

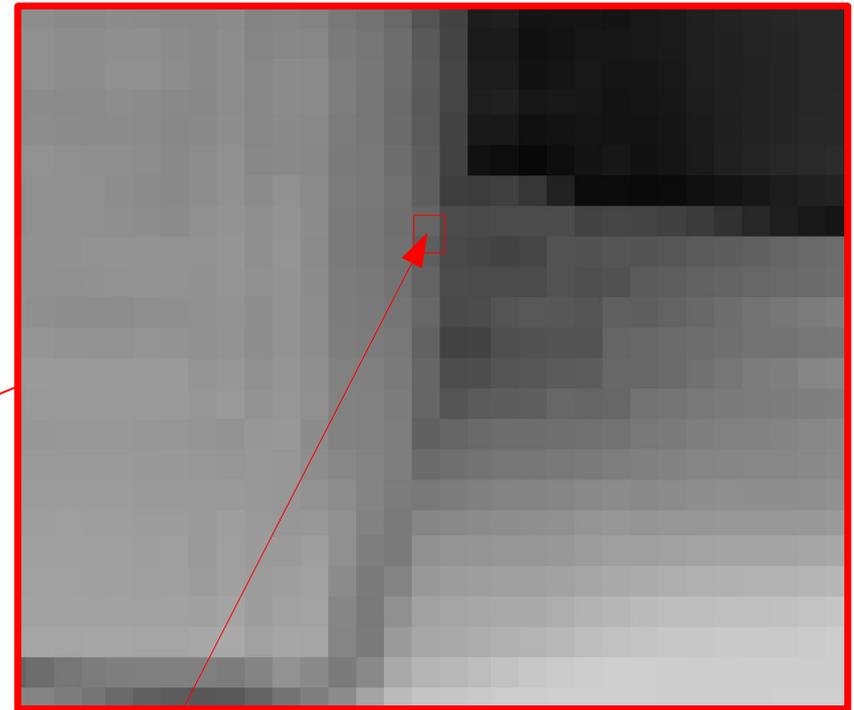
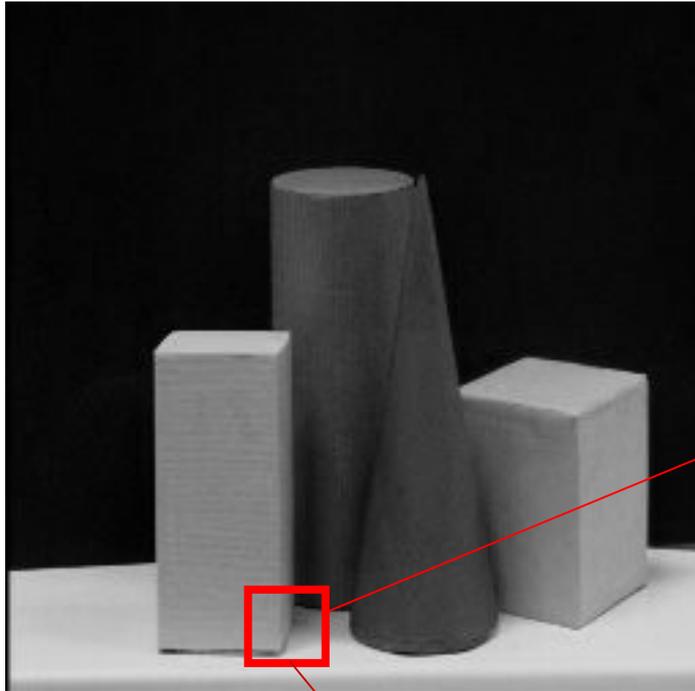
Qu'est ce qu'une image numérique ?



ENSICAEN & Université de Caen & CNRS

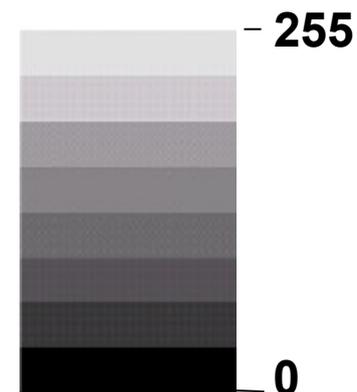


Image numérique



Pixel (PICture ELement)

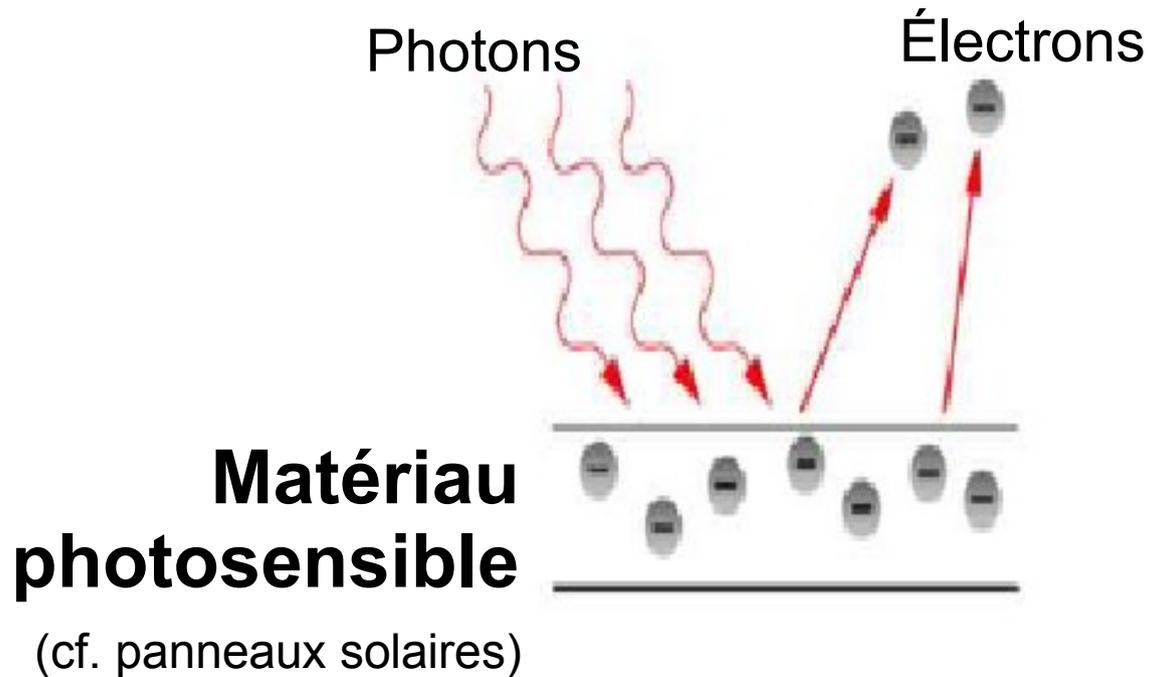
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124	121	114	99	76	75	67	70	76
125	123	117	103	74	76	75	76	83
127	124	120	98	66	67	84	88	87
129	128	122	102	77	78	79	82	83
130	129	125	102	85	91	85	87	91
123	119	113	94	73	70	71	73	67
127	121	114	99	76	75	67	73	75
130	123	117	103	74	76	77	75	81
127	124	120	98	66	67	84	88	85
125	128	122	102	77	78	89	87	87



