

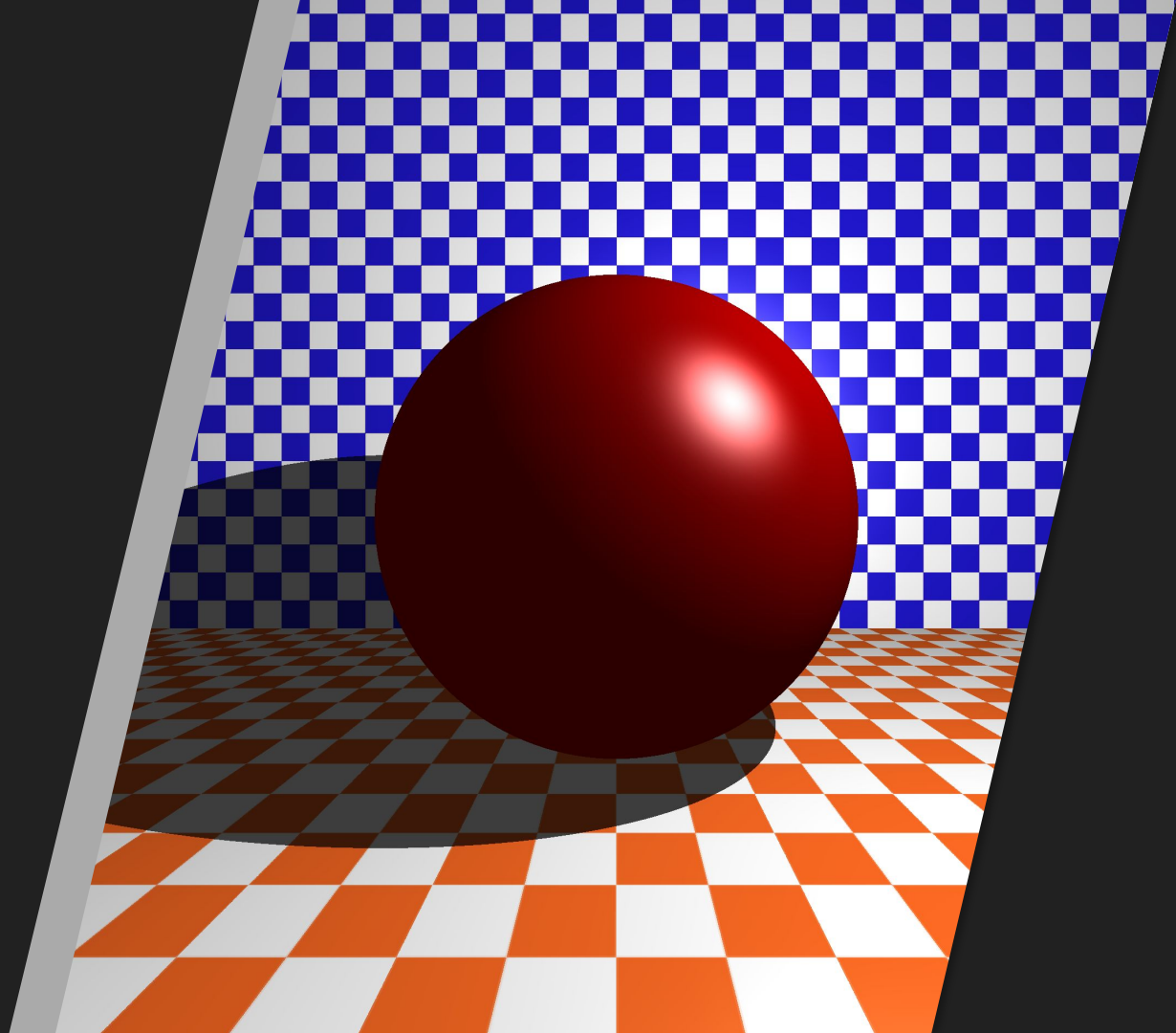
# Moteur de rendu graphique par lancer de rayons

