Diffraction optique de structures quasi-périodiques

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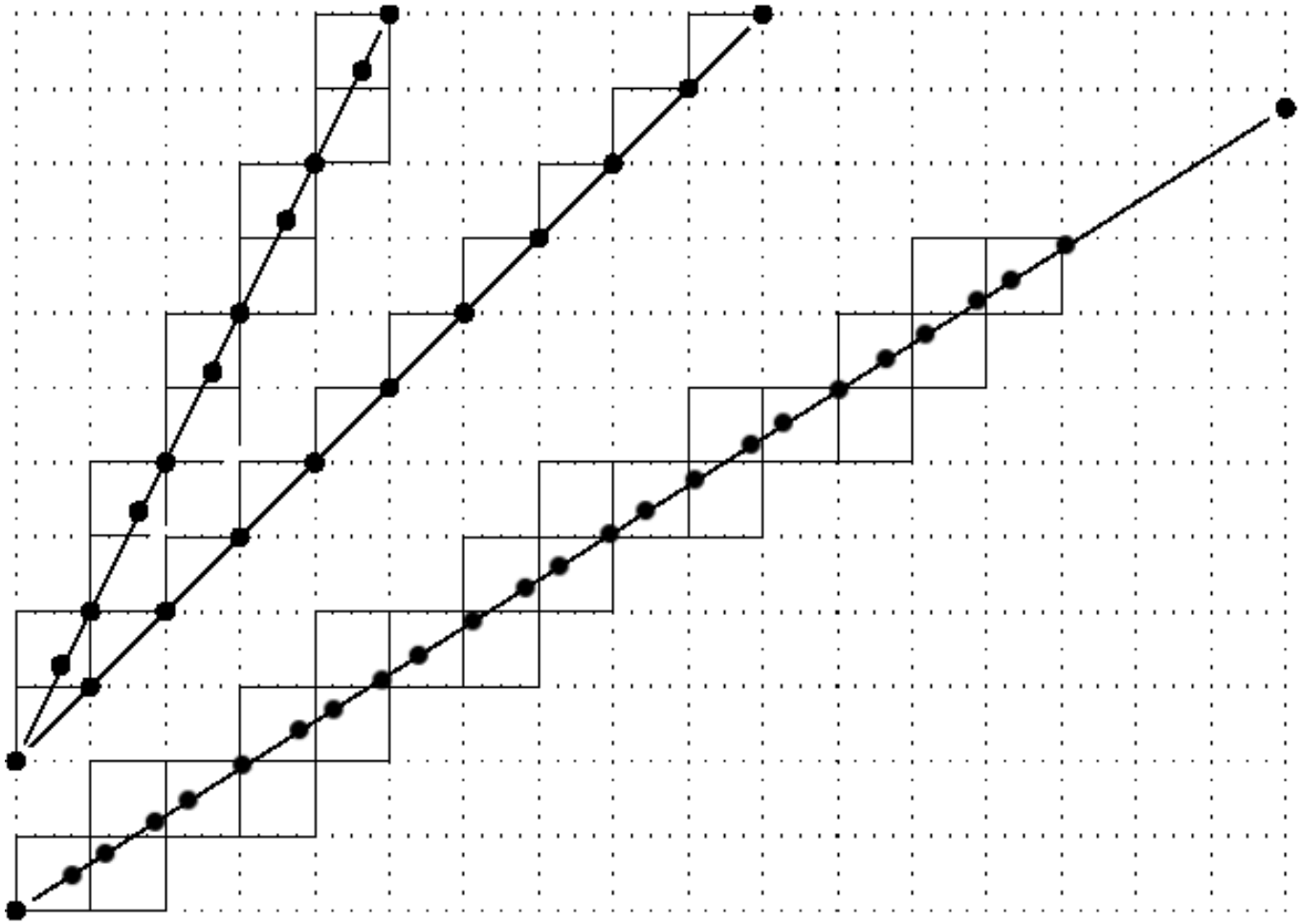
UFR de Physique
L3 MAGISTERE DE PHYSIQUE

Projet de physique expérimentale du Magistère de physique

Diffraction optique de structures quasi-périodiques

1. Structures périodiques, quasi-périodiques et apériodiques
2. Grilles au format PostScript
   - Approche
   - Grilles ayant un angle quelconque
   - Création de la page
3. Expérience
   - Qu'est-ce que la diffraction ?
   - Montage et Améliorations
   - Les grilles
   - Les mesures
4. Diffraction
   - Diffraction par des fentes équidistantes
   - Pertubation sinusoïdale, approximation des 3 tâches
   - Diffraction par des points dans un plan
   - Cas quasi-périodique

Structures périodiques, quasi-périodiques et apériodiques



Création des grilles au format PostScript®

Programme en C $\longrightarrow$ image PostScript $\longrightarrow$ kghostview

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newpath
0 1 *moveto*
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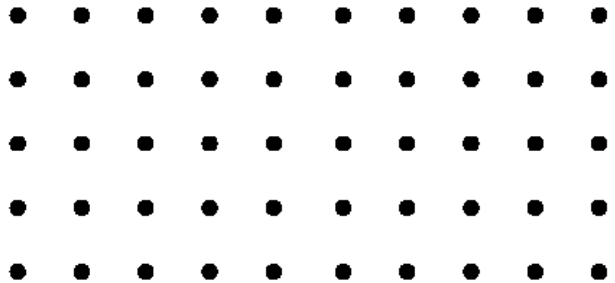

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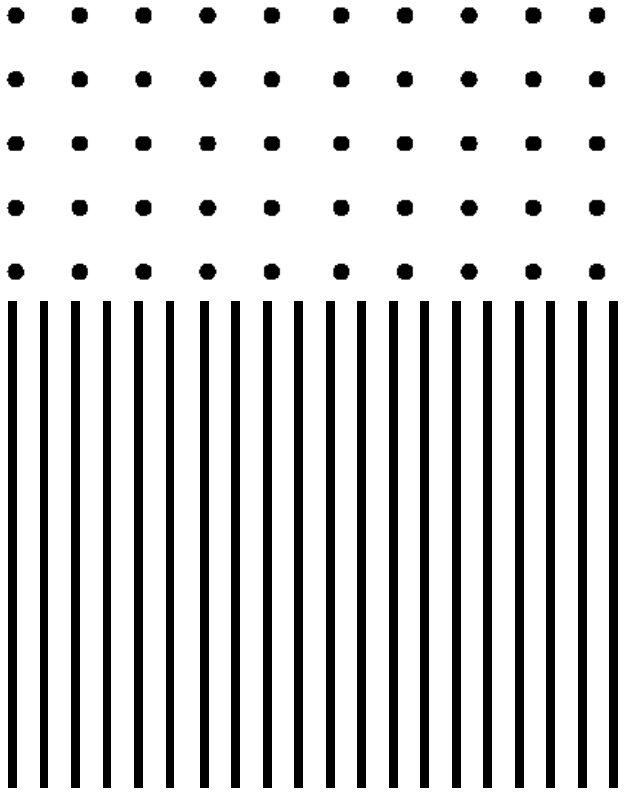
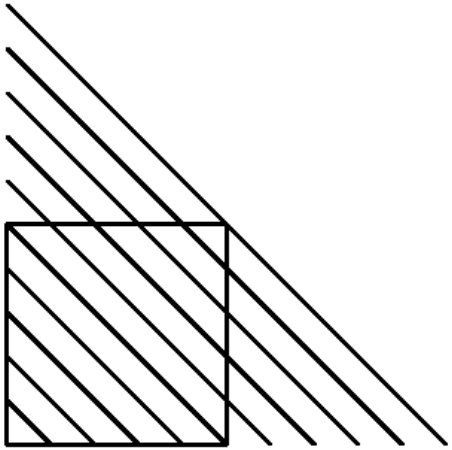
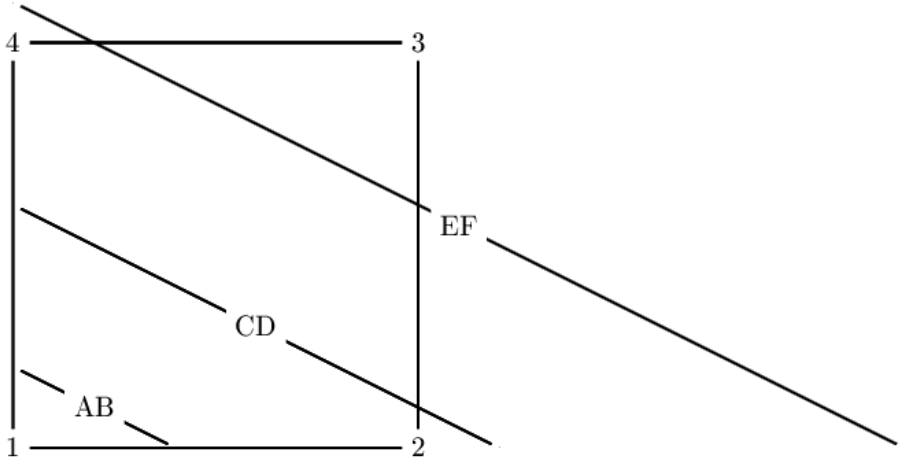
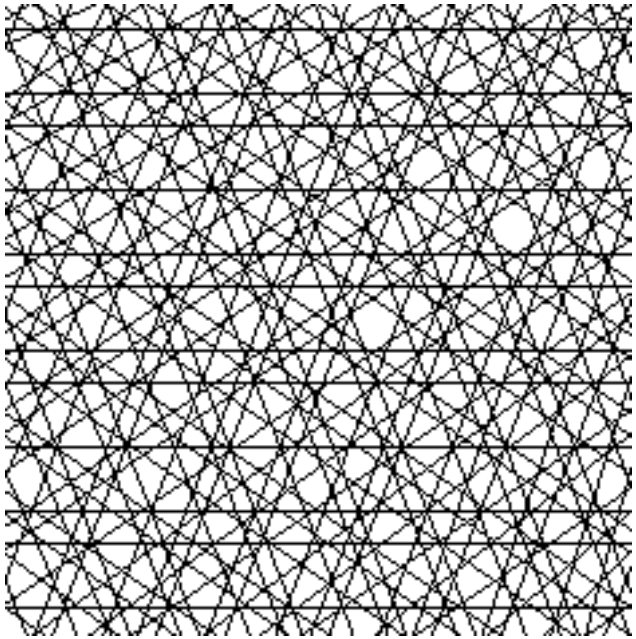