Formation des images

L'effet photo-électrique (A. Einstein, Prix Nobel 1921)

La quantité d'électrons
est proportionnelle
à la quantité de photons

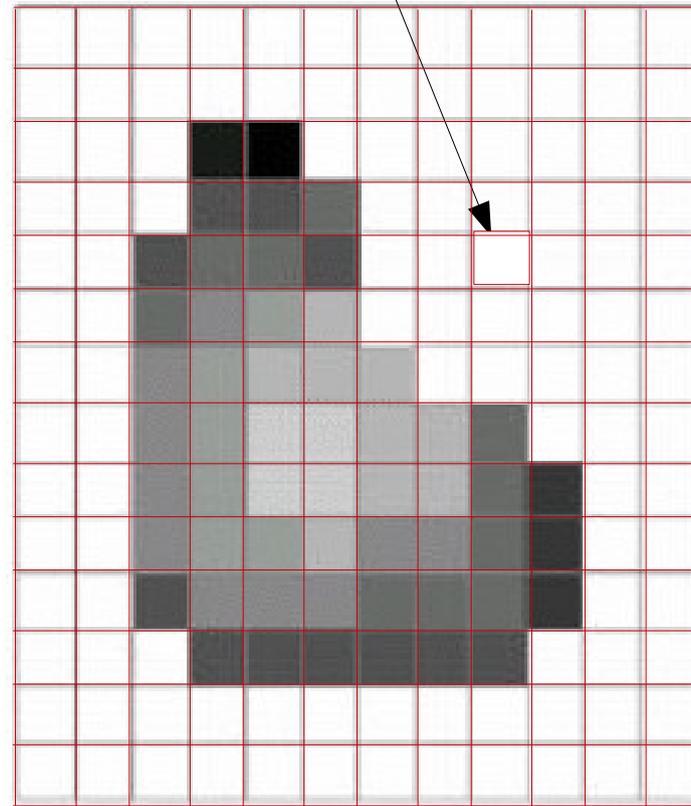
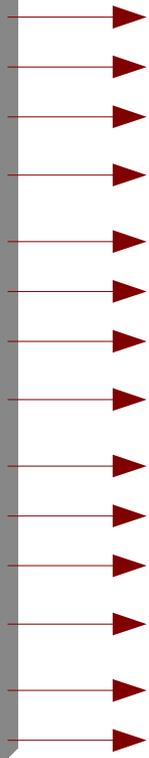
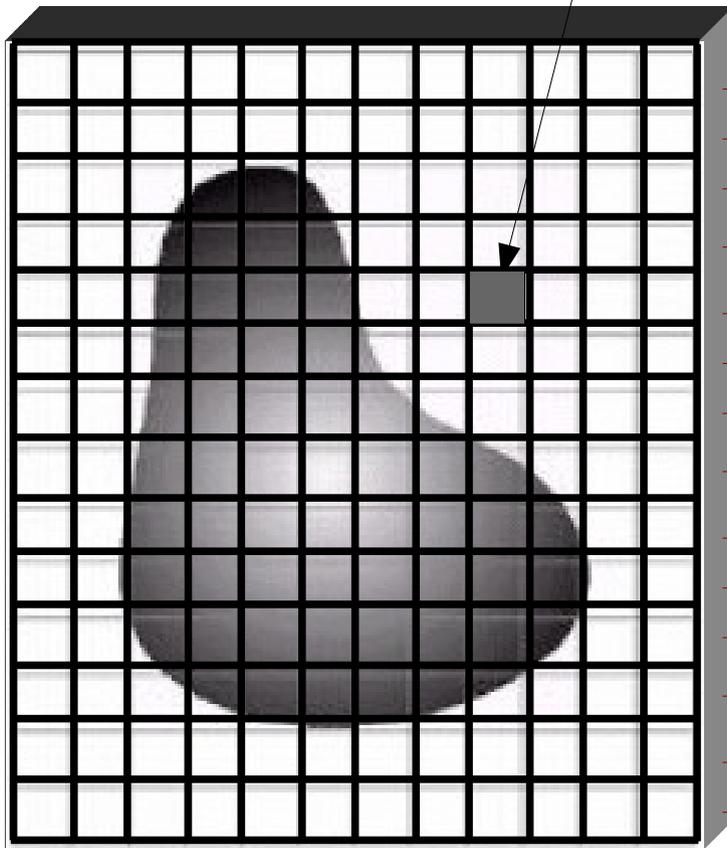


Numérisation

Photosite
(Matériau photosensible)

