog under Light Effects
- Fully extend range by scaling up the light
- Can change color, intensity and many other attributes – use IPR rendering for quick results





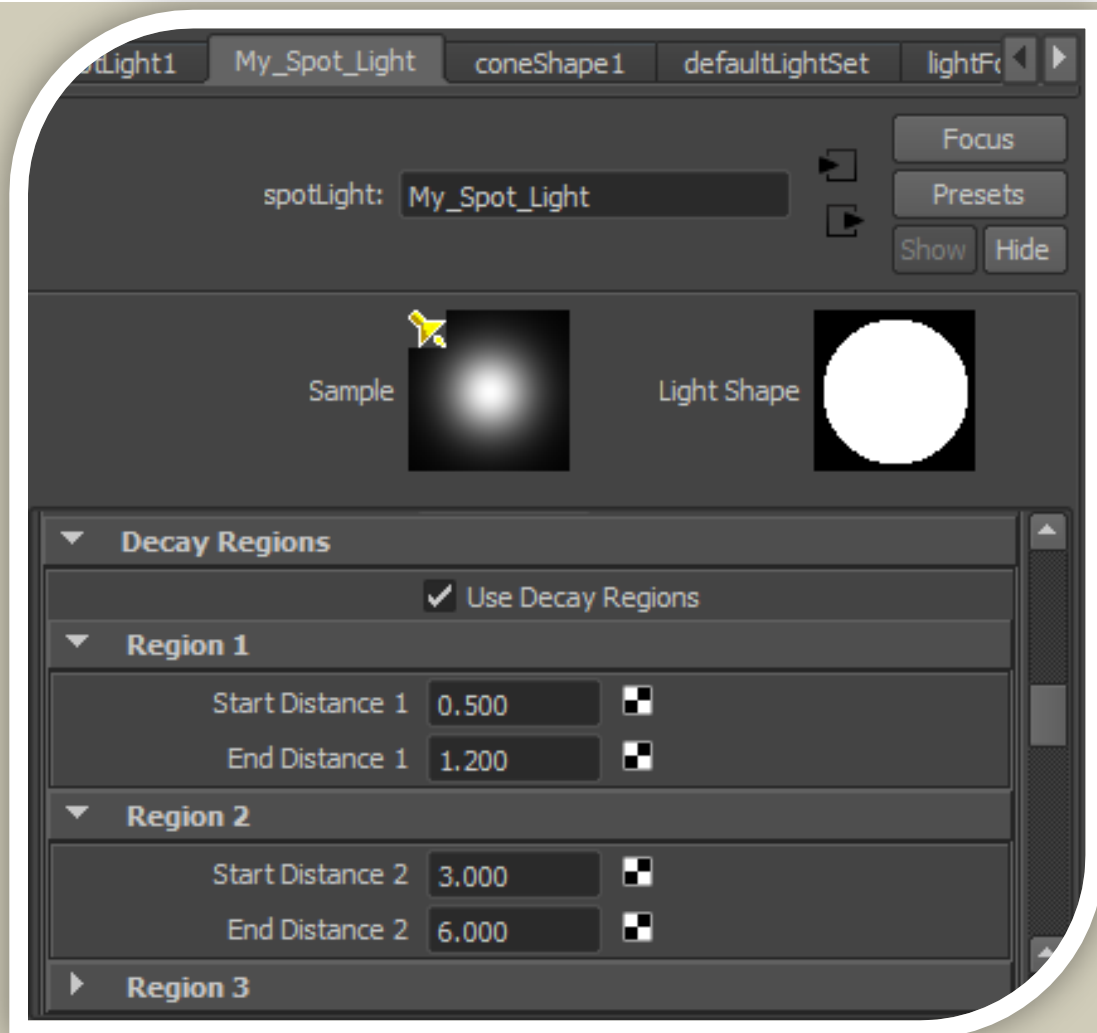
# LIGHT FOG

- Add Light Fog under Light Effects
- Fully extend range by scaling up the light
- Can change color, intensity and many other attributes – use IPR rendering for quick results