Marc Michoux - Alexandre Labbé

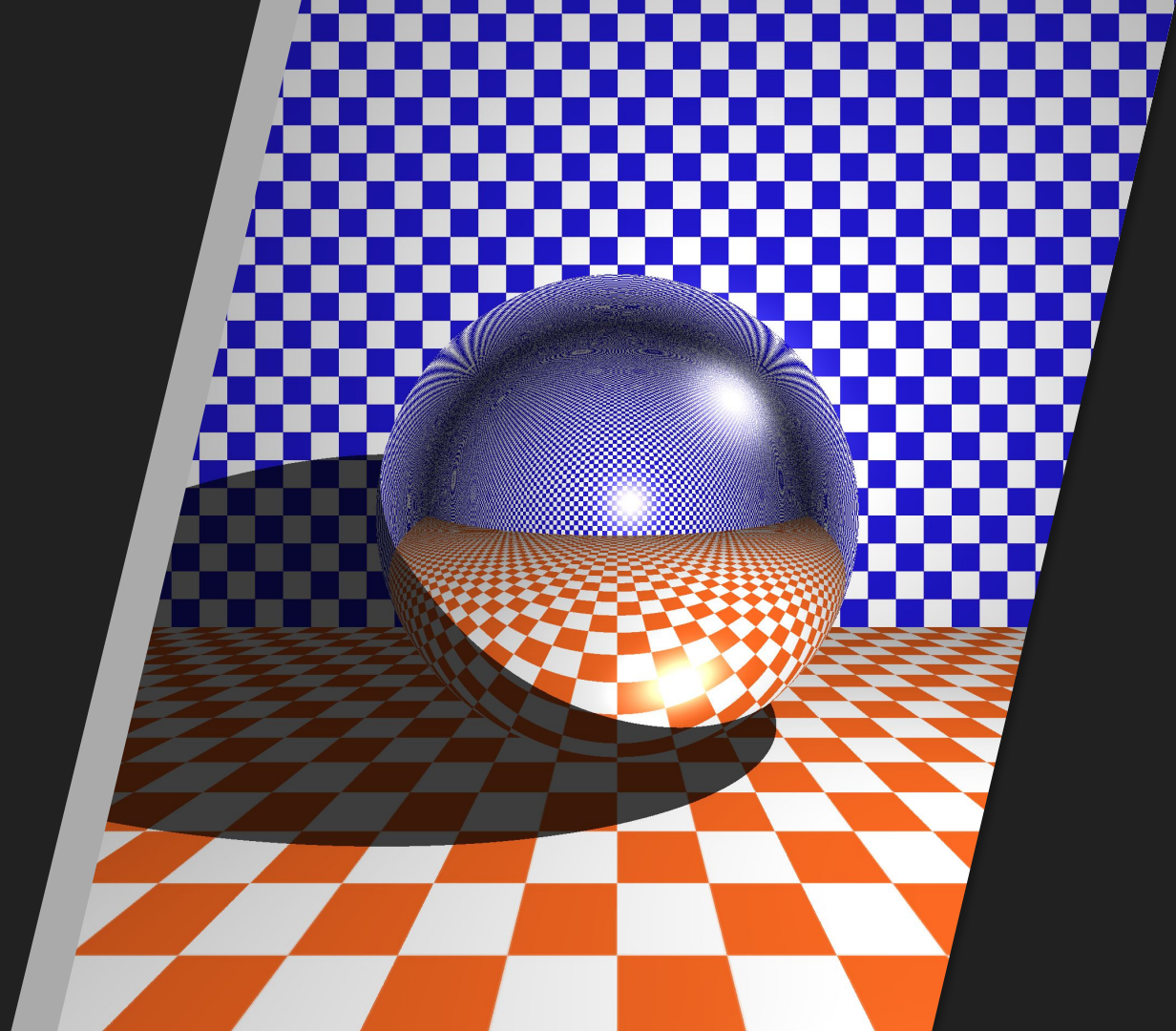
# Affichage d'objets simples

Sphère / Plan infini / Polygone

