

# DEOS 03 - Évaluation de la qualité d'image d'une caméra d'astrophysique

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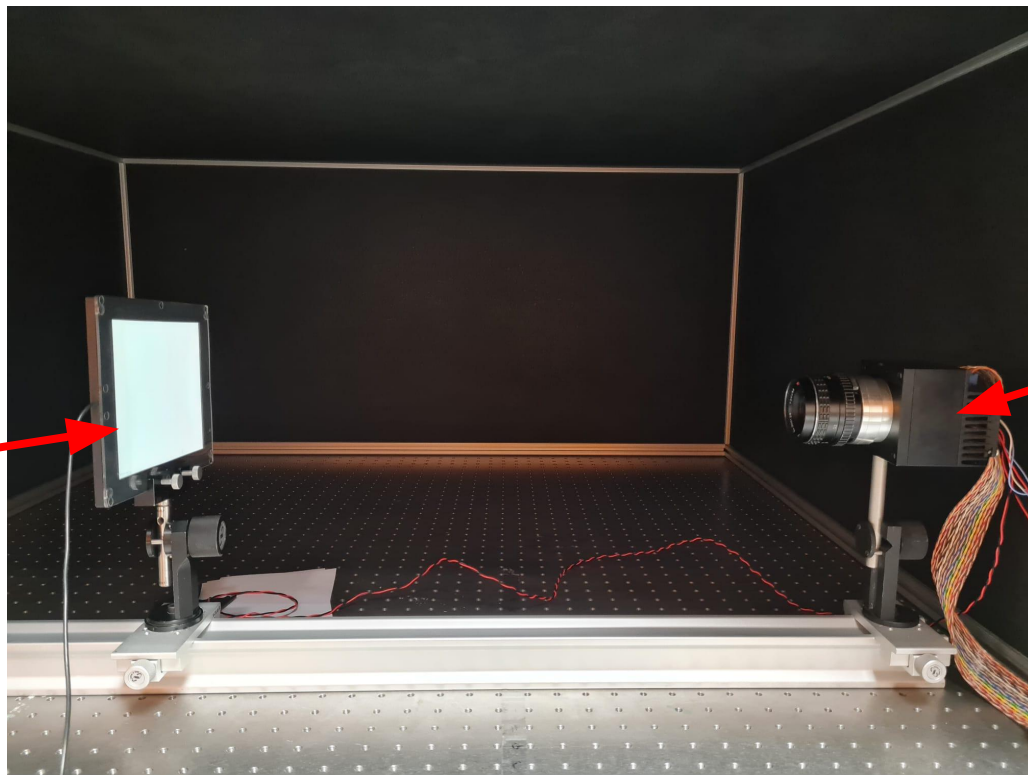
# PLAN

- I. Contexte
- II. Caractérisation électro-optique du capteur CCD
- III. Évaluation de la qualité de l'image