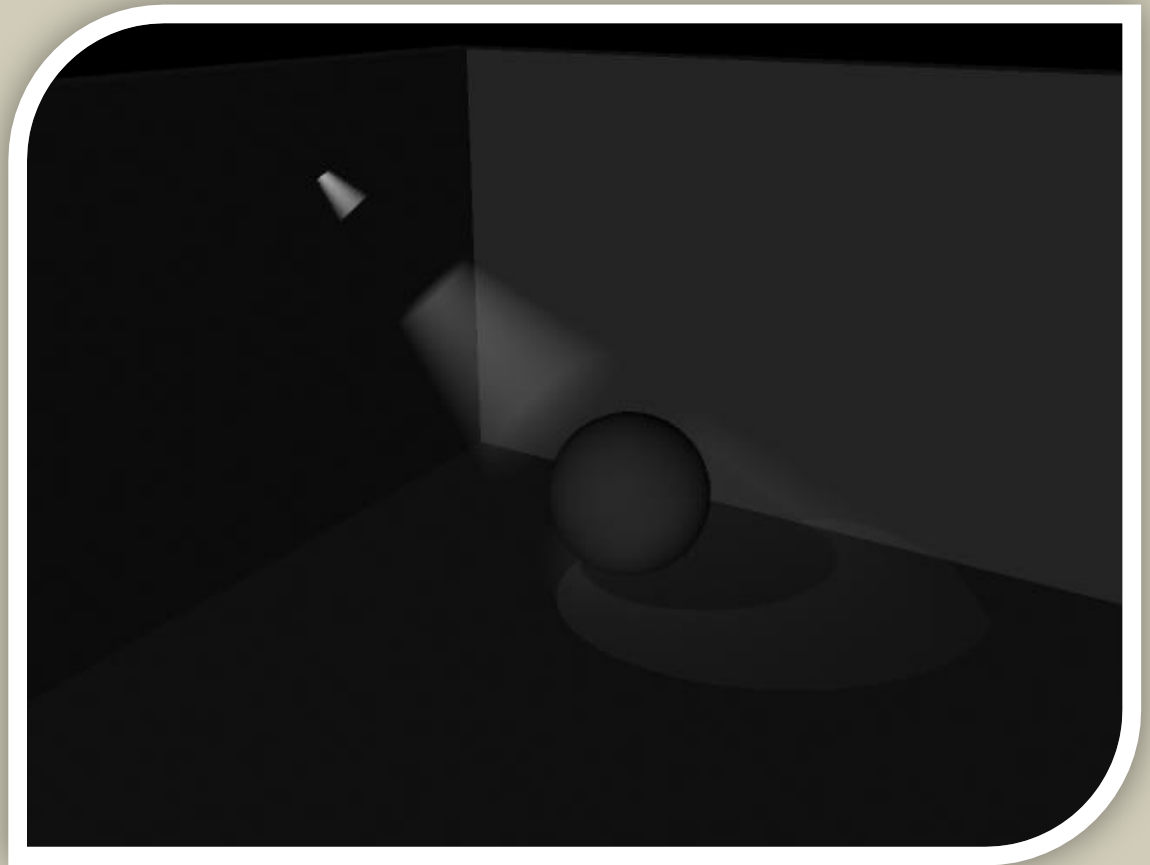
# DECAY REGIONS

- Decay Regions – Use Decay Regions
- Control over what areas the fog light is active
- Display -> Camera/Light Manipulator -> Decay Regions
- Display -> Show -> Light Manipulators