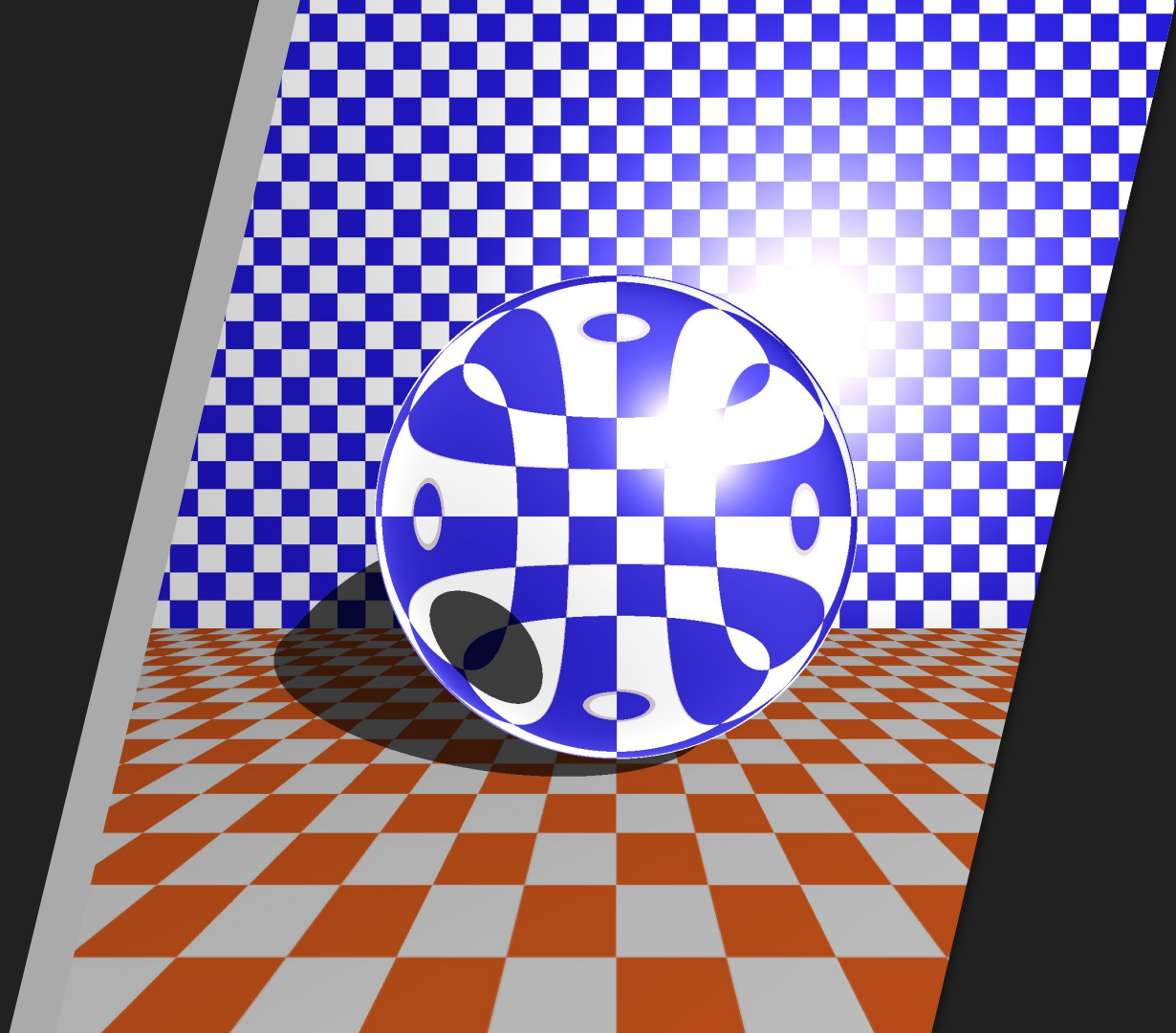
Ombre portée / Diffusion de la  
lumière / Réflexion spéculaire