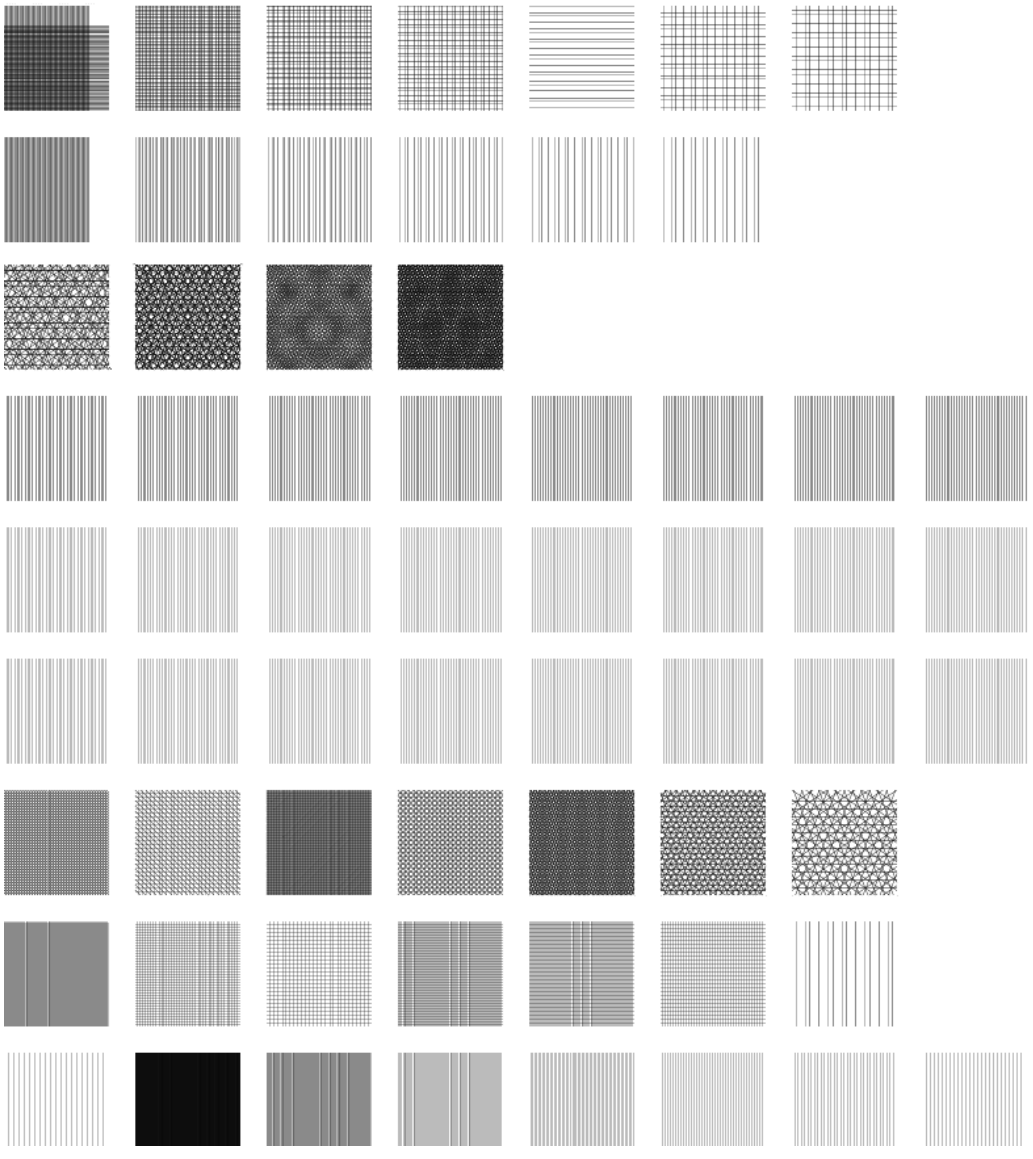
Grilles ayant un angle quelconque







La page des grilles



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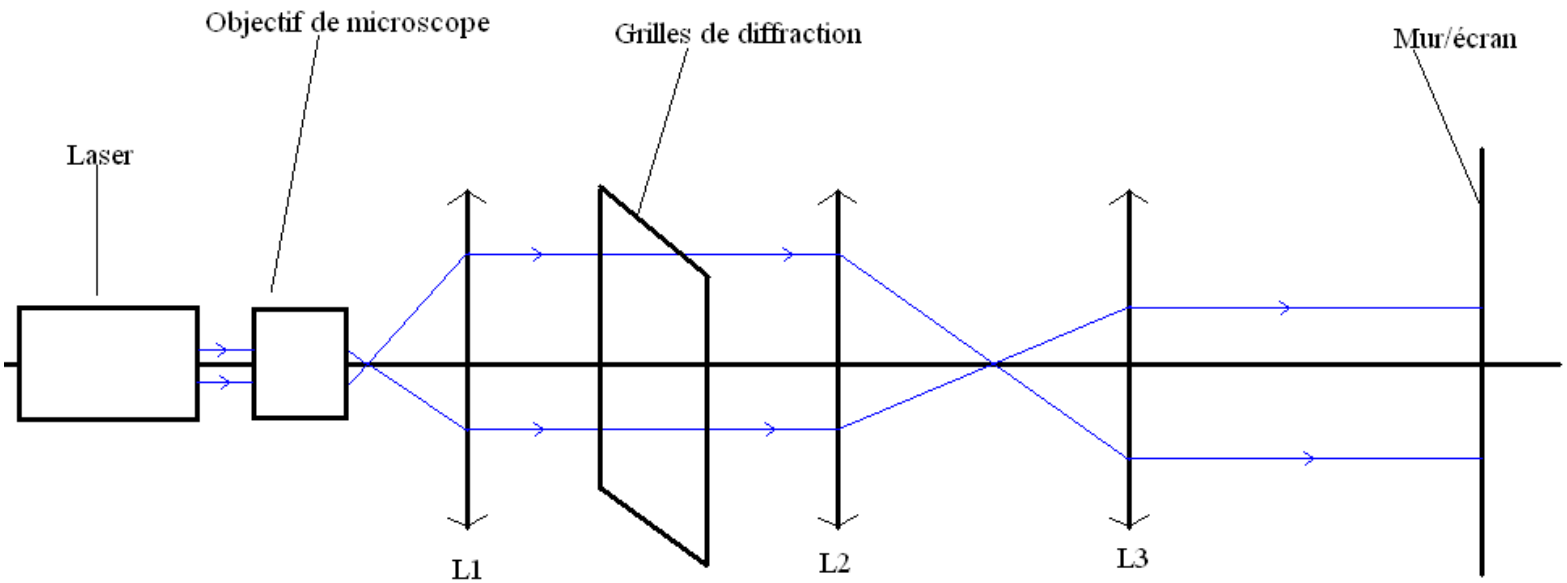
Montage expérimental