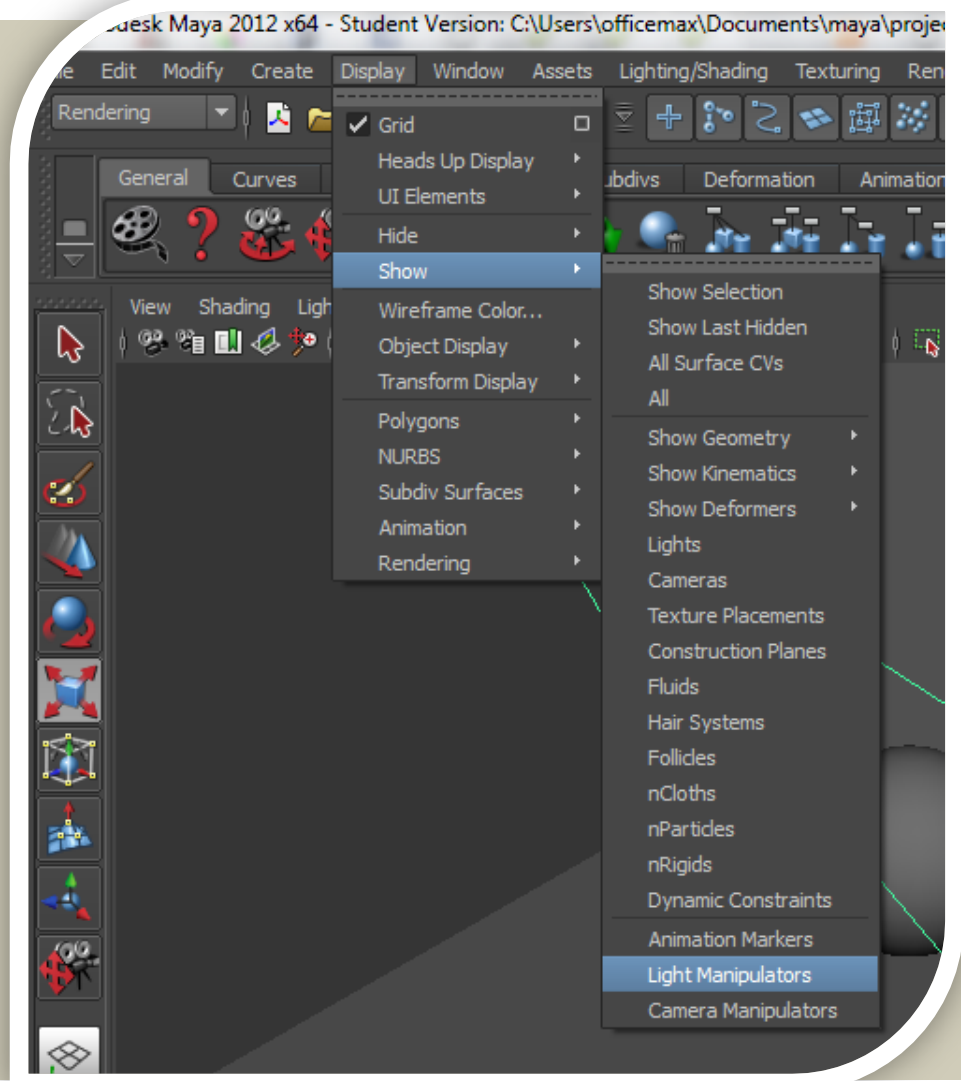
# DECAY REGIONS

- Decay Regions -  
Use Decay Regions
- Control over what  
areas the fog light  
is active
- Display ->  
Camera/Light  
Manipulator ->  
Decay Regions
- Display -> Show ->  
Light Manipulators