Pixel

Échantillonnage
Quantification



Capteur

Image numérique

Échantillonnage

Nombre de pixels



10x7 pixels



38x25 pixels



150x100 pixels



600x400 pixels

Quantification

Nombre de niveaux de gris



2 niveaux
de gris



8 niveaux
de gris



32 niveaux
de gris



256 niveaux
de gris

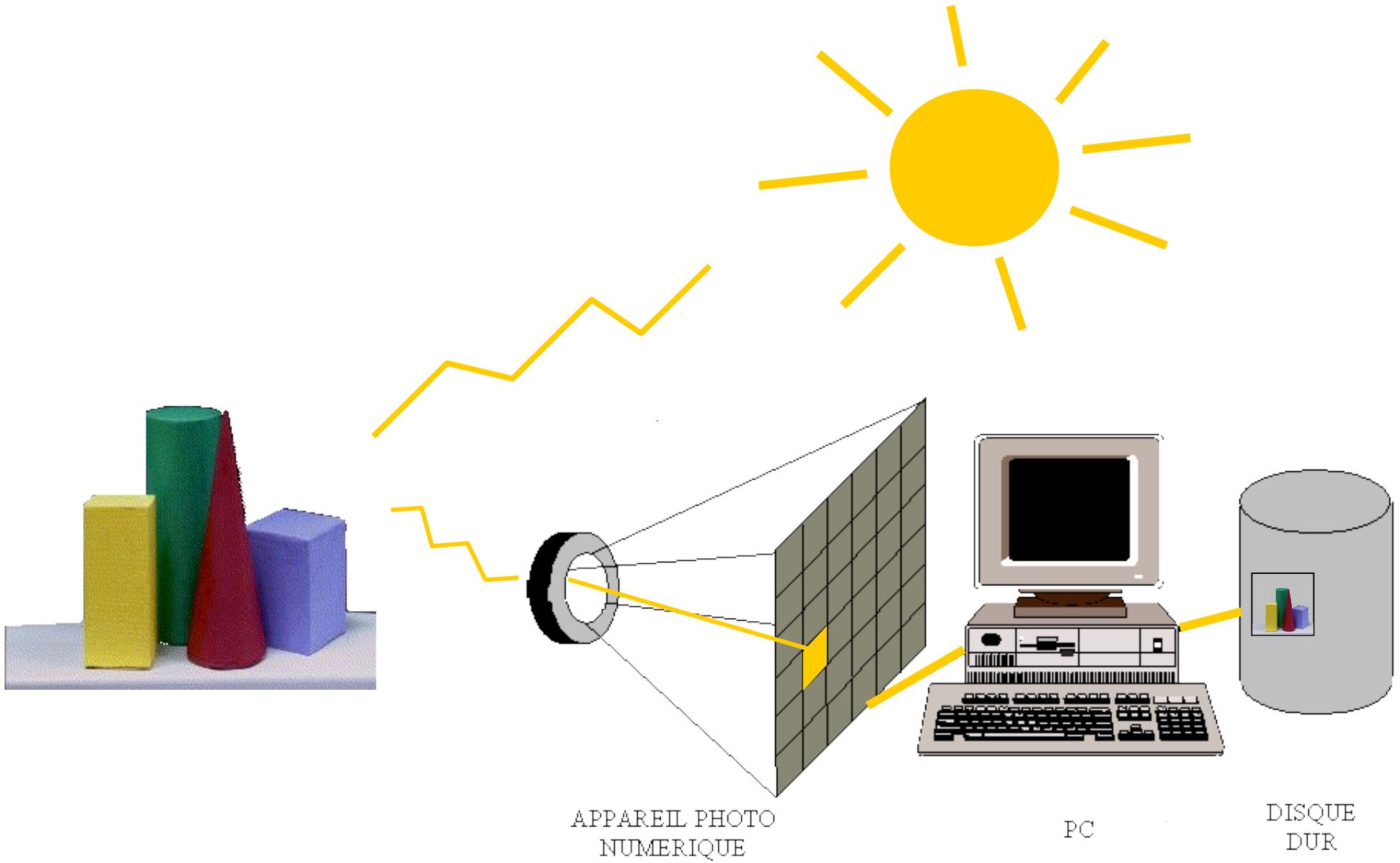


Image couleur

3 couleurs primaires

Autres couleurs

Rouge

Vert

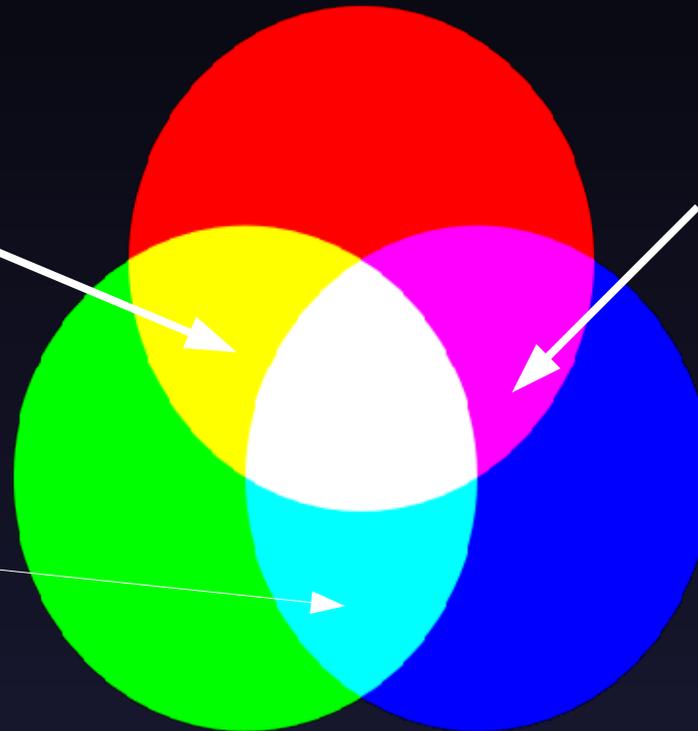
Bleu

synthèse additive

Jaune

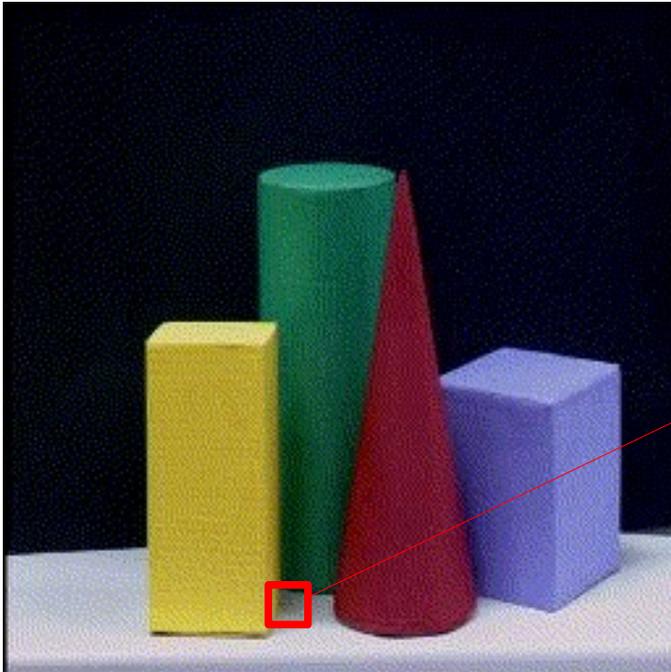
Magenta

Cyan



Trois composantes : 256 rouges x 256 verts x 256 bleus
≈ 16 millions de couleurs par

Image couleur



[x: 103 ,y: 226 ,z: 0]					
146	109	109	73	73	73
146	109	109	73	73	73
85	0	85	0	85	85
182	109	109	73	73	73
146	109	73	73	73	73
85	0	85	85	85	85
146	146	109	73	109	73
146	146	73	109	73	109
85	0	0	85	85	85
182	109	73	73	73	73
146	109	73	73	73	109
0	85	0	85	0	85
146	146	109	73	109	109
146	109	109	73	109	73
85	85	0	85	85	85
146	109	109	109	73	109
146	109	109	109	73	109
85	0	85	85	85	85