Le montage en lui-même

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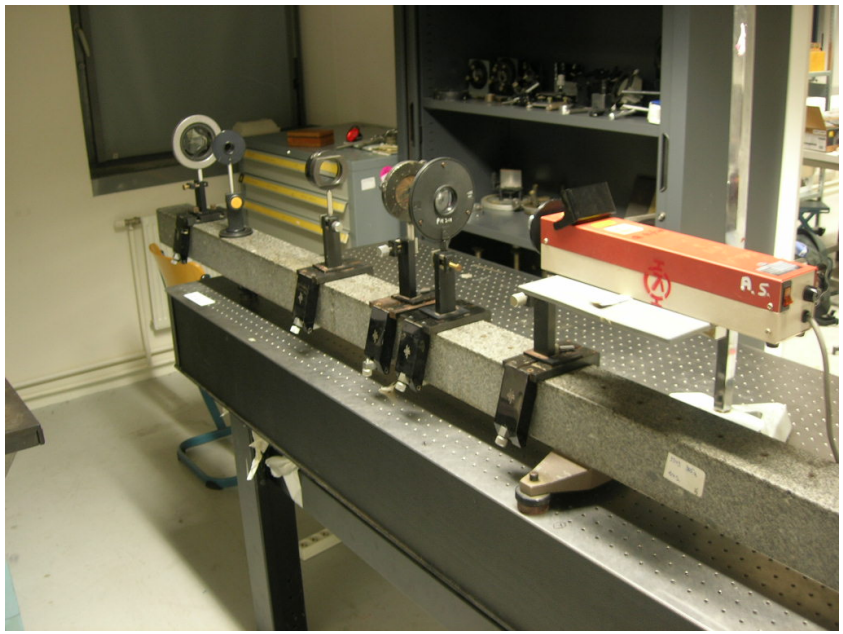

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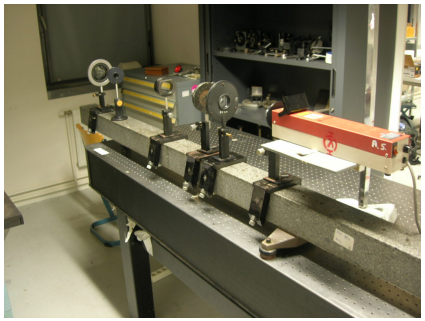
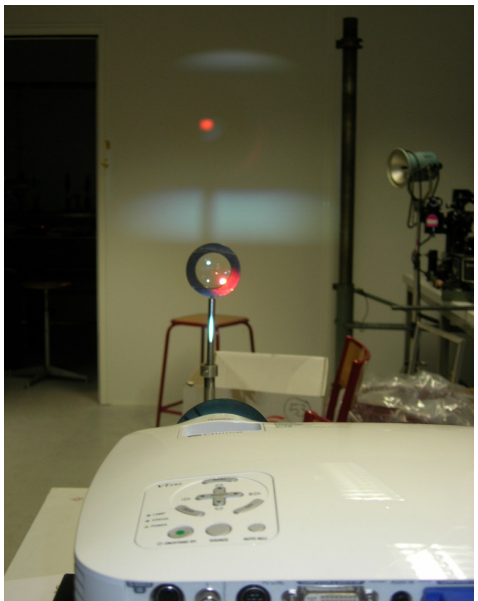
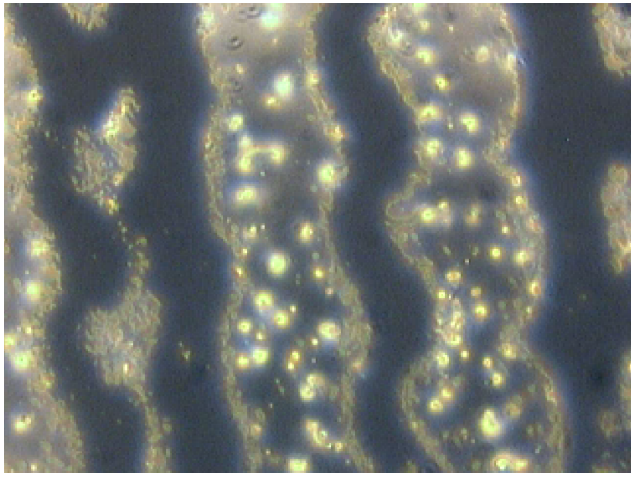


Améliorations apportées



Les grilles

Imprimante classique



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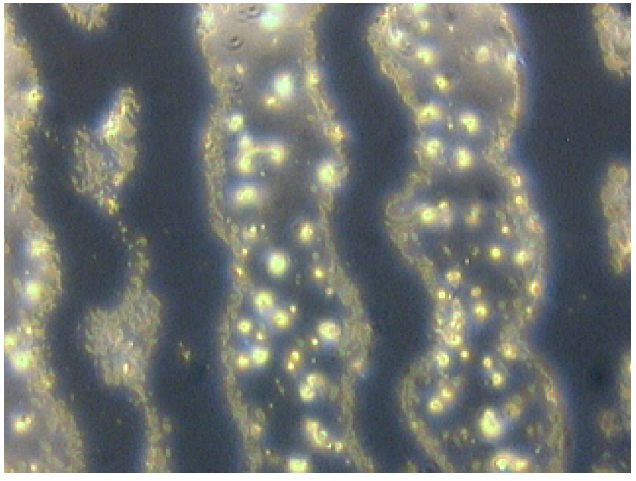
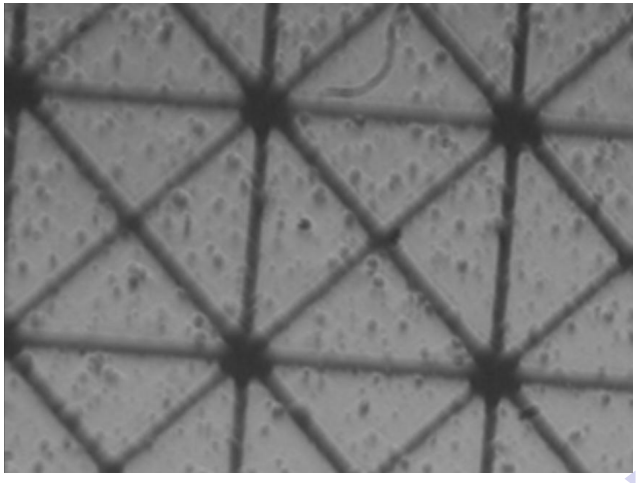
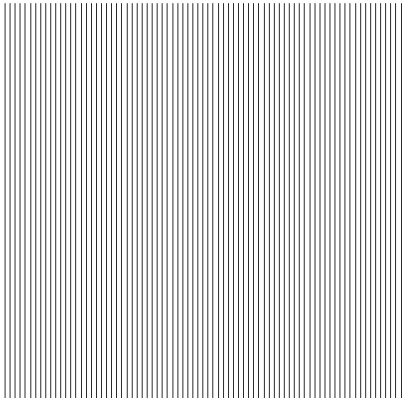
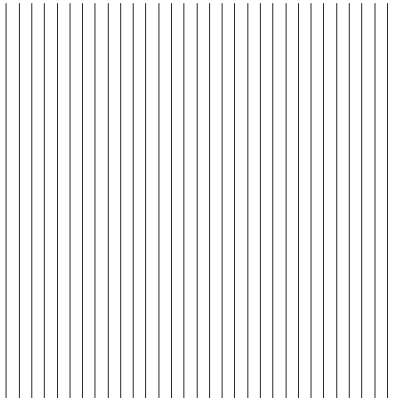