# I. Contexte

CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>

Panel LED



Caméra  
AUDINE

**FIG 1 : Banc optique**





## II. Caractérisation électro-optique du capteur CCD

Feuilles blanches :  
diminuent l'illumination

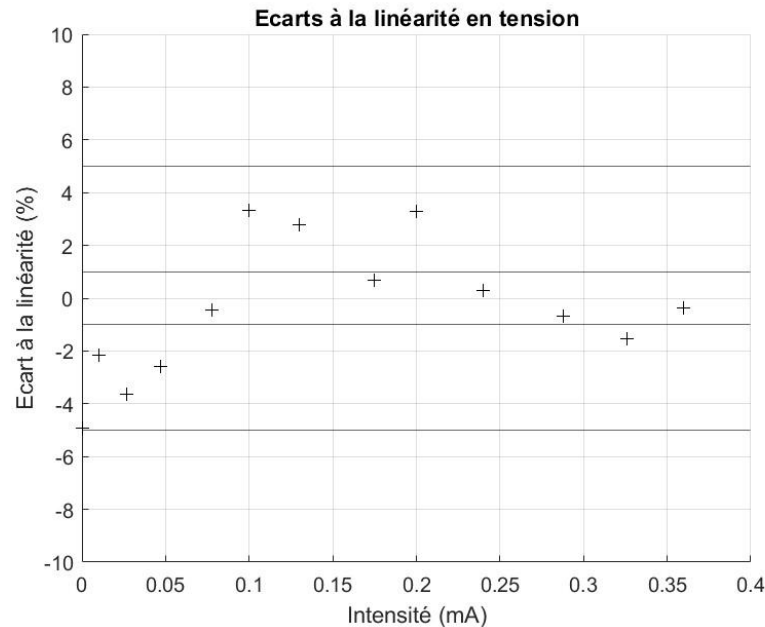
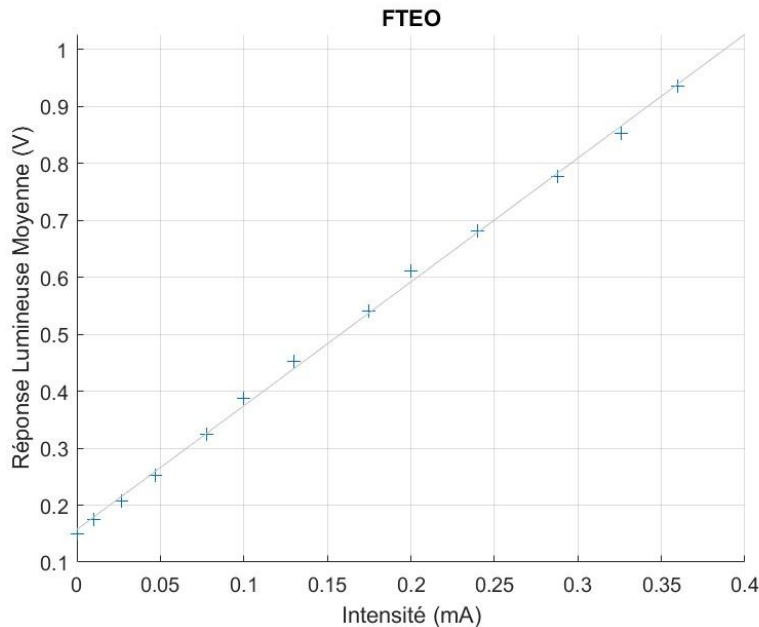


TOPEZA - MISBAH - RENAUD





# Régression linéaire

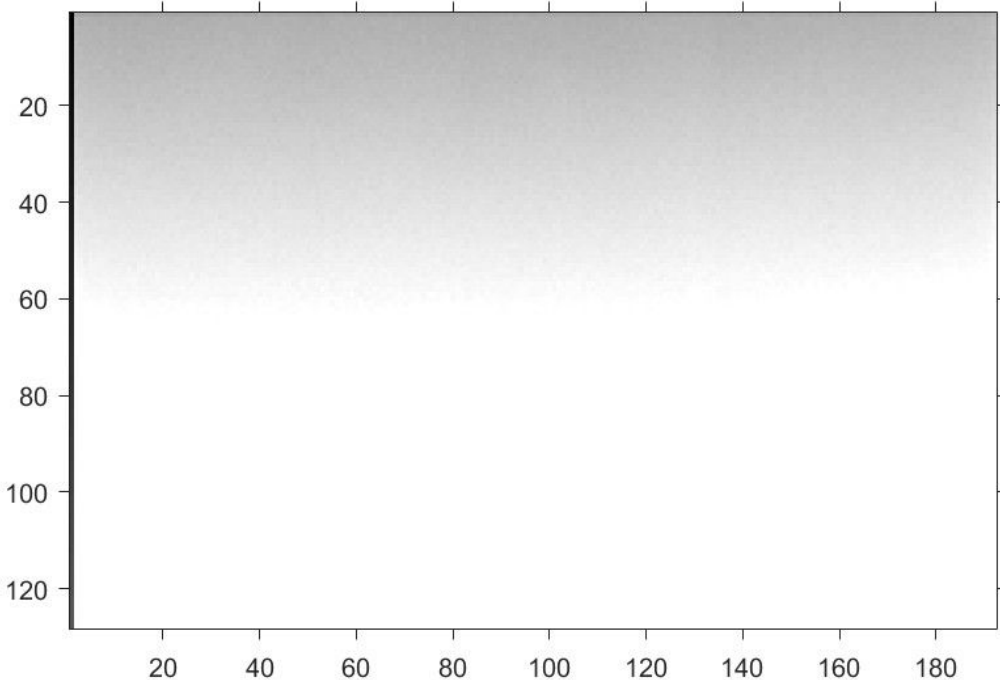


Tous les points à moins de 5% du modèle linéaire, mais pas à moins de 1%.

CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>

# Smearing

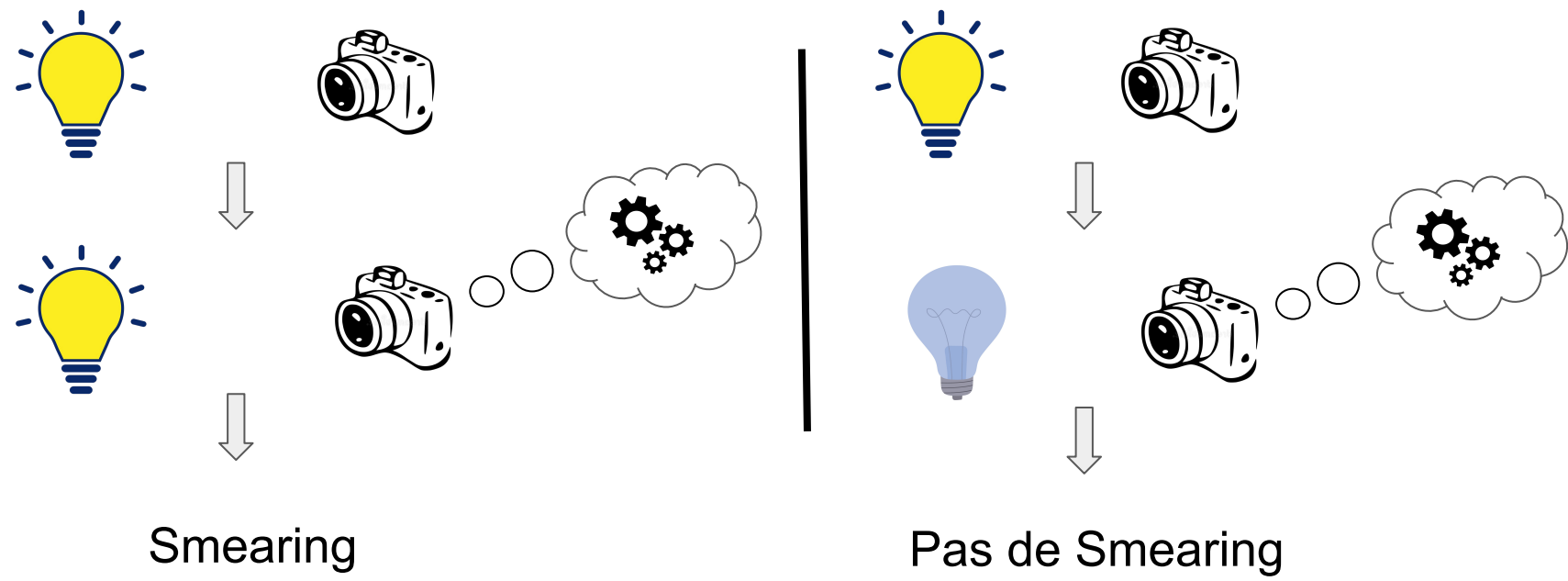
Lorsqu'un pixel reçoit une quantité trop importante de photons, il sature et déborde sur ses voisins un peu à la manière d'un seau trop rempli.



CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
○ ○ ○	○ ○ ○ ○ ● ○ ○ ○	○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○