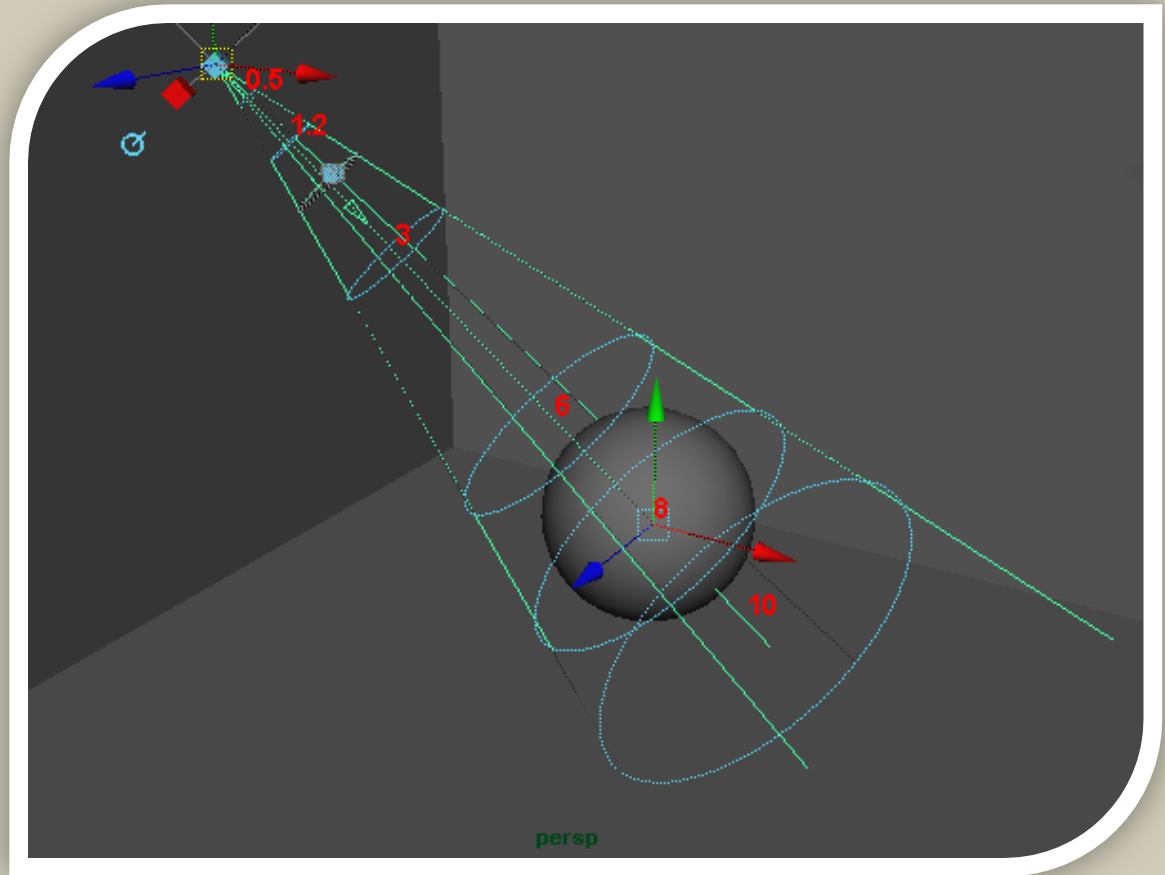
# DECAY REGIONS

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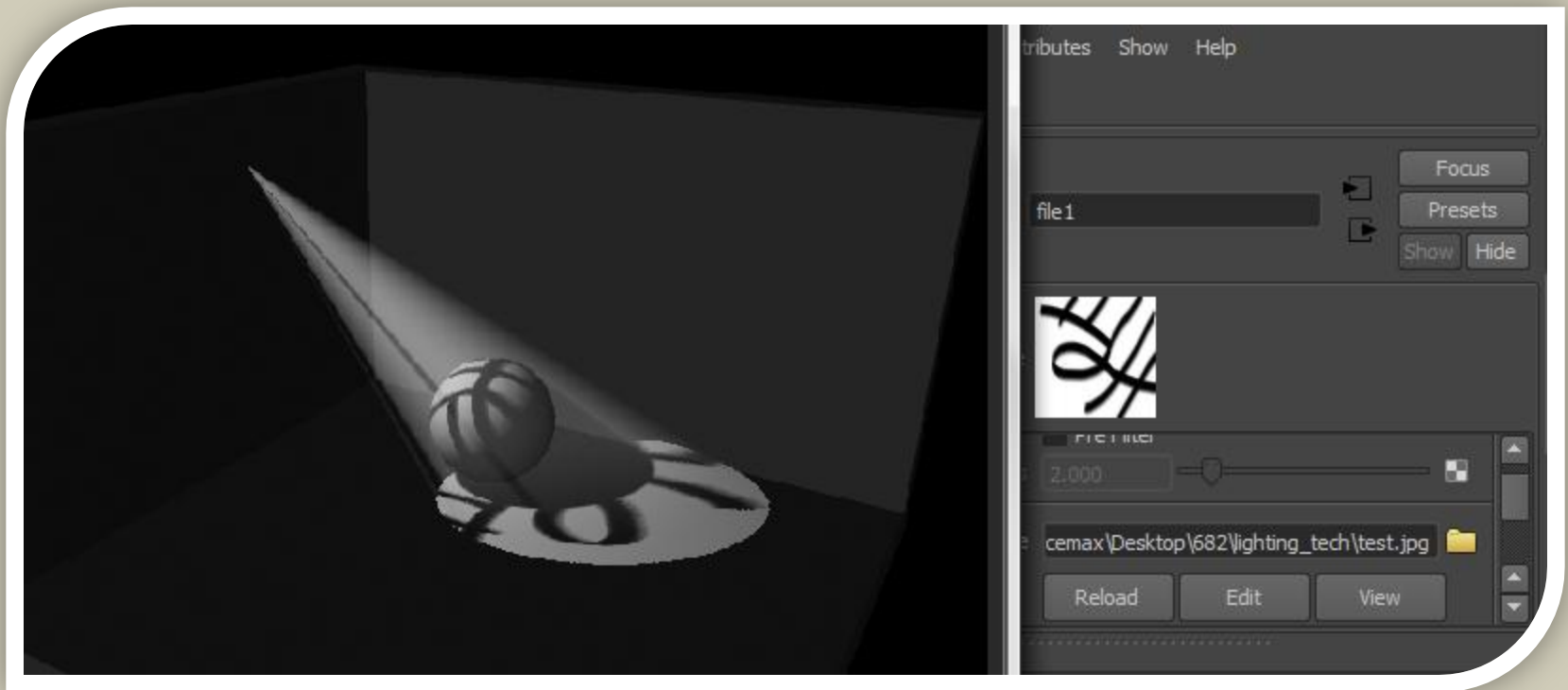
# DECAY REGIONS

