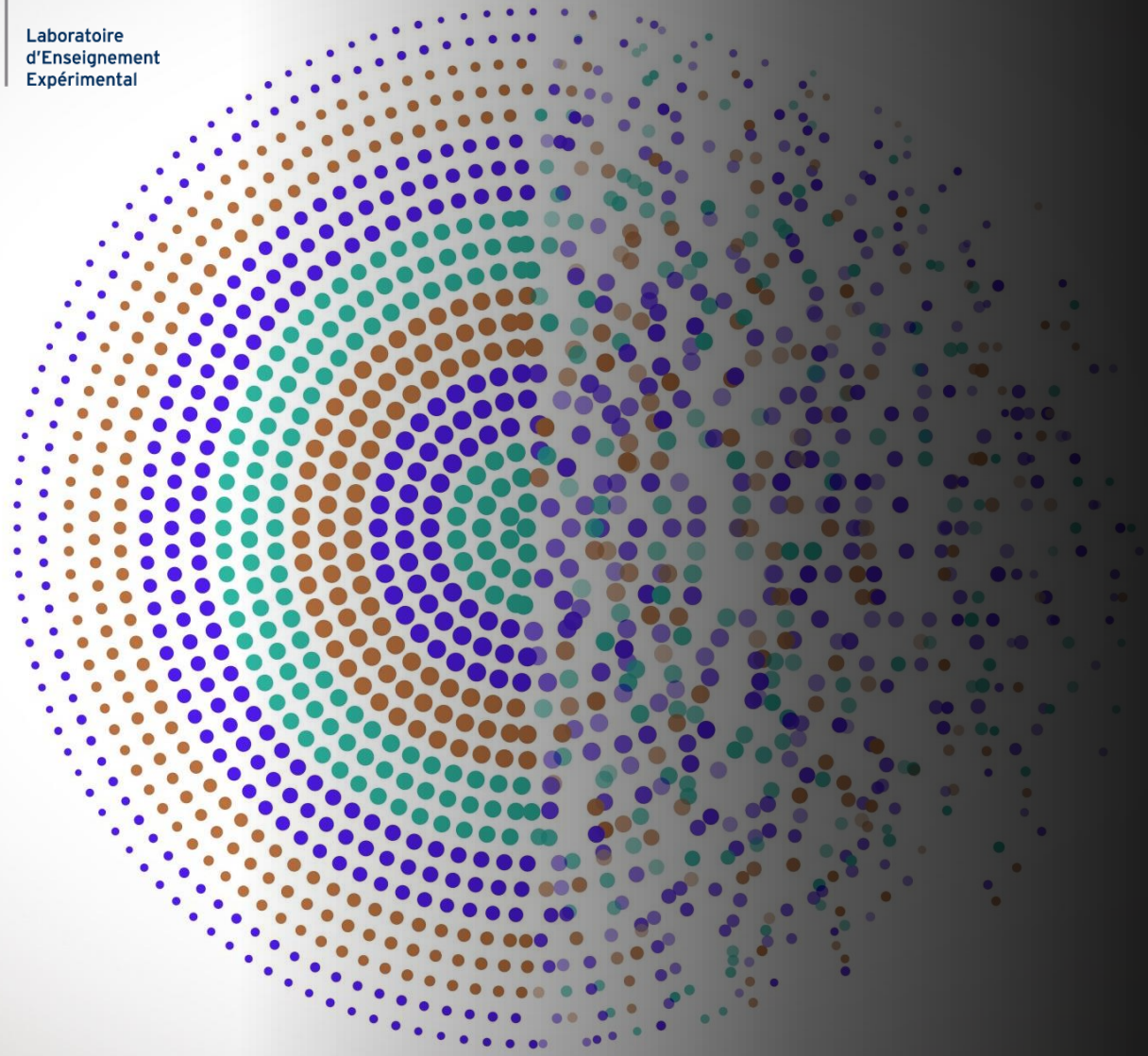
INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech | LEnsE Laboratoire d'Enseignement Expérimental