Image multispectrale

- Analyse de tableau de peinture

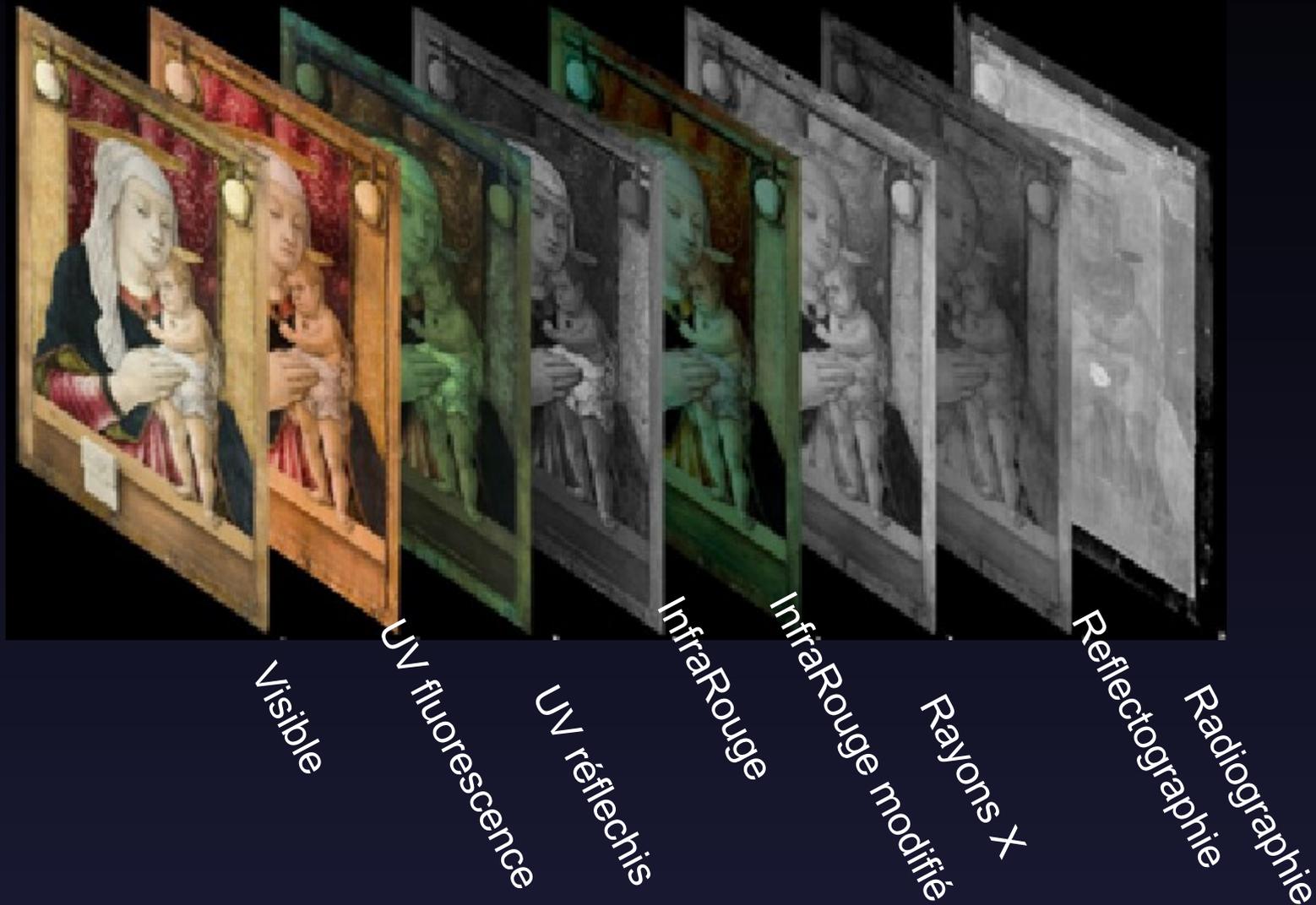
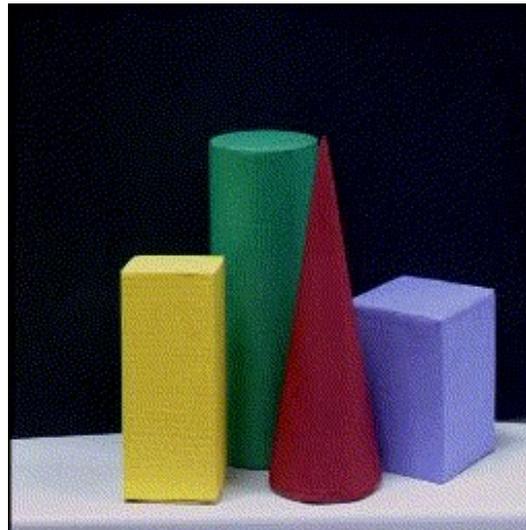
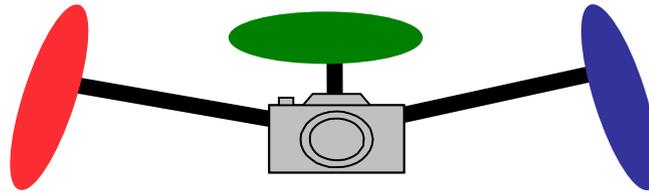
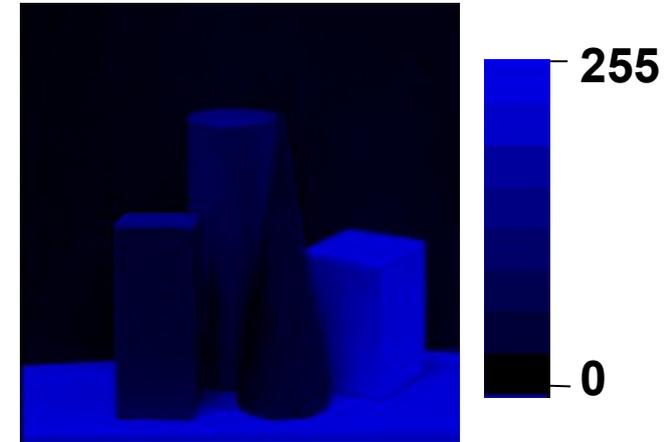
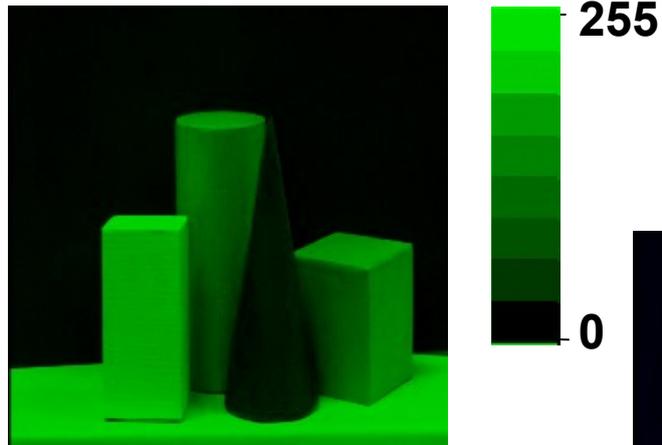
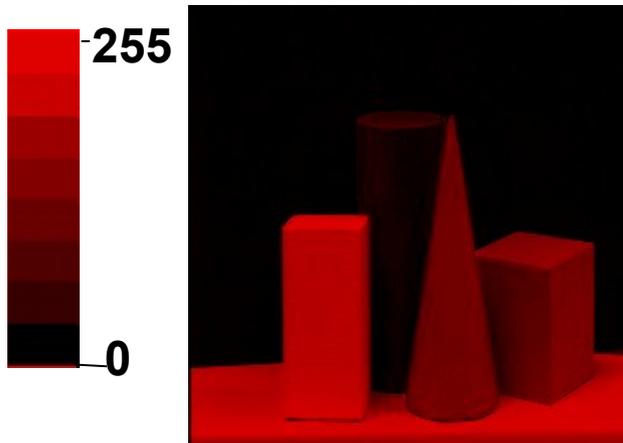
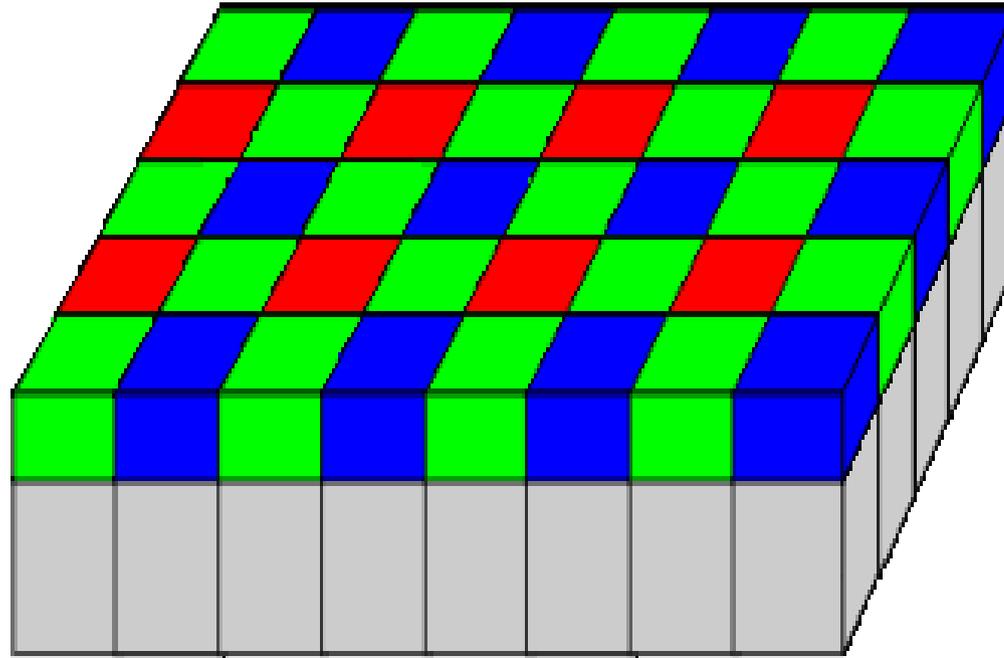