- Decay Regions - Use Decay Regions
- Control over what areas the fog light is active
- Display -> Camera/Light Manipulator -> Decay Regions
- Display -> Show -> Light Manipulators



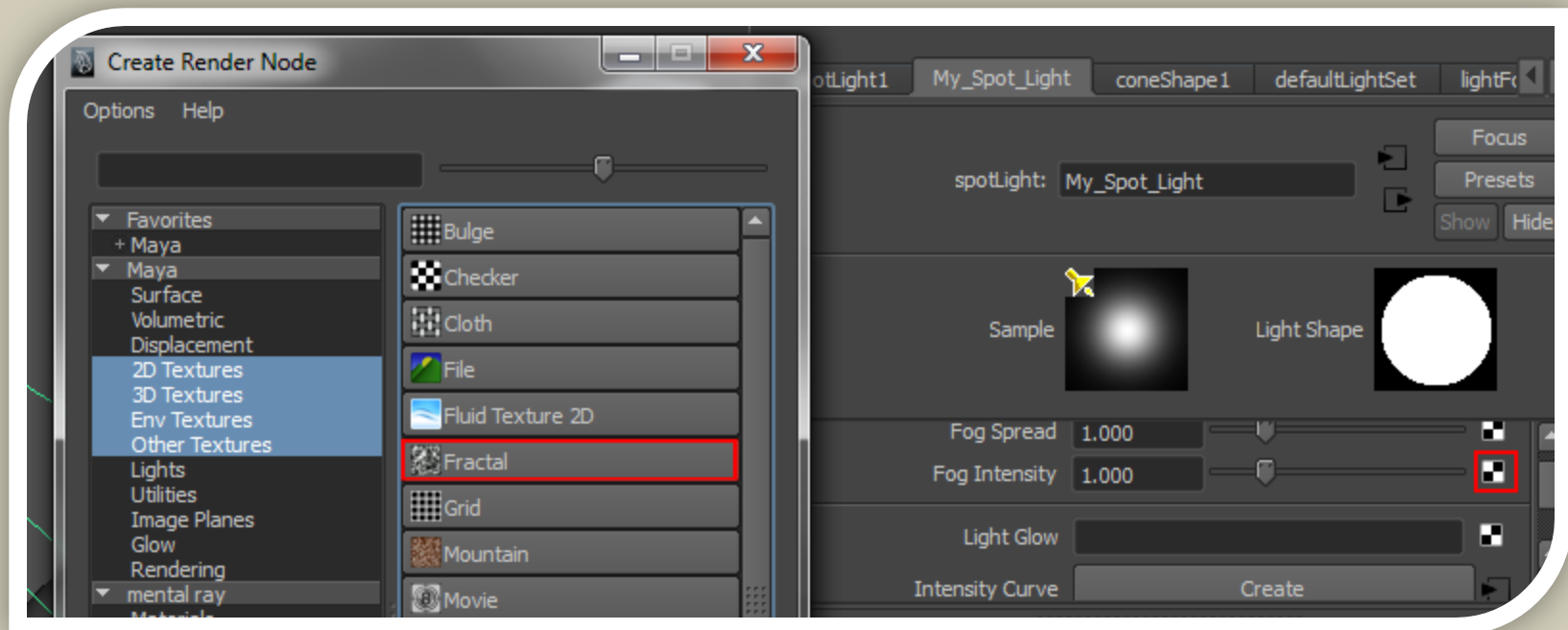
# COLOR MAPPING

- For color mapping – click the checkered square and choose an option – can be user created file
- Can be black and white or a full color picture