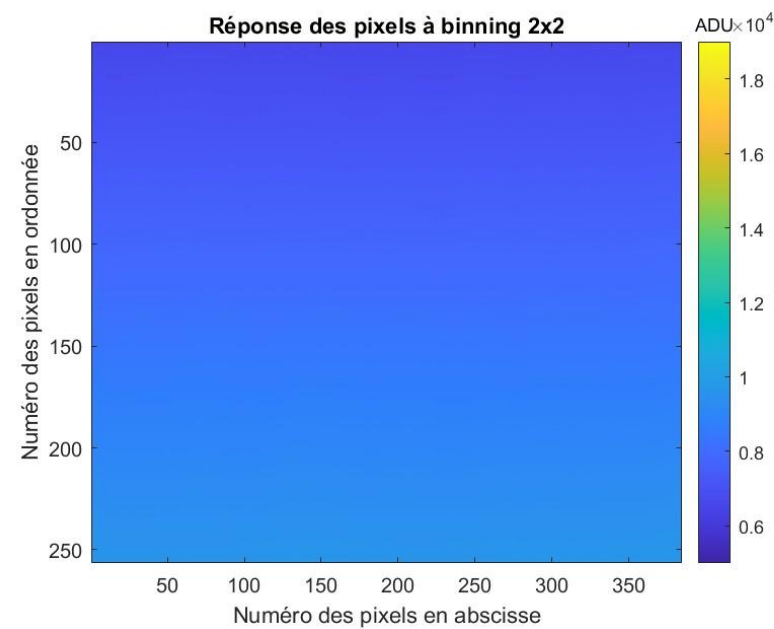
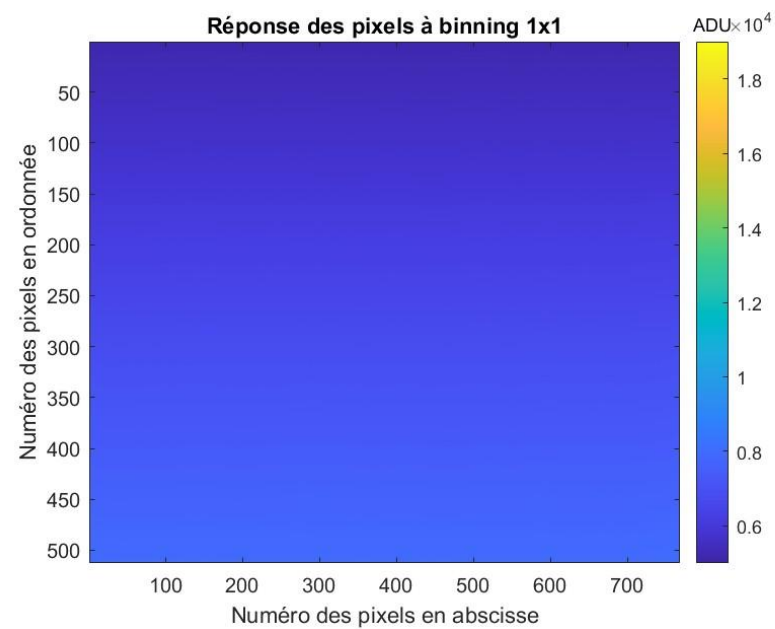
# Smearing

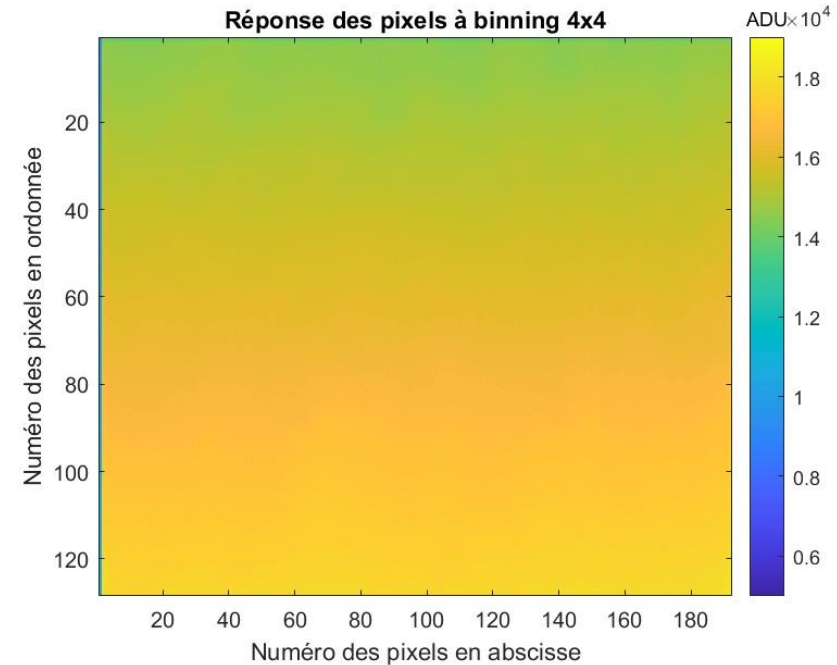
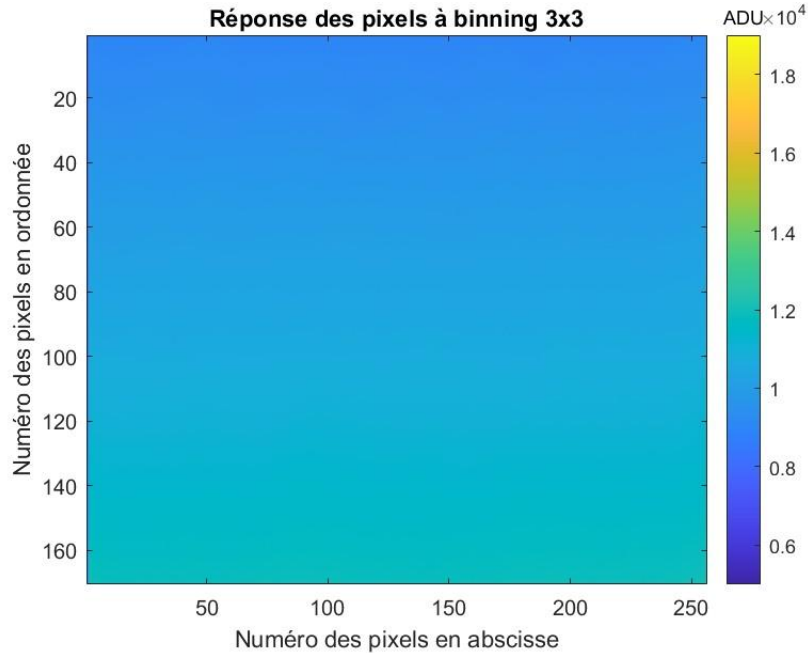
temps d'intégration < temps de lecture de la matrice → smearing



CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>

# Influence du binning sur la réponse du capteur





4x4 : temps d'intégration moins long, mais résolution moindre



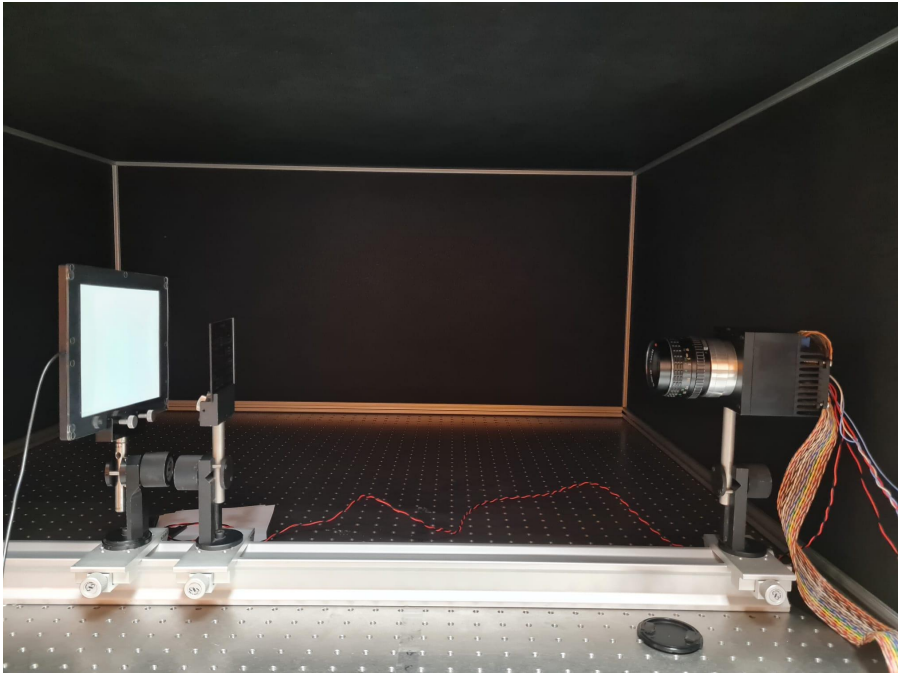




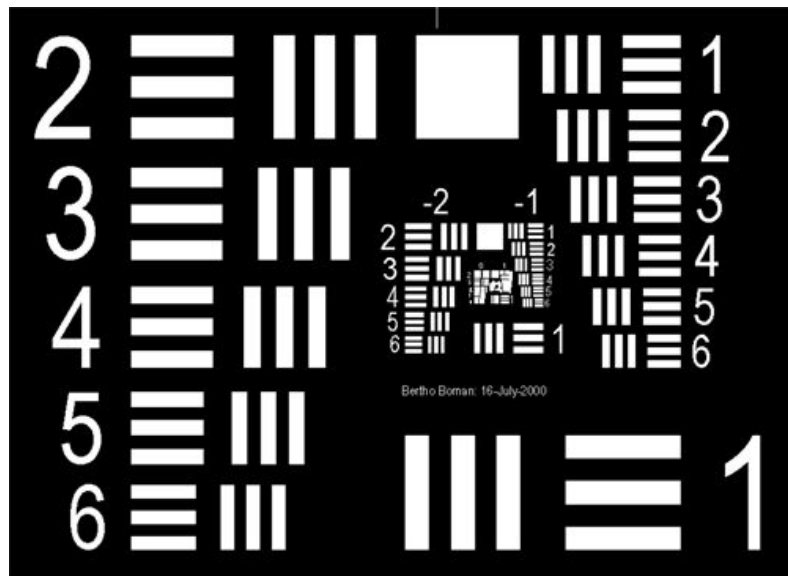
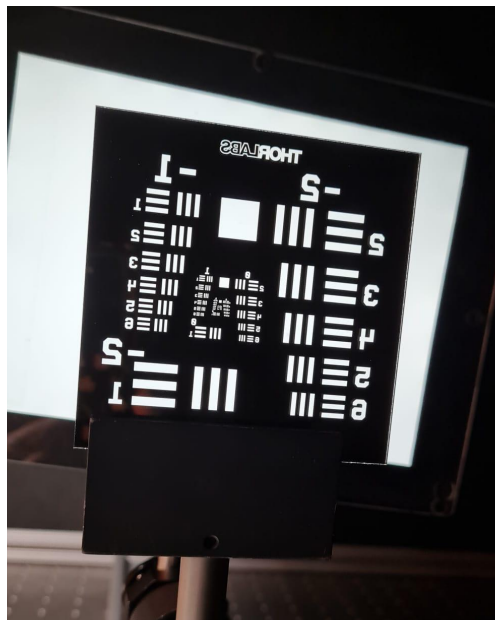
### III. Évaluation de la qualité de l'image

CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>