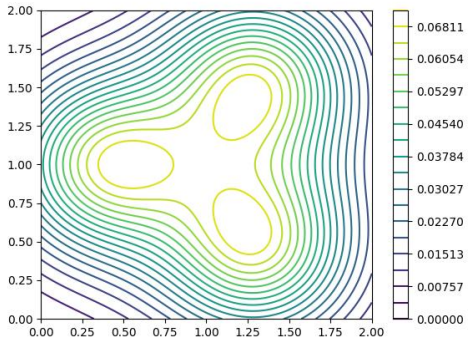


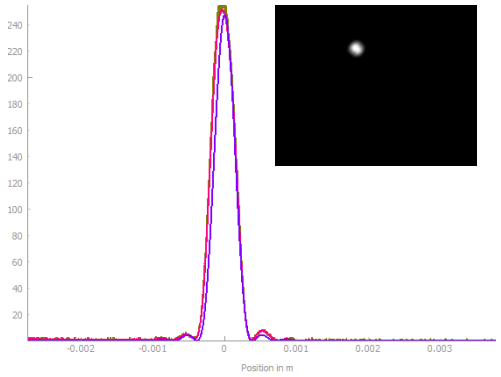
ONIP-2 / FISA

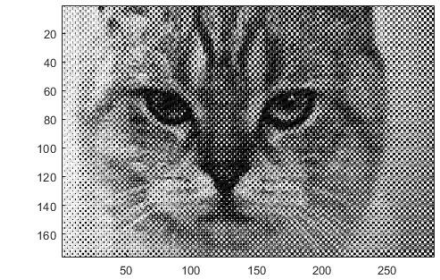
Prog Objet Diffraction Filtrage

Outils Numériques / Semestre 6 / Institut d'Optique / ONIP-2

ONIP-2 / S6-FISA







Concevoir et mettre en place un **programme informatique de simulation** ou/et **de traitement de données** (sous Python) dans un ***contexte scientifique***.

3 séquences

- Programmation Objet
- Filtrage
- Diffraction

Durée : 18h = 9 séances de 2h

Forme des apprentissages :

Approche projet / problème

En lien avec les TP de diffraction et de détramage

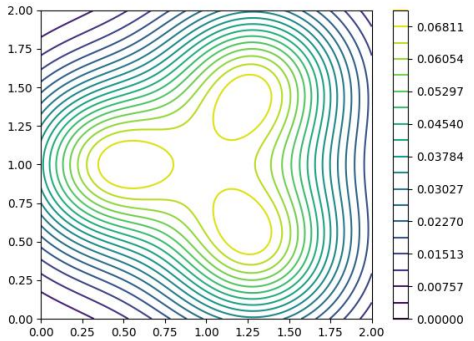
Travail en binômes sur machine

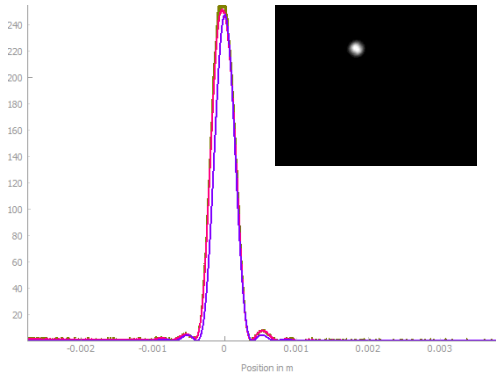
Evaluations :