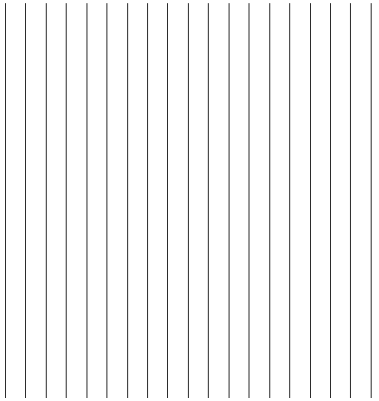
Imprimante professionnelle

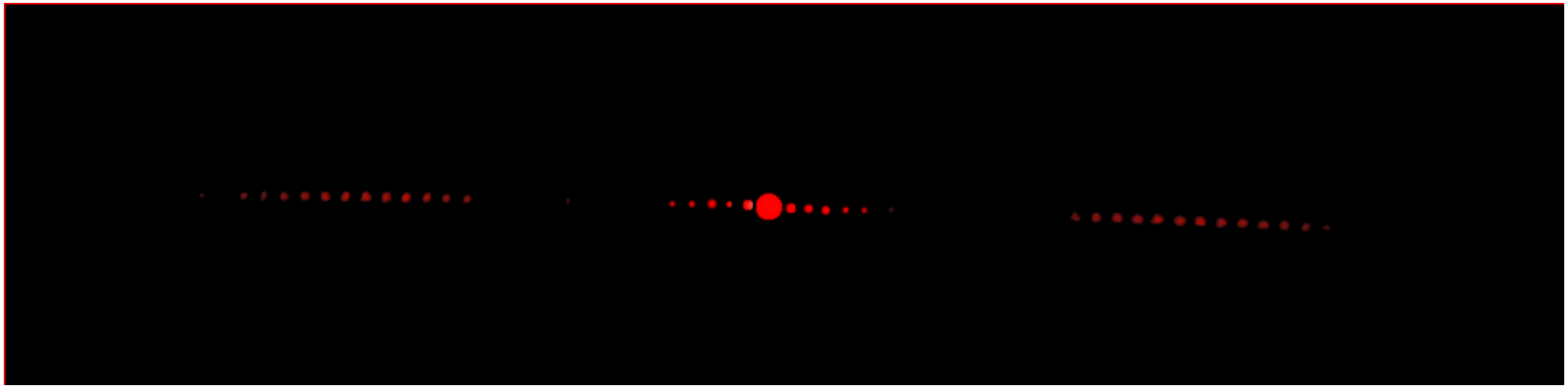


Les mesures



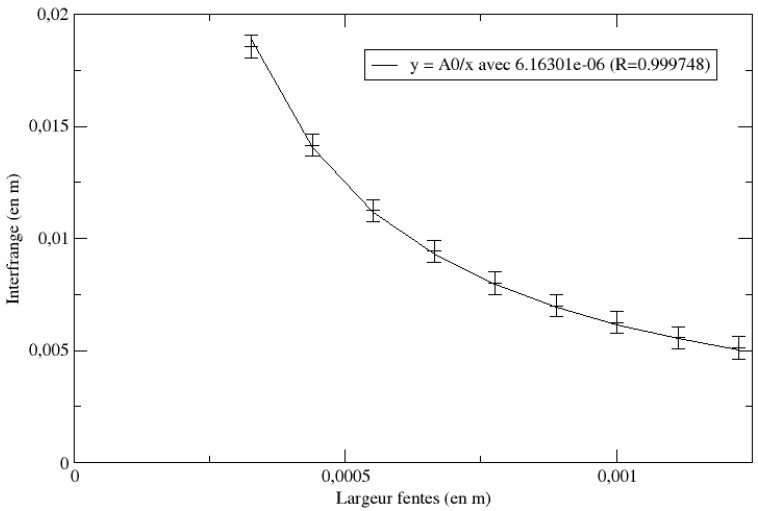


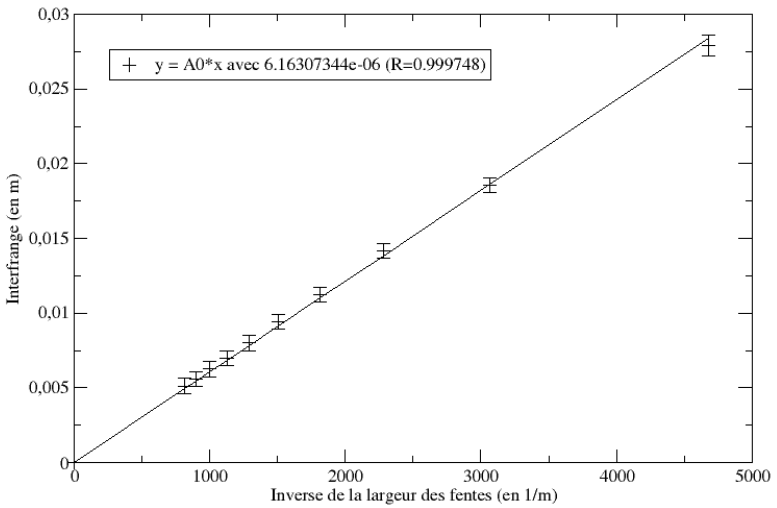




Les mesures

Courbes d'étalonnage





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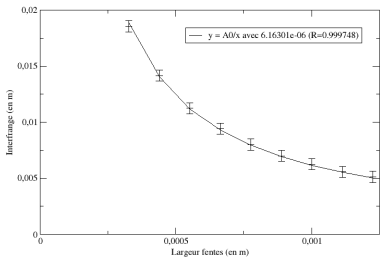

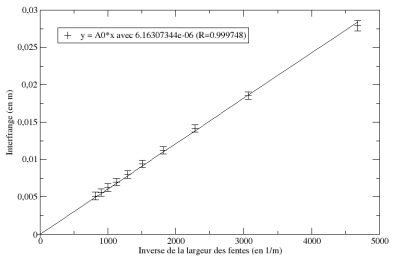

- Expérimentalement : $i = 3,77214.10^{-4} + \frac{5,92508.10^{-6}}{a}$

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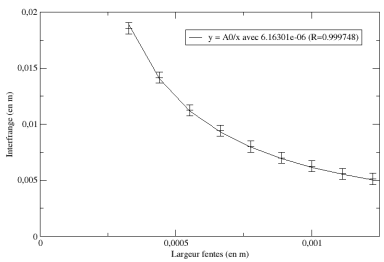

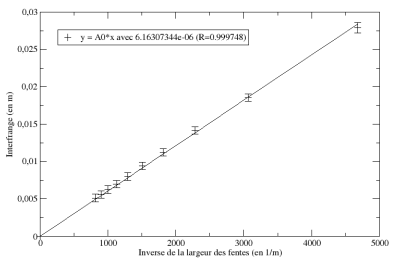

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Les mesures

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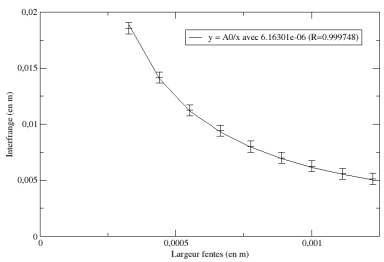

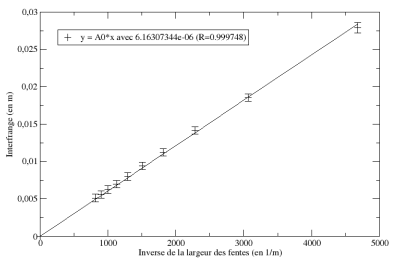

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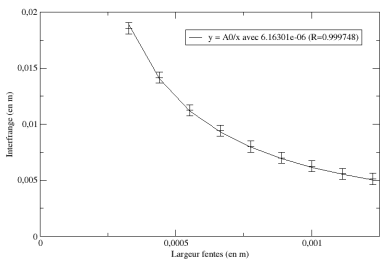