# III.Evaluation de la qualité de l'image



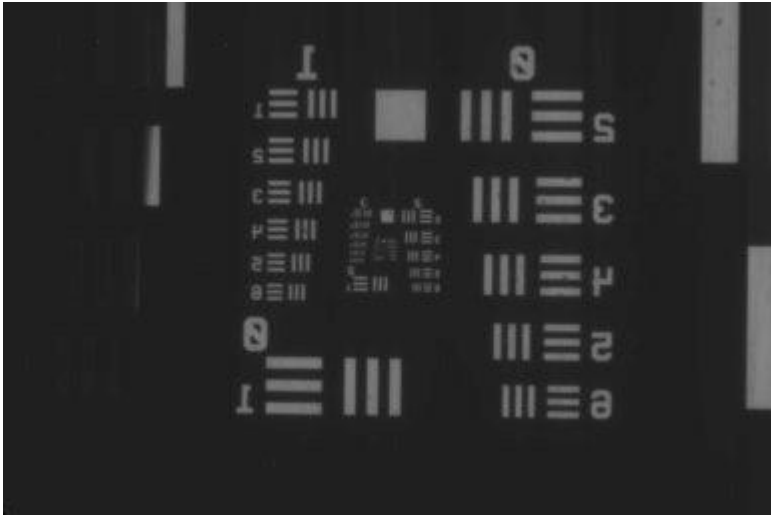
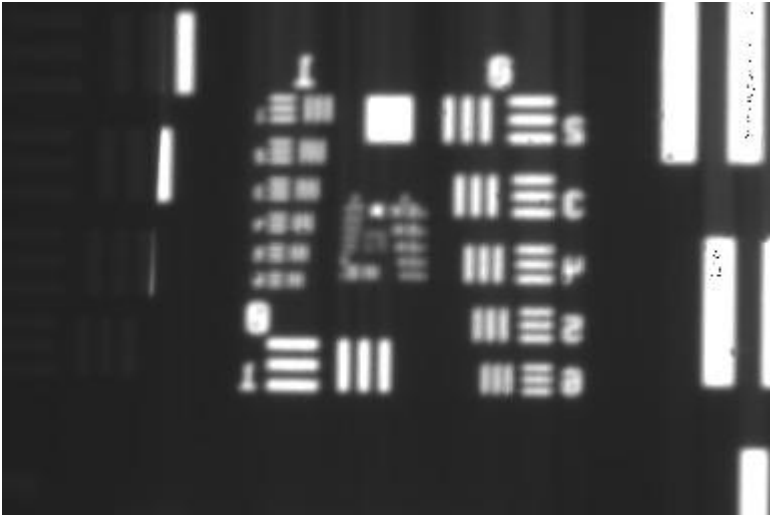
**FIG 6 : Montage expérimental**



**FIG 7 : La mire négative USAF 1951**

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<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>