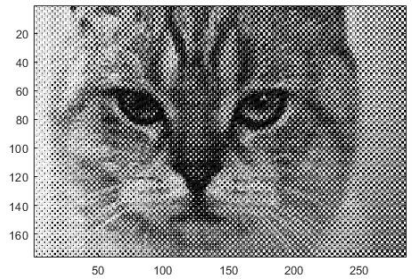
Compte-rendu de TP

Participation / Programmation

ONIP-2 / Déroulement







TP1 - Diffraction

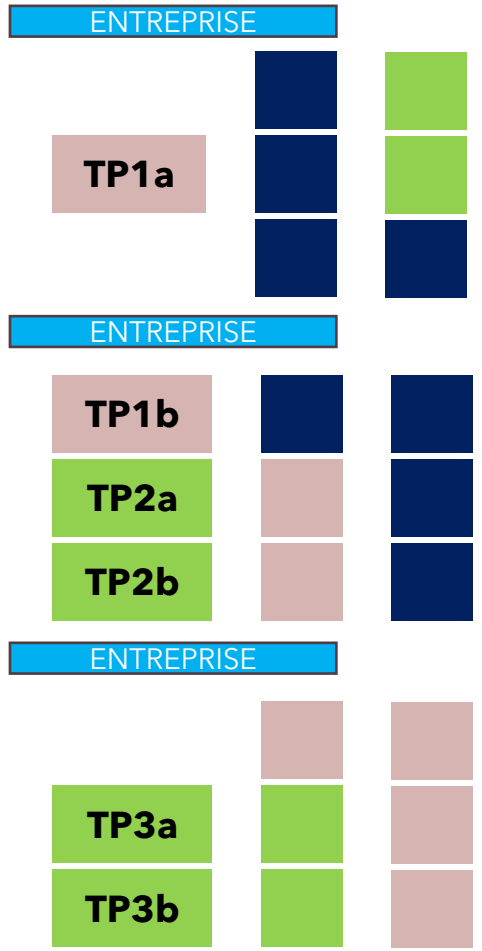
TP2/3 – Filtrage Détramage

3 séquences

Programmation Objet

Filtrage

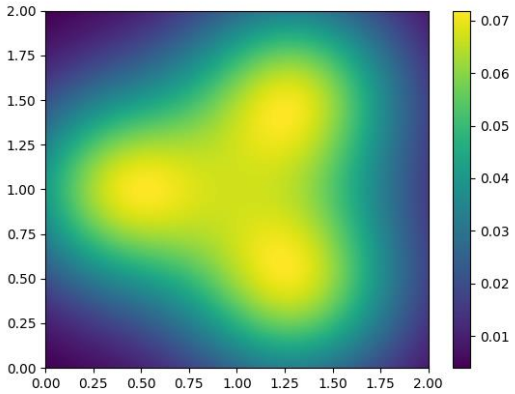
Diffraction

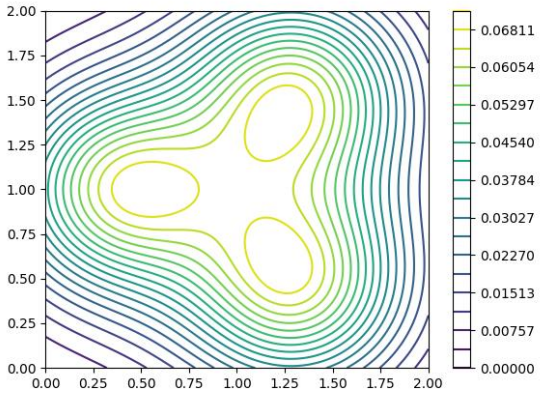


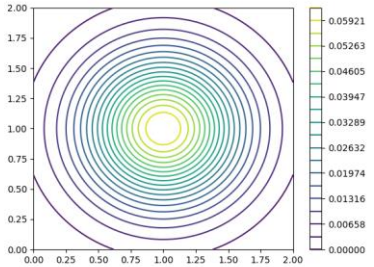
ONIP-2 / Mini-projet – Programmation Objet

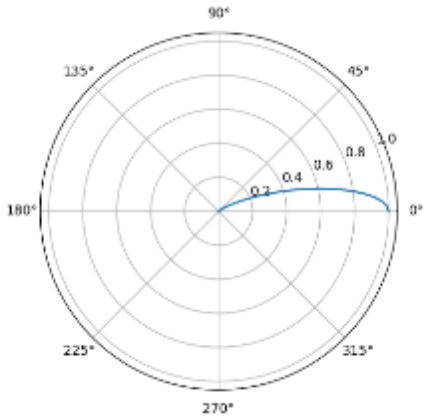
Programmation Objet | 4 séances

Carte d'éclairement de sources incohérentes









Source caractérisée par leur indicatrice de rayonnement

$$I(\alpha) = I_0 \cdot \exp(-(4 \cdot \ln(2)) \cdot (\alpha/\Delta)^2)$$

Eclairement d'une source ponctuelle donnée par la formule de Bouguer

$$E = \frac{I \cdot \cos(\psi)}{d^2}$$

ENTREPRISE

TP1a

ENTREPRISE

TP1b

TP2a

TP2b

ENTREPRISE

TP3a

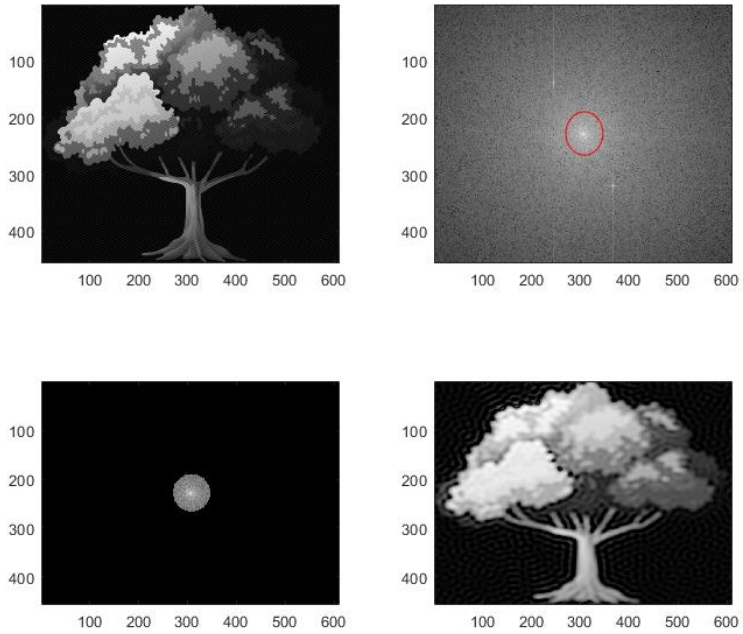
TP3b

Code commenté
Validation des simulations
Figures pertinentes

ONIP-2 / Détramage et filtrage (TP)