Image couleur



Capteur couleur



Matrice de Bayer

Interpolation

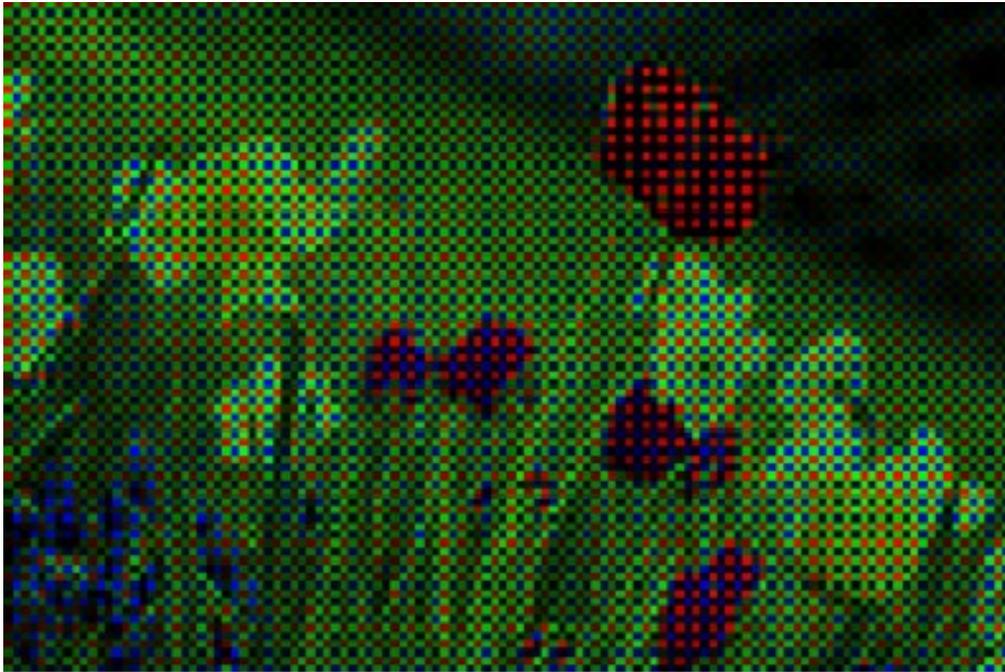
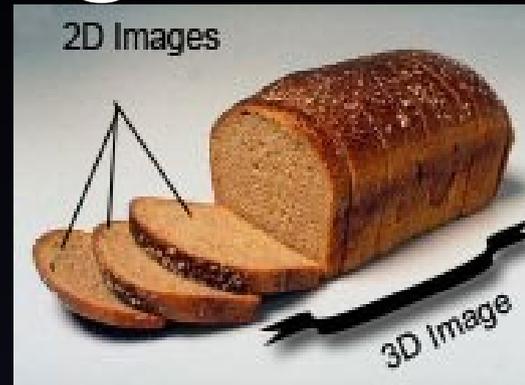