Focalisation

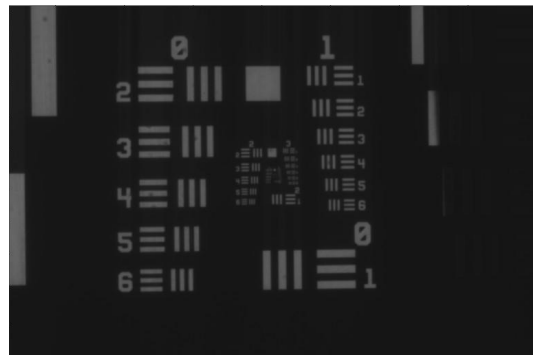


*FIG 8 : Premières images en binning 2x2*

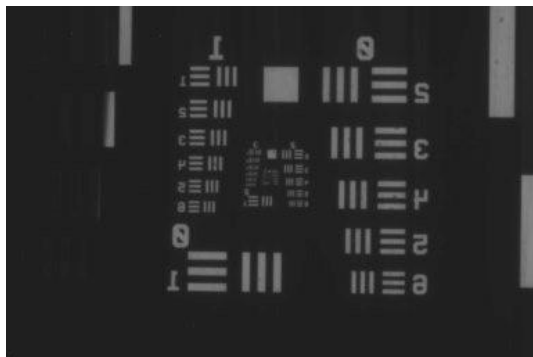


CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○	○ ○ ○ ○ ● ○ ○ ○ ○ ○	○