Filtrage | 2 séances

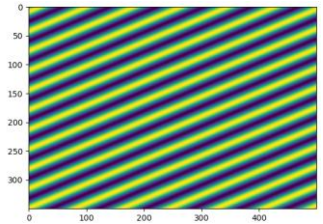
Simulation des expériences de détramage / filtrage



Génération de trames

Calcul de FFT sur des images

Détramage / Filtrage



ENTREPRISE

TP1a

ENTREPRISE

TP1b

TP2a

TP2b

ENTREPRISE

TP3a

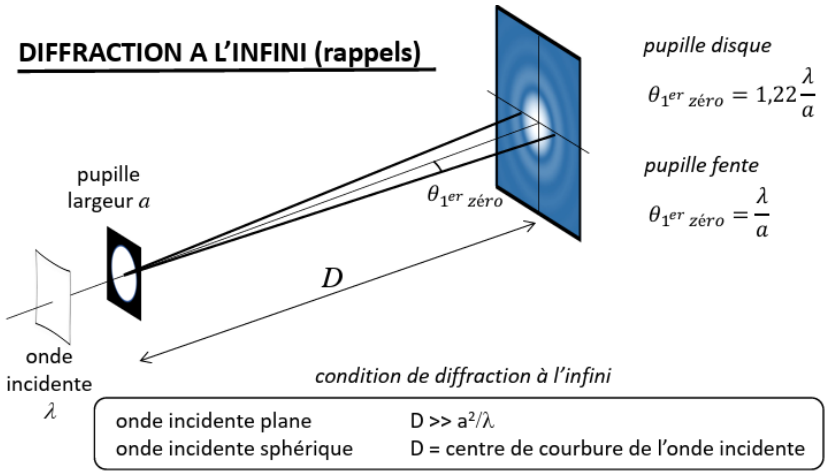
TP3b

Démarche scientifique
Figures pertinentes
Analyse des phénomènes

ONIP-2 / Diffraction

Diffraction | 3 séances

Analyse des images de diffraction



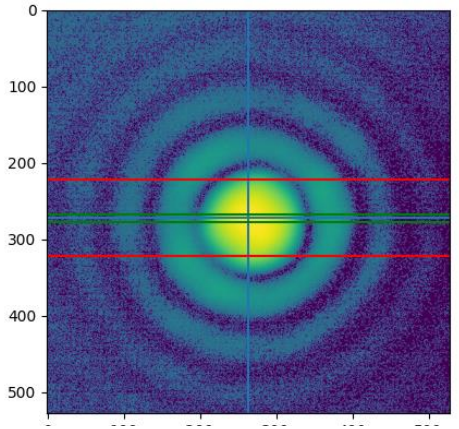
pupille disque

$$\theta_{1^{er}\ zéro} = 1{,}22\frac{\lambda}{a}$$

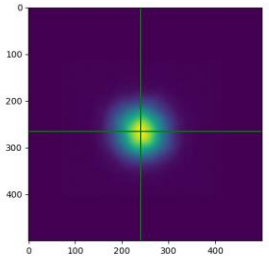
pupille fente

$$\theta_{1^{er}\ zéro} = \frac{\lambda}{a}$$

$$\mathcal{E}_{disque} = \left|\frac{J_1(\pi x)}{\pi x}\right|^2$$



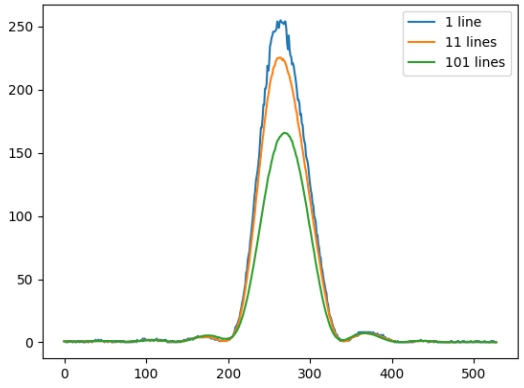
$$x = \frac{a \times sin\theta}{\lambda}$$



Coupe dans l'image (barycentre / max)

Moyennage

Modélisation (fit)



ENTREPRISE

TP1a

ENTREPRISE

TP1b

TP2a

TP2b

ENTREPRISE

TP3a

TP3b

Illustration du TP de diffraction
Codes commentés (annexe)