Image 3D

1 unité d'image =
voxel

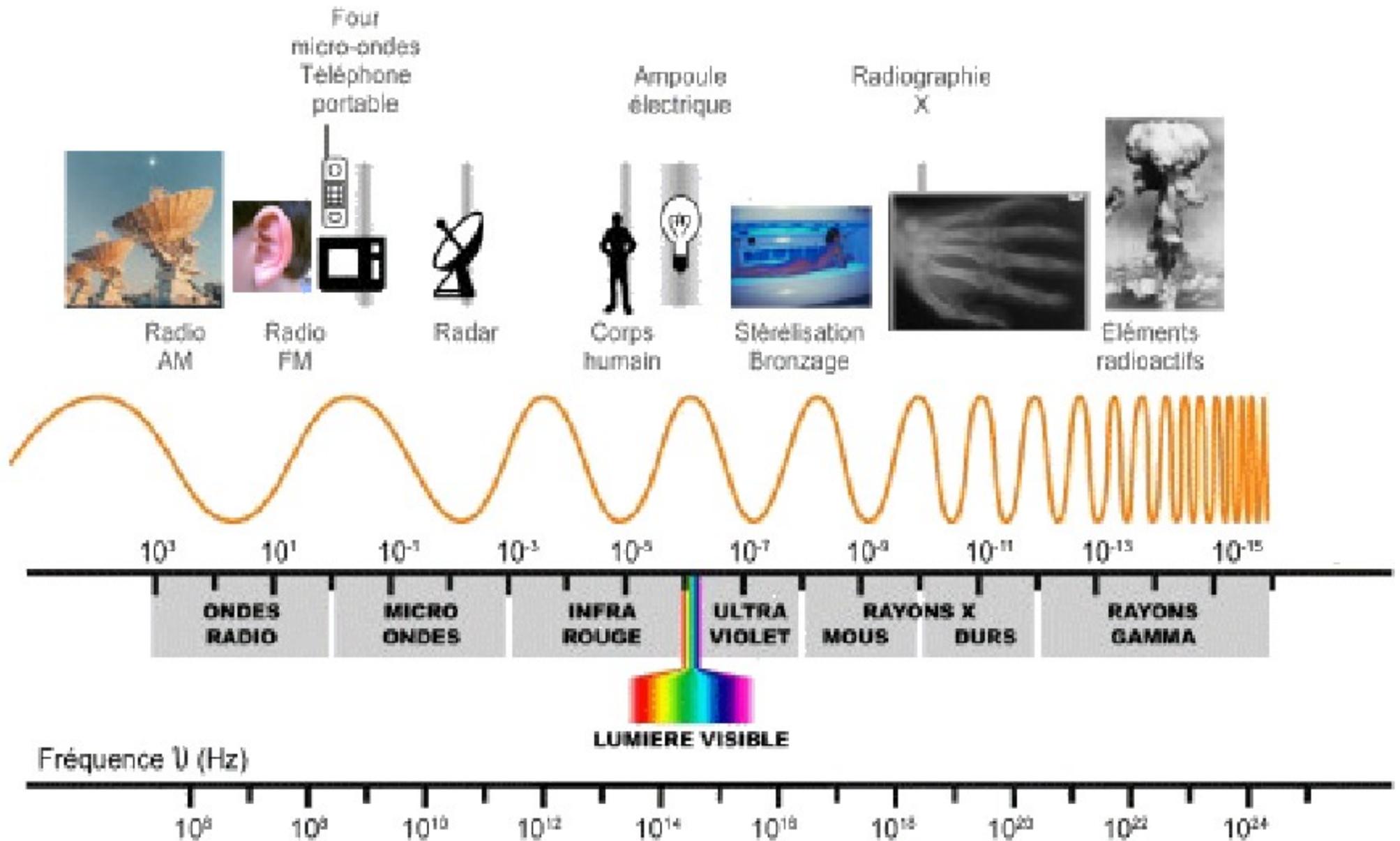


Vidéo

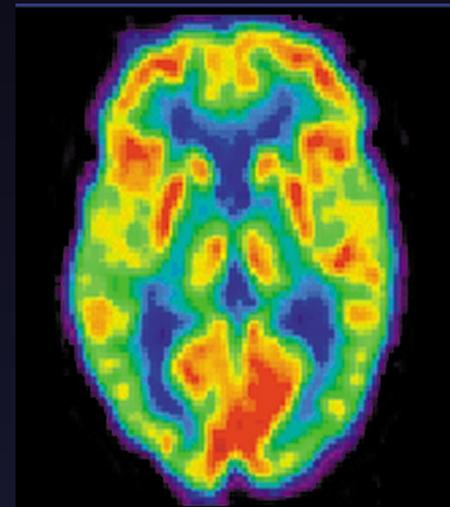
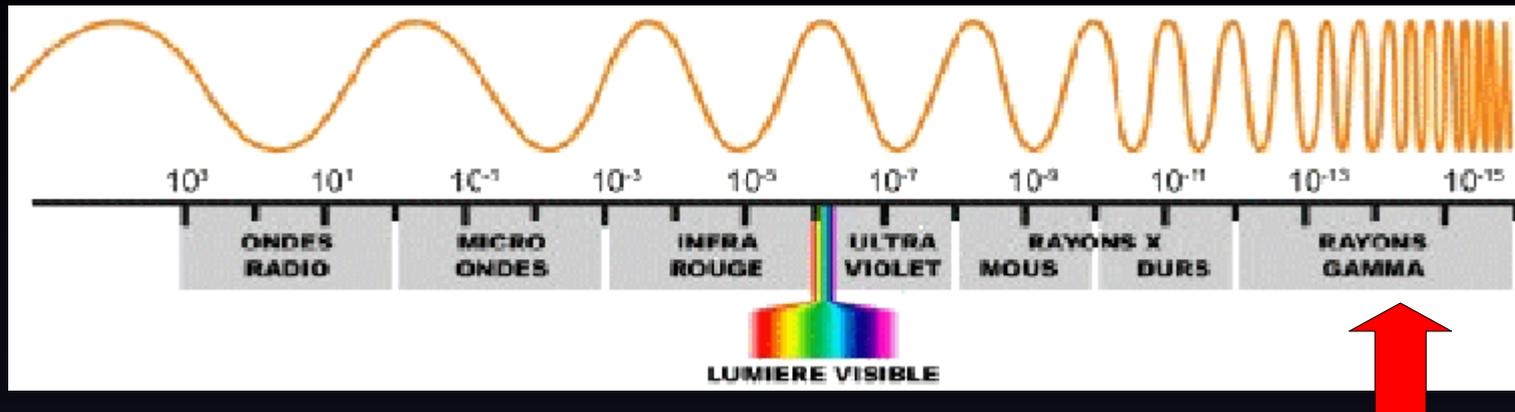
Séquence d'images cadencée (p. ex. 25 images / seconde)