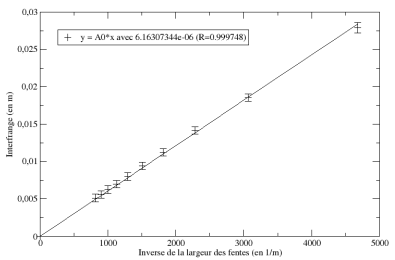

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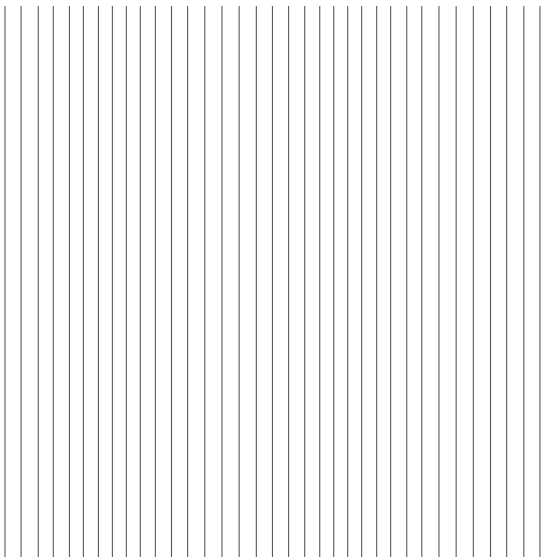
- On en déduit la distance D entre l'objet et sa figure de diffraction : D = 7,27 m

Diffraction par des fentes équidistantes



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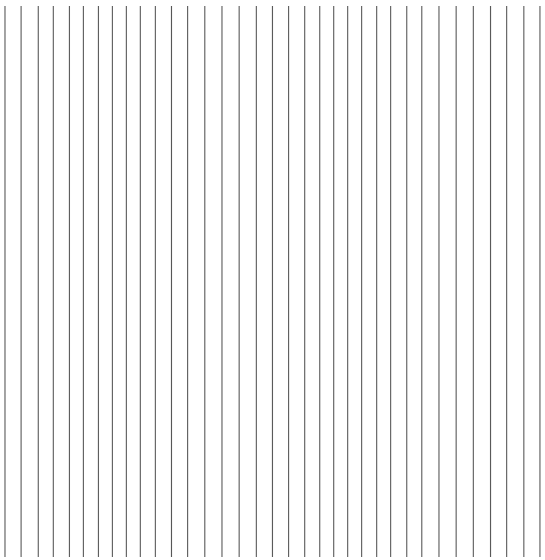

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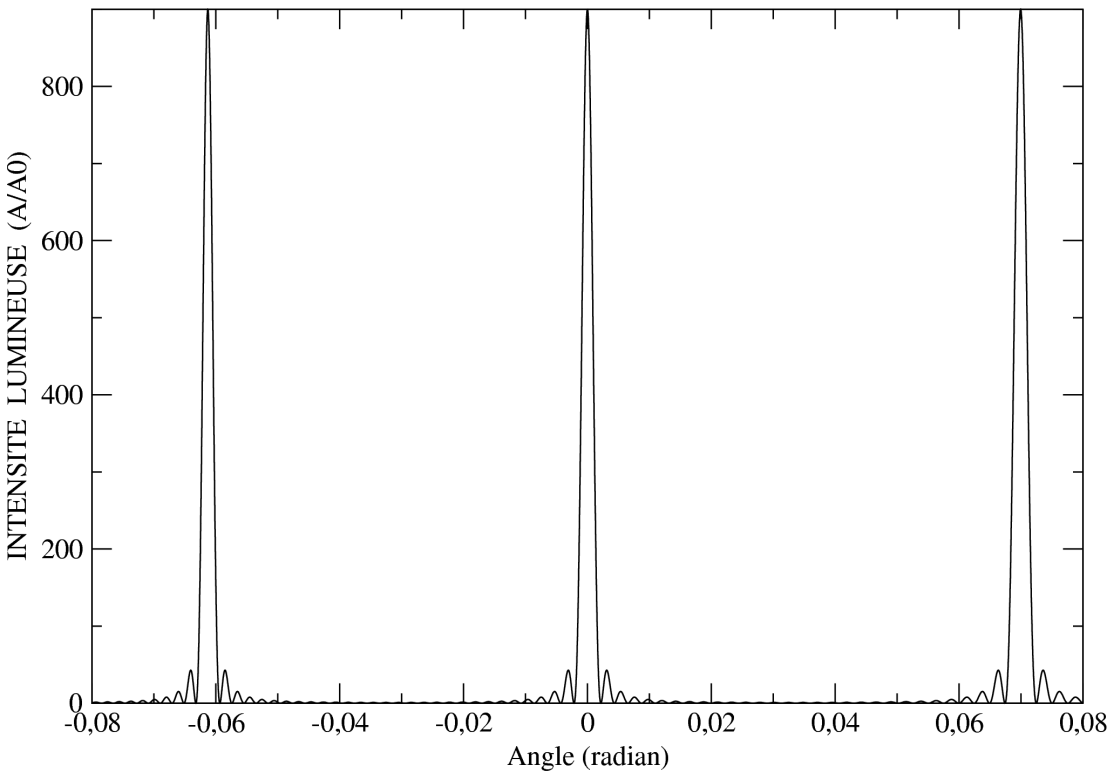
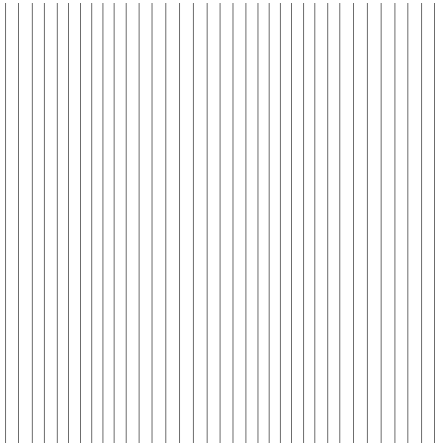
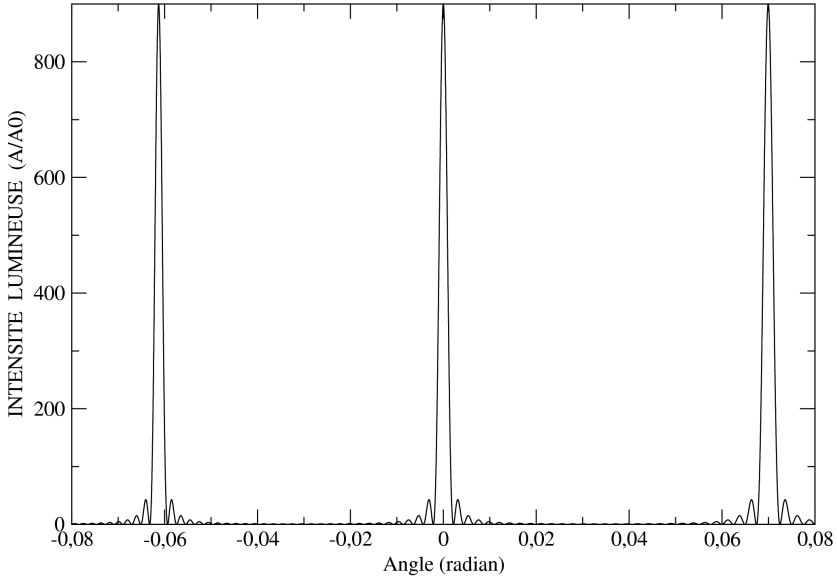