# Réflexion de la lumière



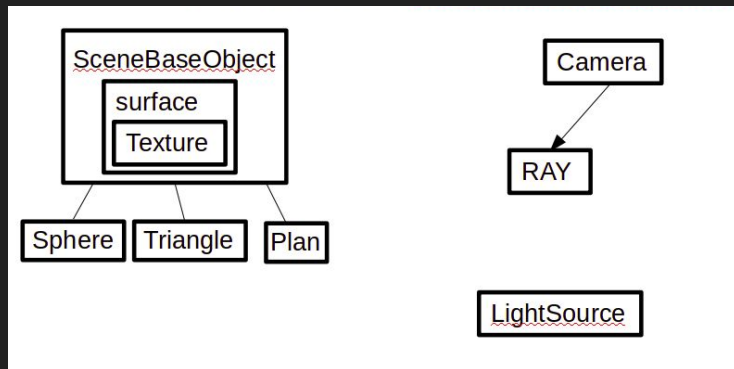
# Réfraction de la lumière



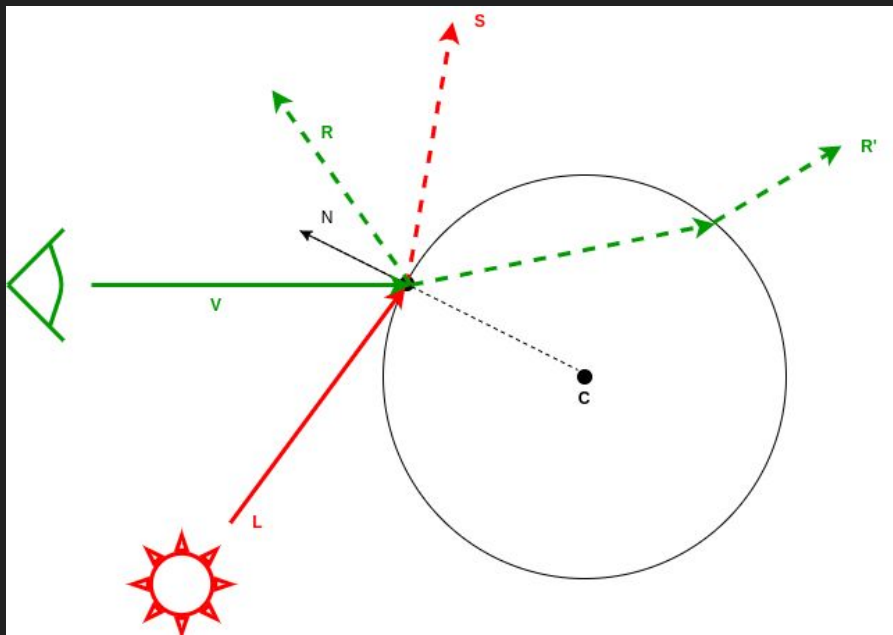
# Classes essentielles

```
class SceneBaseObject {  
    public:  
        Surface surface;  
        std::vector<float> center;  
        float n1, n2;  
};
```

```
class Camera {  
    private:  
        float focal;  
    public:  
        int pixels_per_row;  
        int pixels_per_column;  
        std::vector<float> position;  
        float width;  
        float height;  
};
```



# Algorithme récursif



$$I = k_d * I_a + I_s * (k_d(\vec{L} \cdot \vec{N}) + k_s(\vec{V} \cdot \vec{S})^n) + k_{r'} I_{r'} + k_r I_r$$

# Description XML des scènes

```
<camera>
  <coords type="center">
    <coord type="x">0</coord>
    <coord type="y">0</coord>
    <coord type="z">0</coord>
  </coords>
  <coord type="width">15</coord>
  <coord type="height">10</coord>
  <coord type="focal">5</coord>
  <coord type="n_width">2048</coord>
  <coord type="n_height">2048</coord>
</camera>
```

```
<source>
  <coords type="center">
    <coord type="x">250</coord>
    <coord type="y">-250</coord>
    <coord type="z">250</coord>
  </coords>
  <colors>
    <color type="r">255</color>
    <color type="g">255</color>
    <color type="b">255</color>
  </colors>
</source>
```



# Bibliothèques utilisées

- Librairie standard
- Tiny XML :
  - lecture du format XML  
en C++





# Performances

- Multithreading sur les rayons

```
./texture/tile.ppm  
./texture/blue_tile.ppm  
temps chargement de la scène: 0.048s  
traced 262144 rays in : 1.096 s  
light sources generated in : 0 s  
the pixels have been computed in 5.612s  
temps calcul de l'image: 6.771s  
temps sauvegarde: 0.052s  
temps total: 6.871s
```