Voir le monde au delà du visible

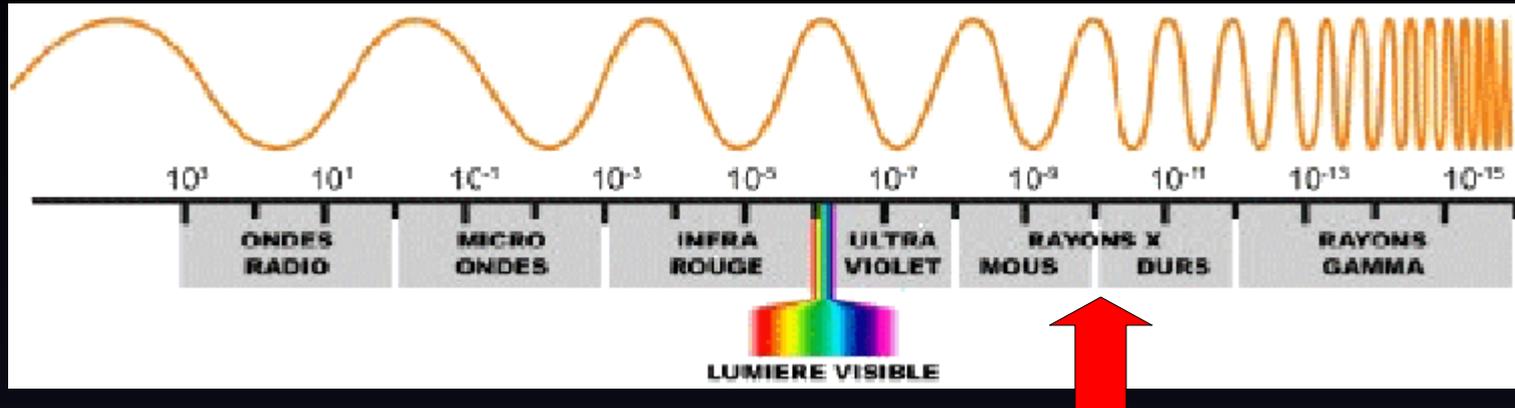


Rayons gamma



TEP – Tomographie à émission de Positrons

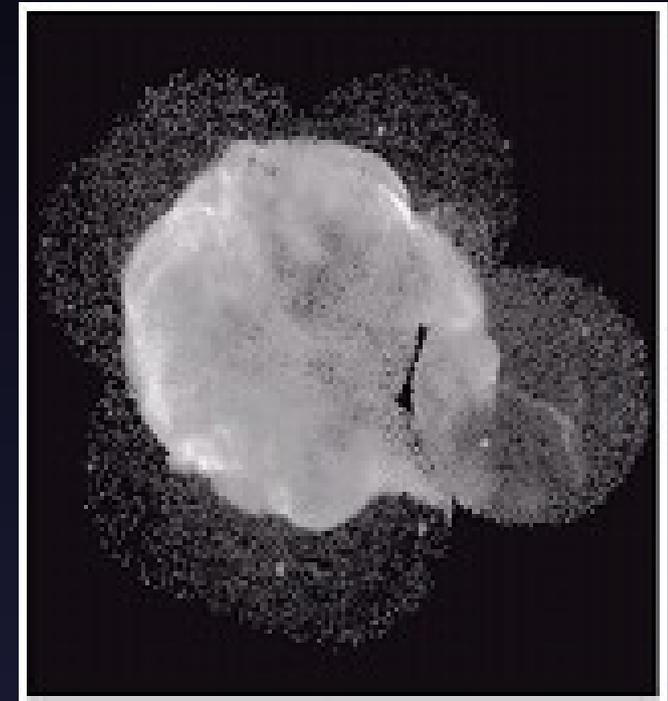
Rayons-X



Radiographie de la poitrine

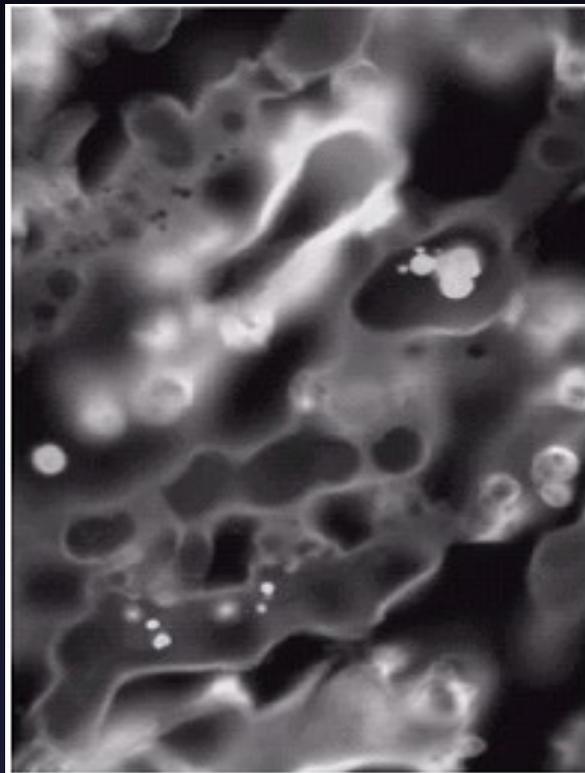
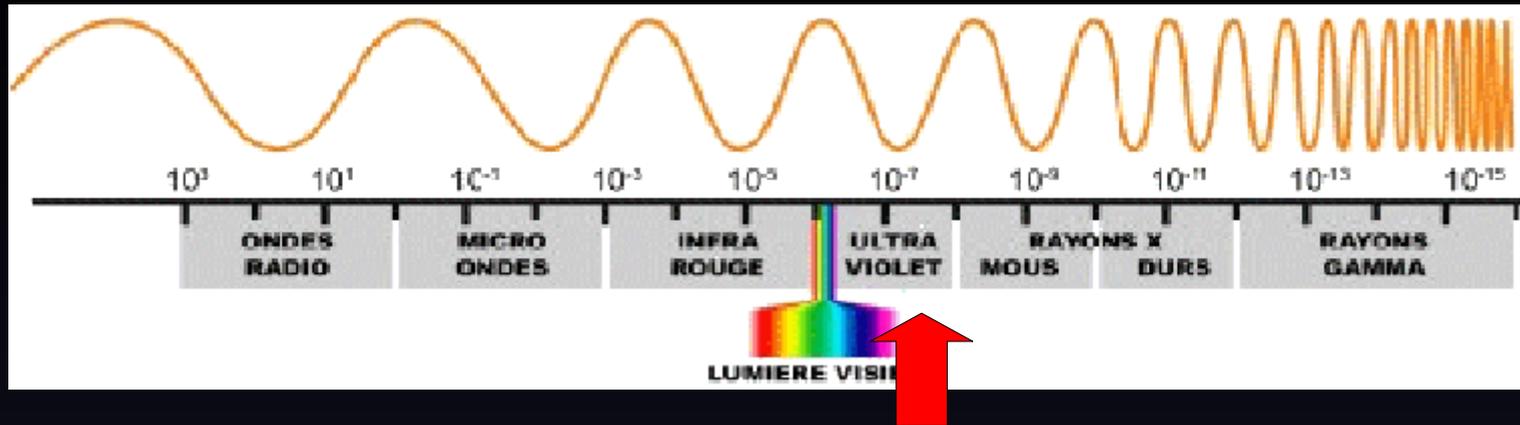


Contrôle de bagage aux aéroports



Explosion d'étoile

Ultraviolet

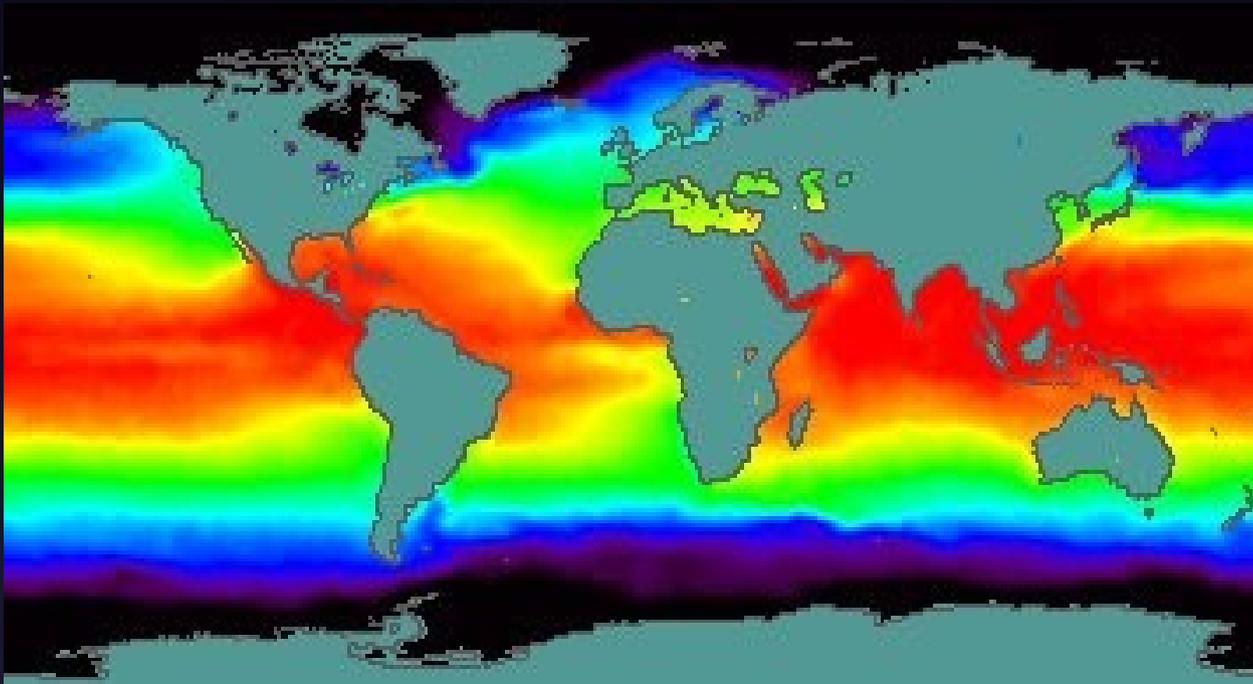
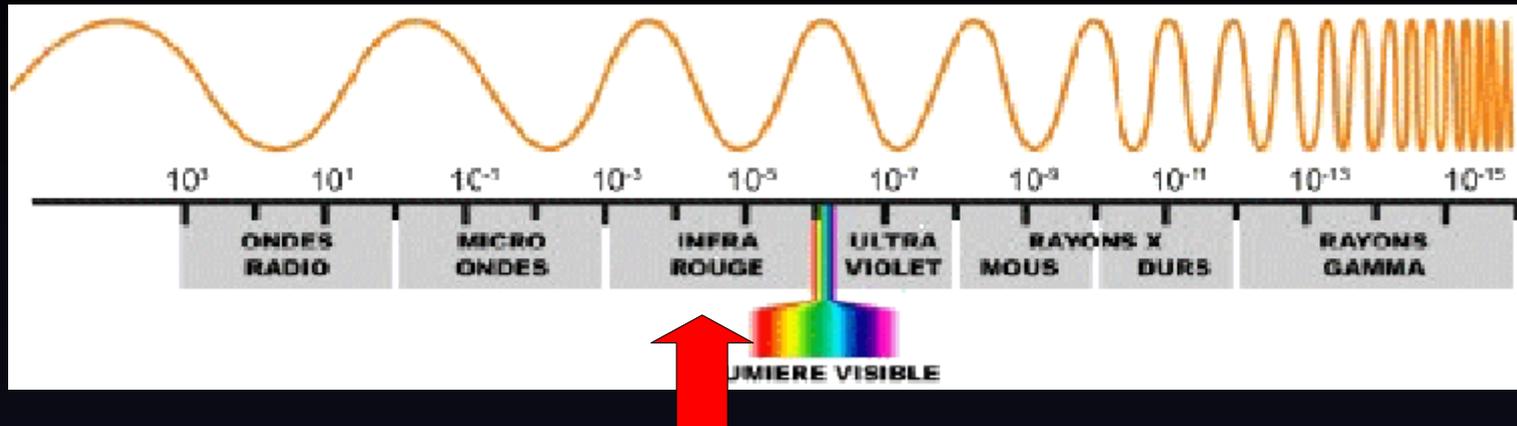