Cas des fentes équidistantes : $\overrightarrow{r_n} = n\overrightarrow{r_1}$





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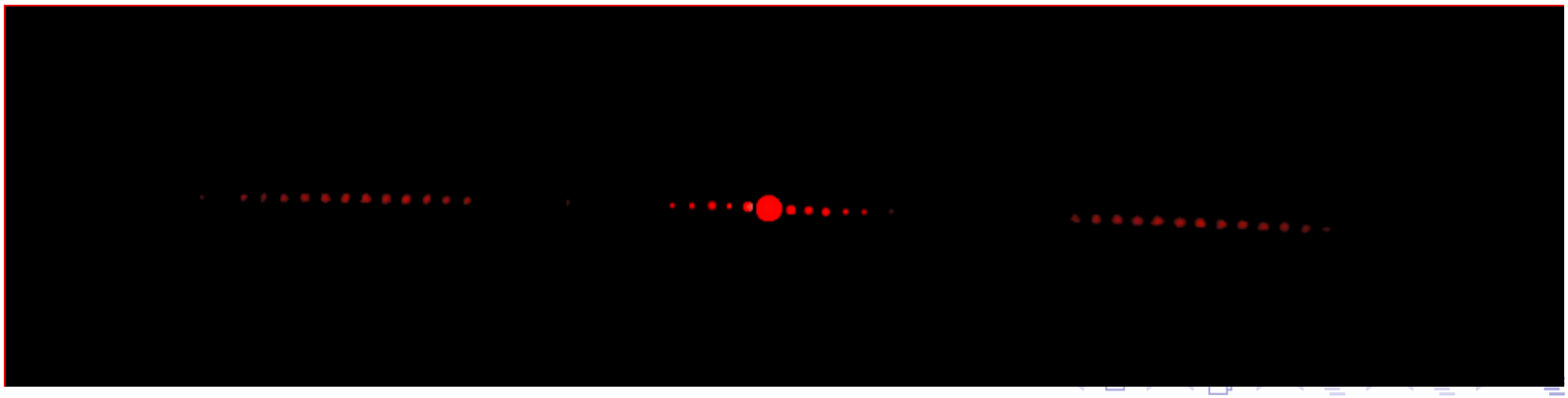
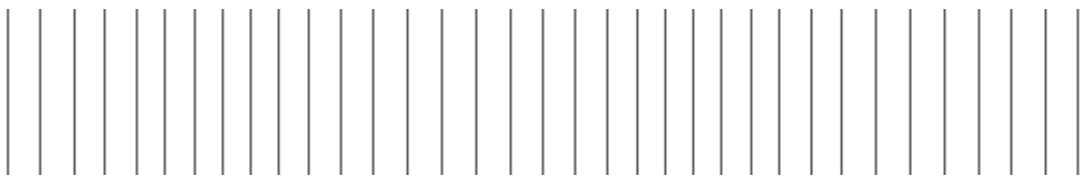


Pertubation sinusoïdale, approximation des 3 tâches

- $\overrightarrow{r_n} = \left(n.r + \epsilon . \sin(\frac{2\pi}{\lambda}.n)\right) . \overrightarrow{e_r}$



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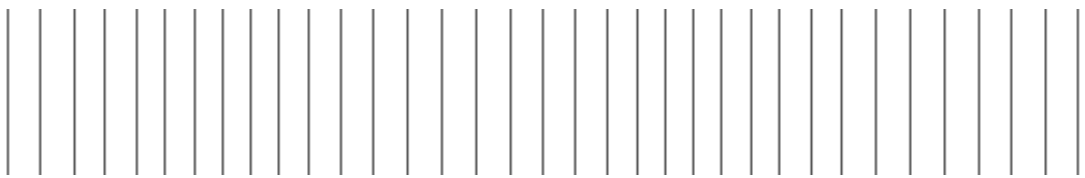

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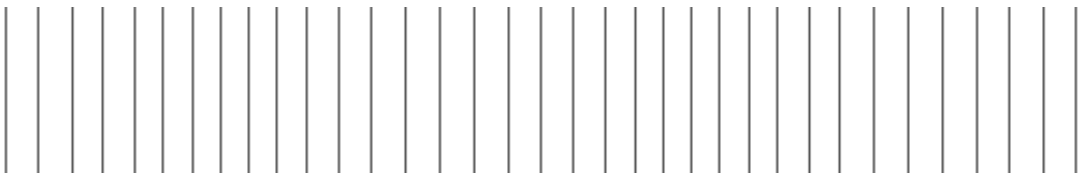

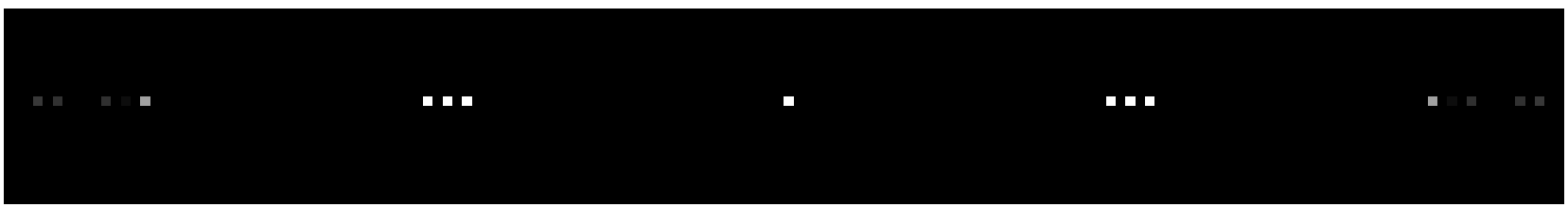

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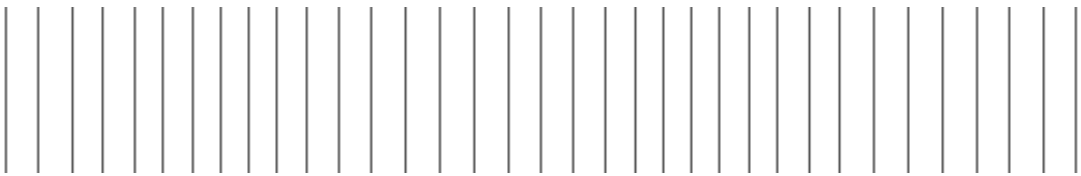
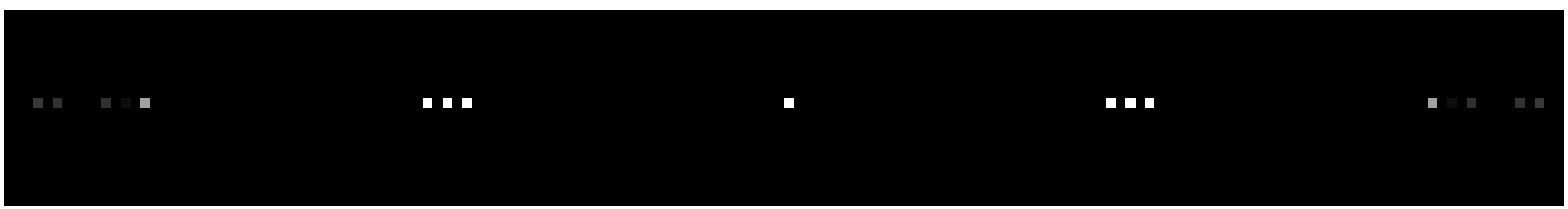
- $d = \frac{4\pi}{\lambda}$





Cas particulier : points régulièrement répartis

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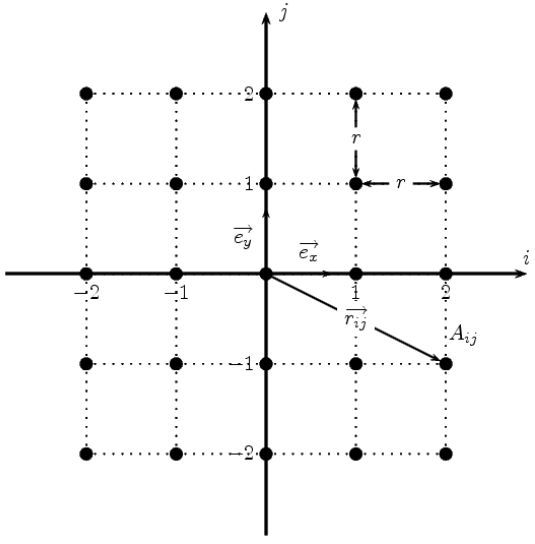