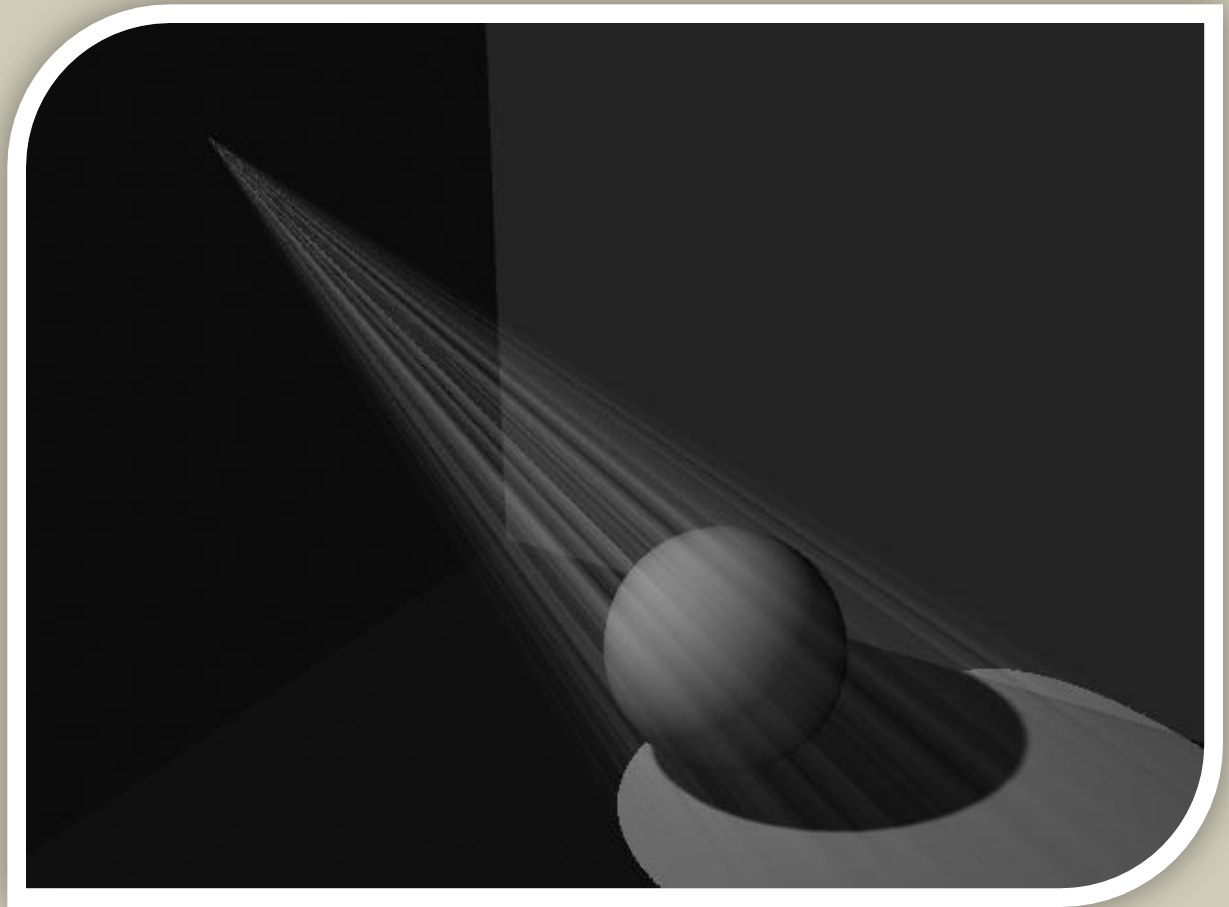
# INTENSITY MAPPING

- Can map intensity like color
- Example: Fractal



# INTENSITY MAPPING

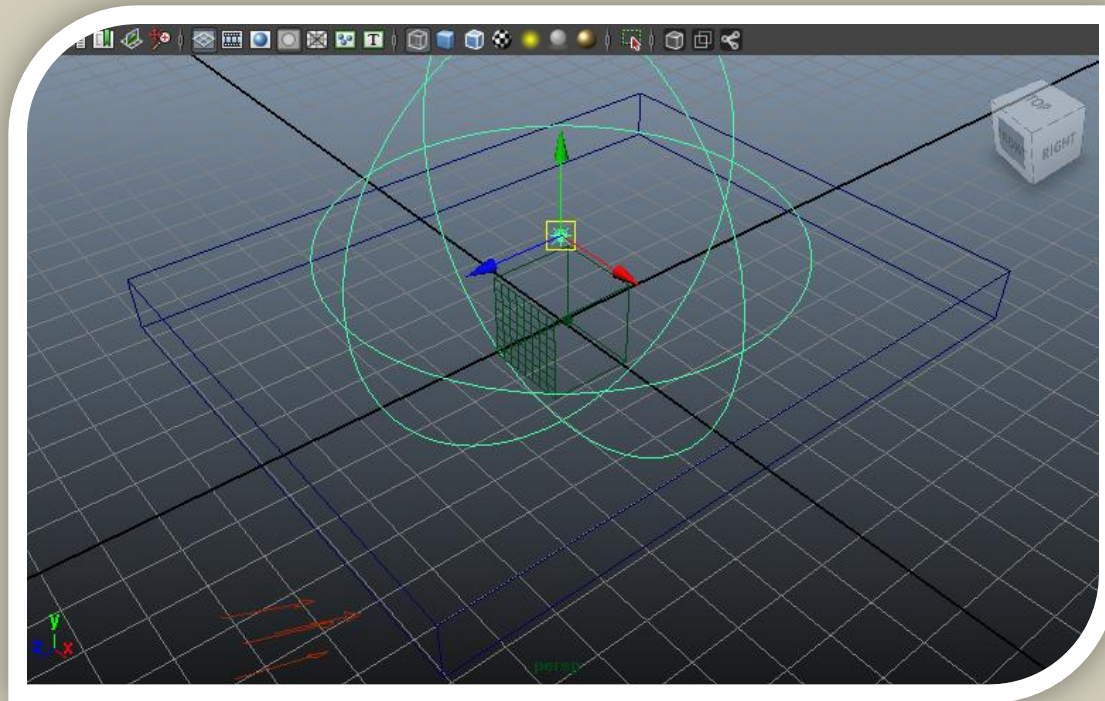
- Can map intensity like color
- Example: Fractal





# POINT LIGHT FOG – FORCE FIELD

- Map “Clouds” to Point Light Fog Intensity



# POINT LIGHT FOG – FORCE FIELD

Map “Clouds” to Point Light Fog Intensity

[http://www.youtube.com/watch?v=\\_qwR\\_ouvY6c&context=C366c118AD0EgsToPDskJEFh6huYqR\\_06ZkDMvX6bX](http://www.youtube.com/watch?v=_qwR_ouvY6c&context=C366c118AD0EgsToPDskJEFh6huYqR_06ZkDMvX6bX)

# USEFUL RESOURCES

- Light types -  
[http://accad.osu.edu/~aprice/courses/752/light\\_types.html](http://accad.osu.edu/~aprice/courses/752/light_types.html)
- Lighting tutorials -  
<http://www.cgarena.com/freestuff/tutorials/maya/cginstructor/lighting/index.html>
- Lighting special effects -  
[http://accad.osu.edu/~aprice/courses/752/light\\_fx.html](http://accad.osu.edu/~aprice/courses/752/light_fx.html)
- Maya Help pages