Maïs normal



Maïs contaminé par le charbon

Infrarouge



Température des océans



Température corporelle

Ultrasons

Échographie
embryon



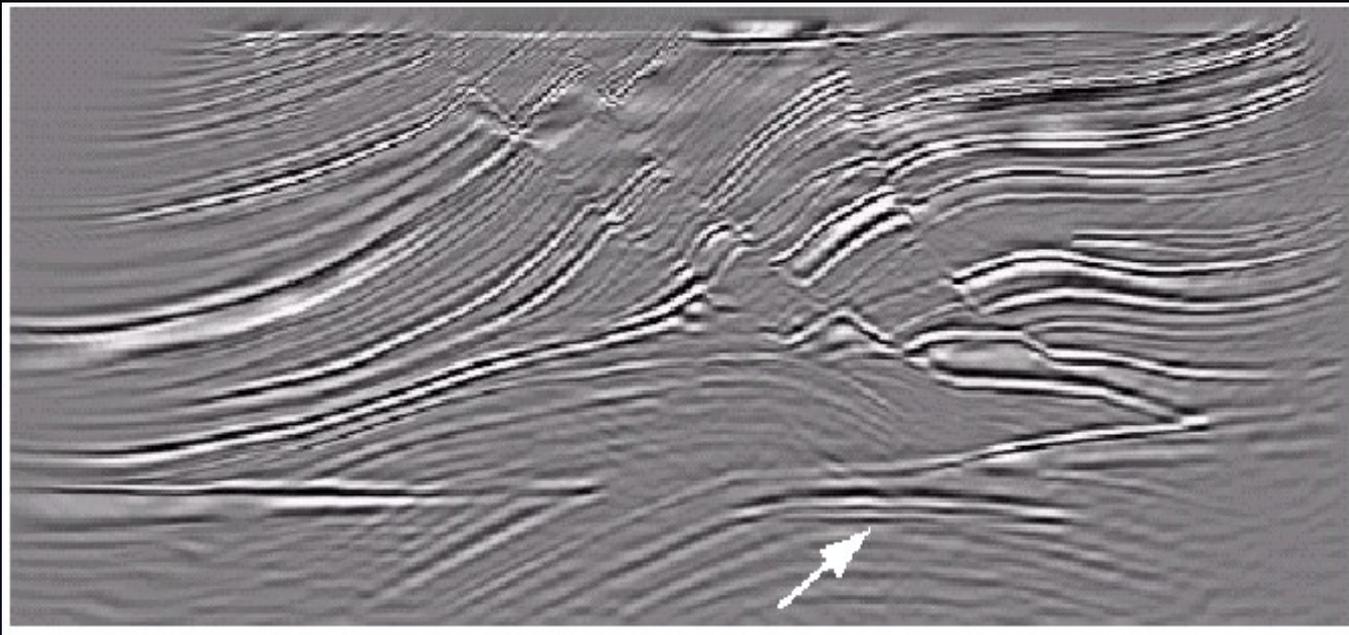
Embryon

Thyroïde



Muscle

Son

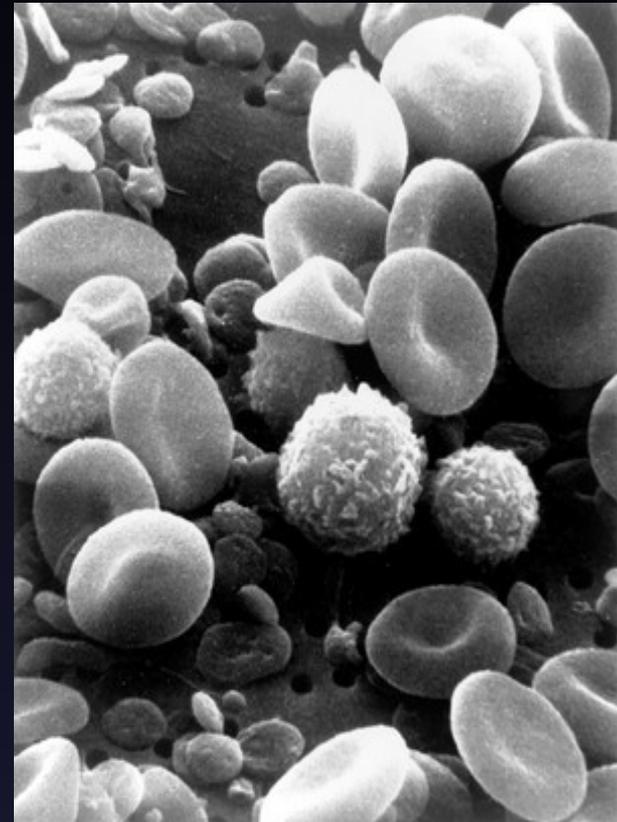


La flèche pointe vers une couche supposée d'hydrocarbure (gaz ou pétrole)

Électronique



Pou



Sang humain