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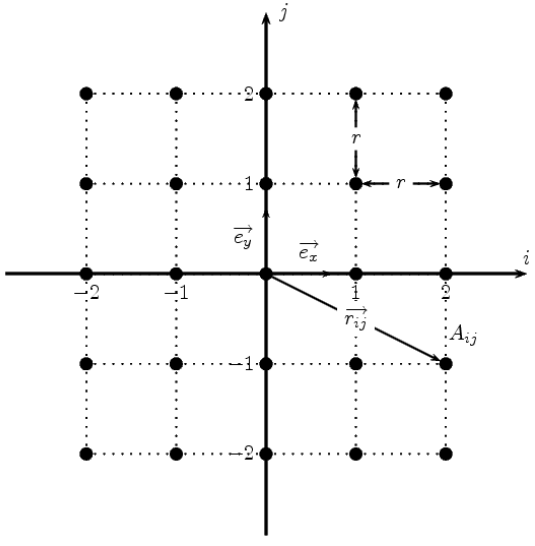
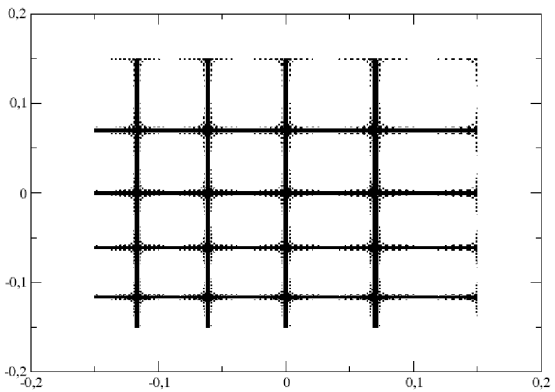
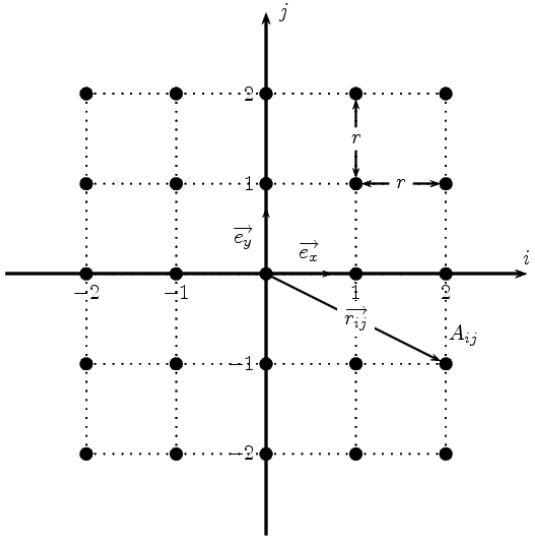
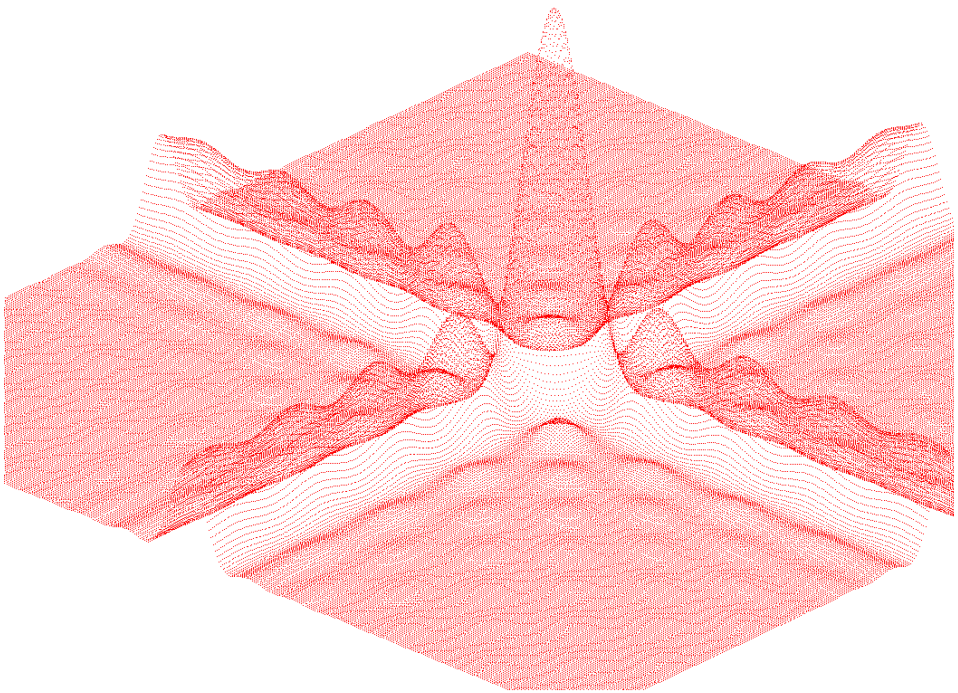