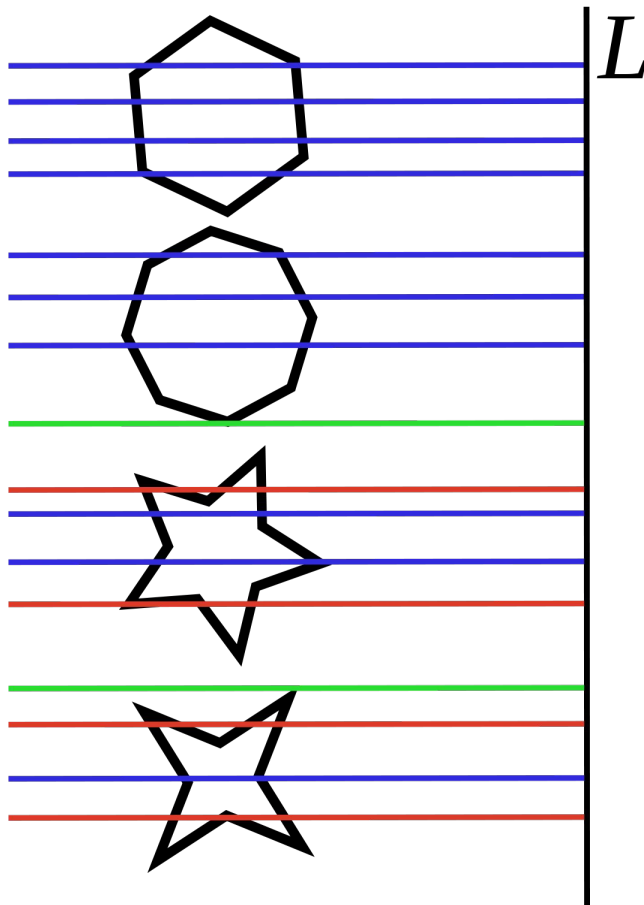
# La suite du Projet

- Implémenter les textures sphériques



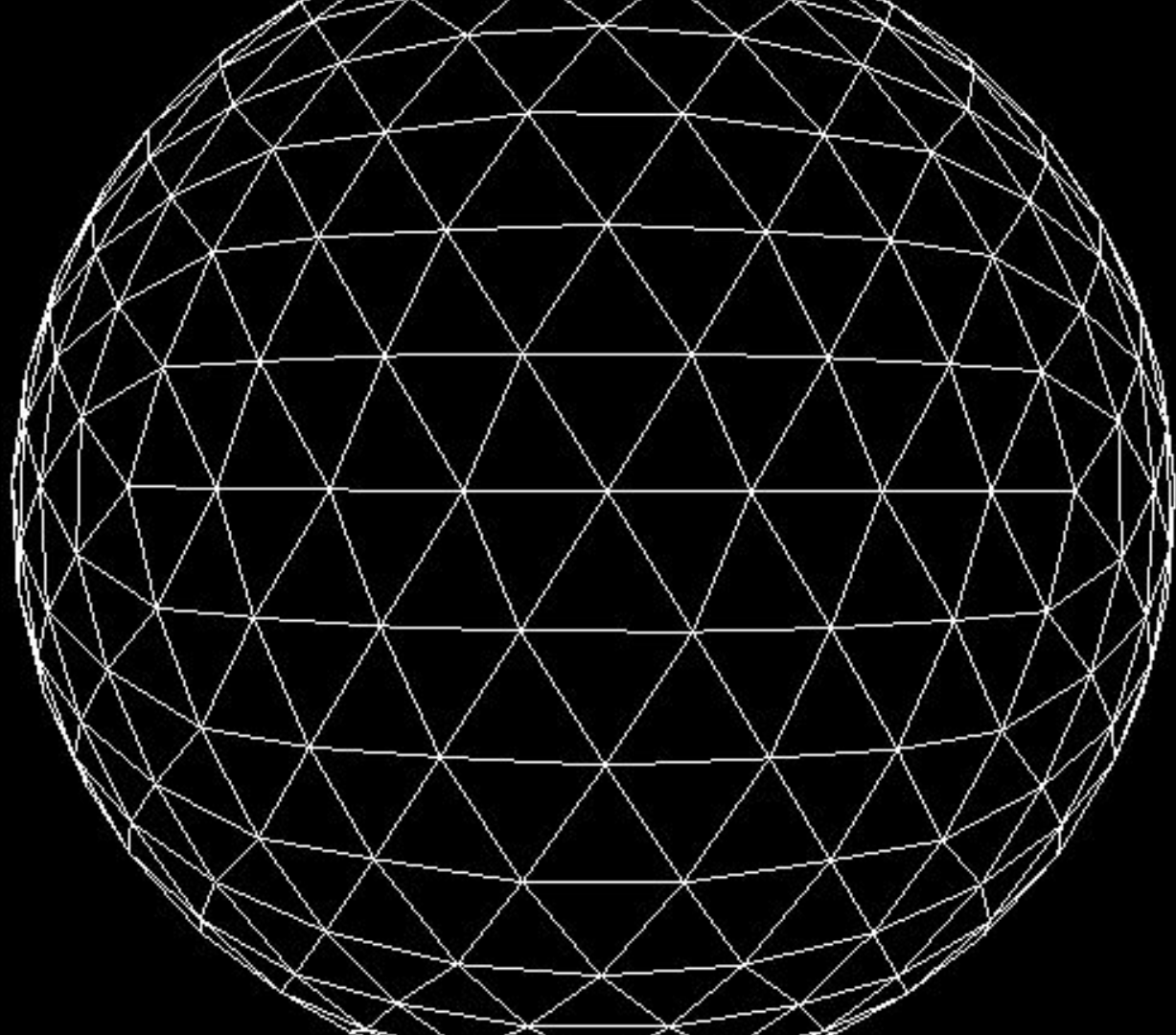
# La suite du Projet

- Gérer les polygones non-monotones



# La suite du Projet

- Gérer des formes tridimensionnelles plus complexes



# La suite du Projet

- Illumination globale