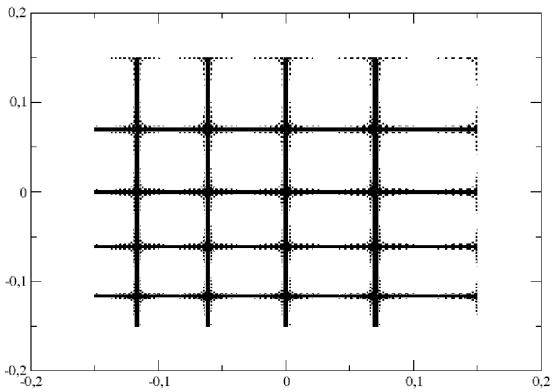


Cas particulier : points régulièrement répartis

$$I(\vec{q}) = I_x(\vec{q}) + I_y(\vec{q}) + \sqrt{I_x(\vec{q}).I_y(\vec{q})}$$







Cas quasi-périodique

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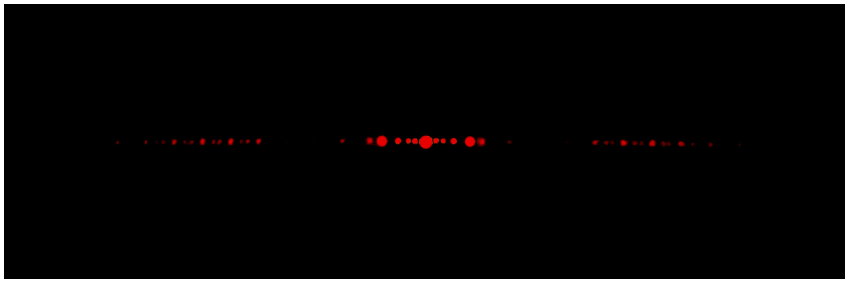
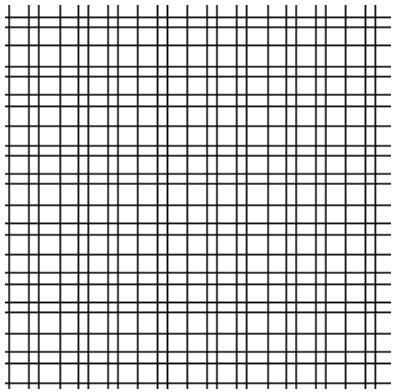
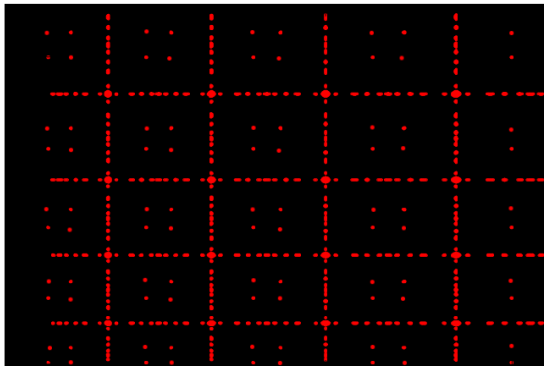
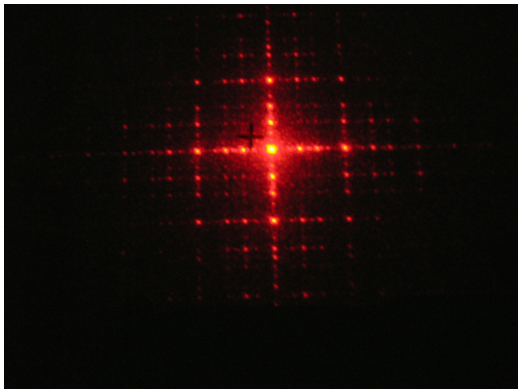
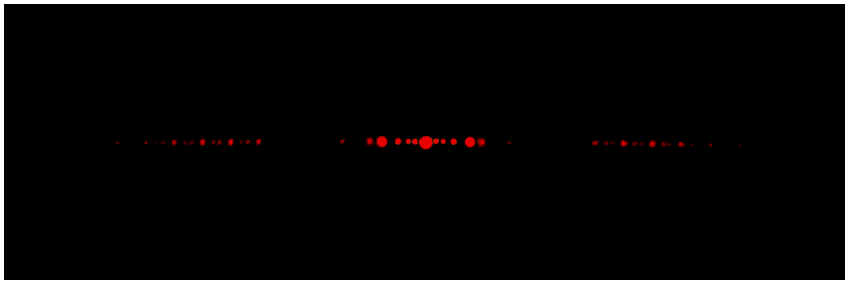
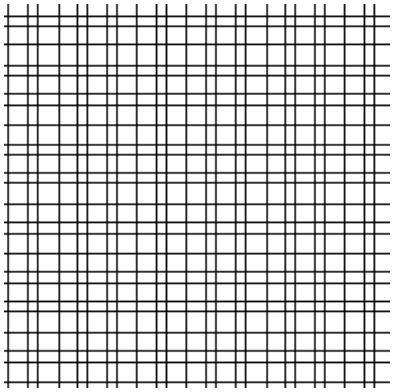
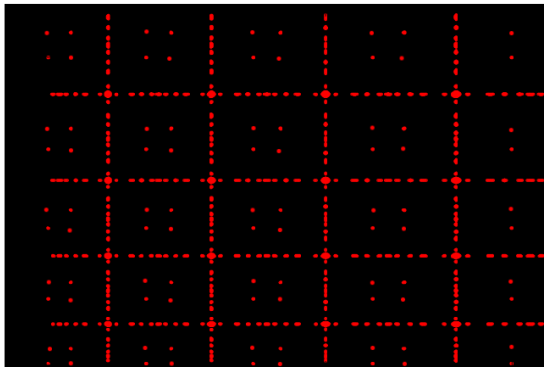
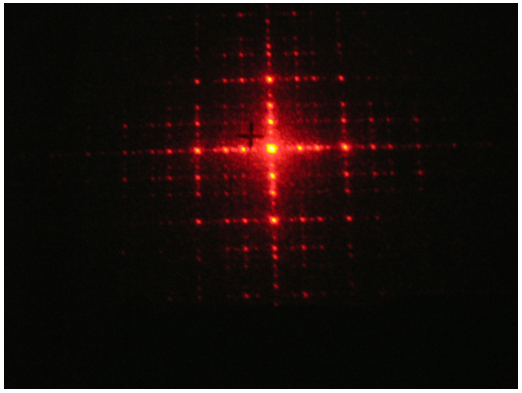
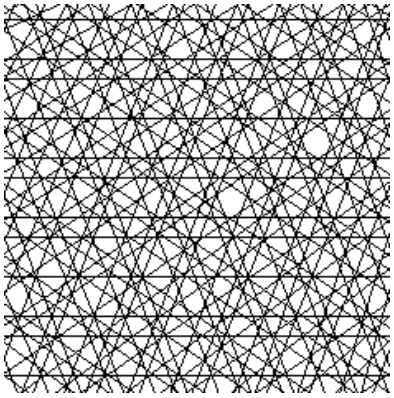
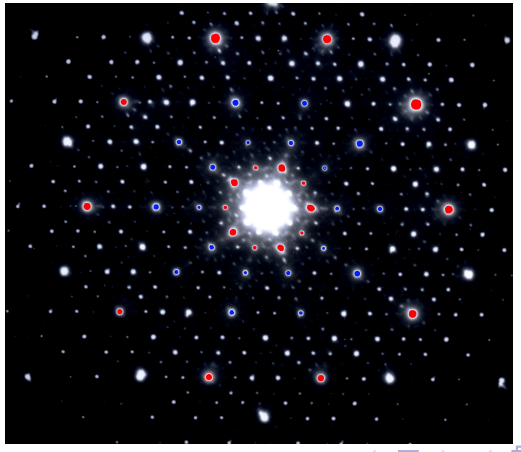
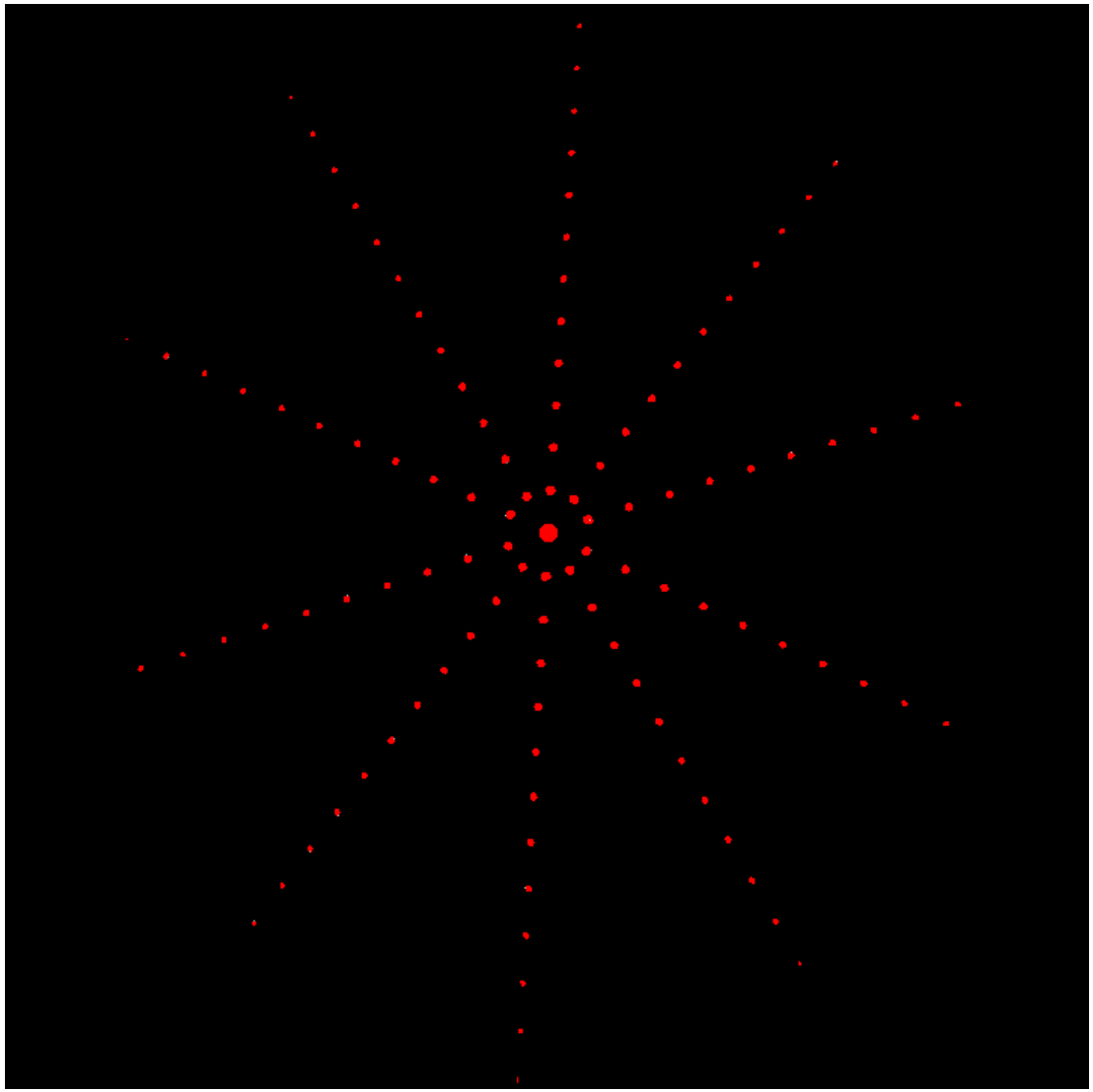








Cas quasi-périodique








Conclusion