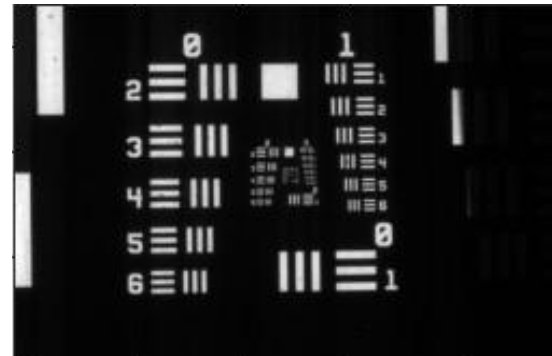
1x1



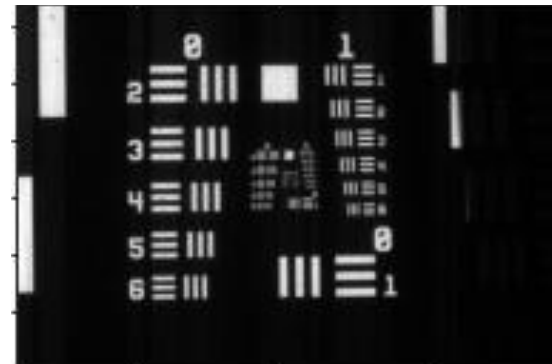
2x2



3x3

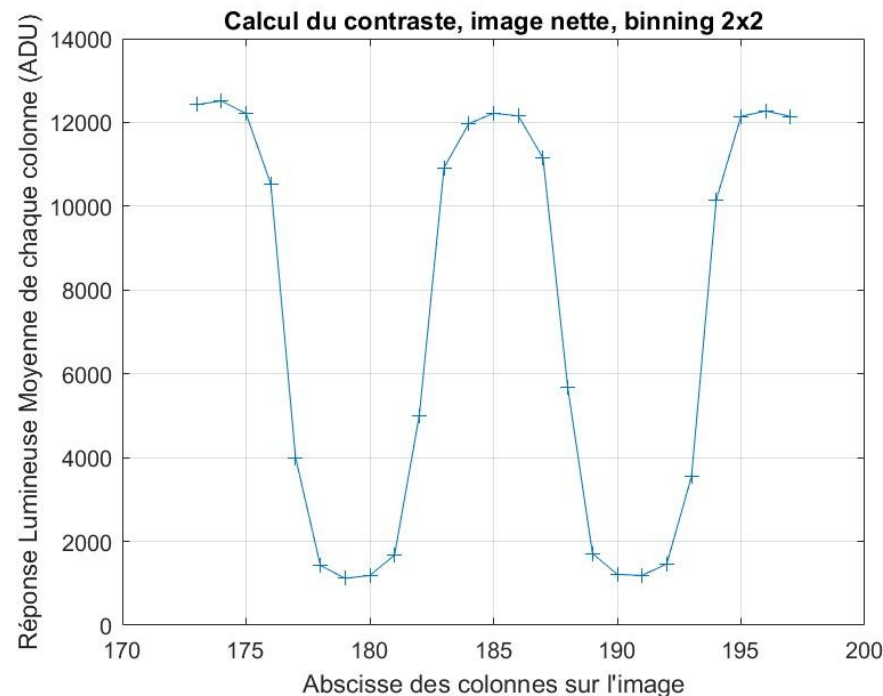
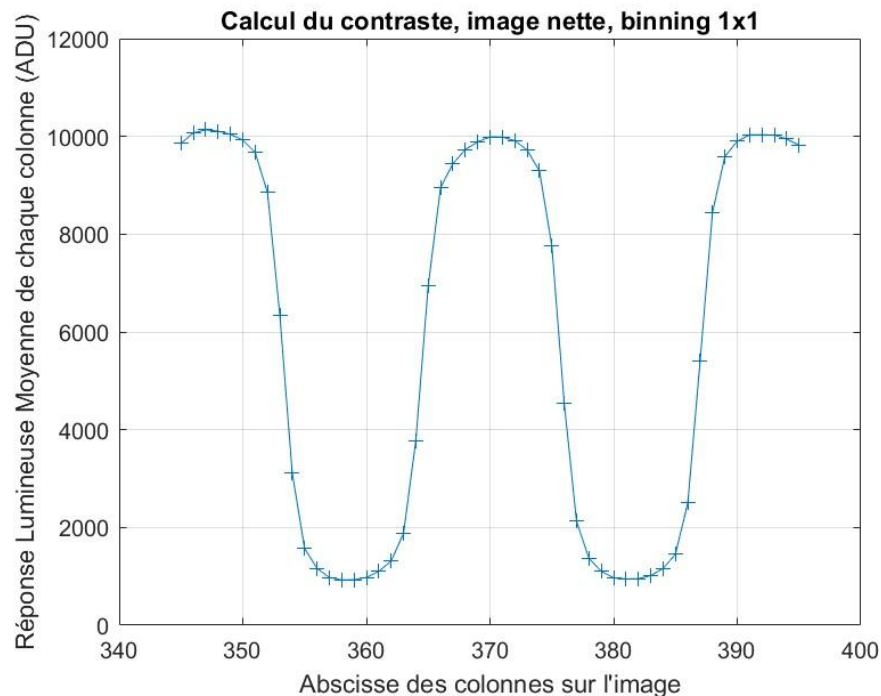


4x4



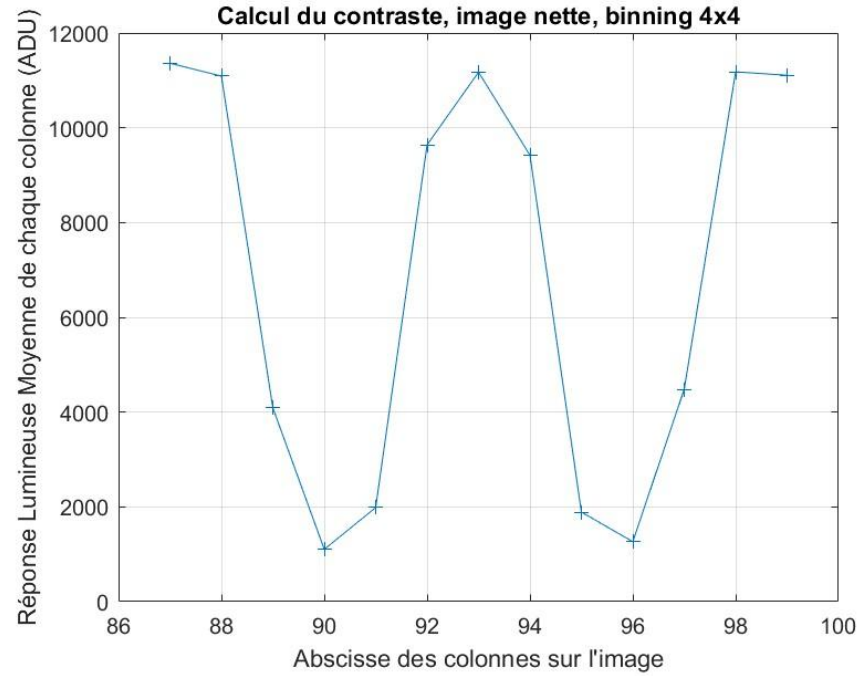
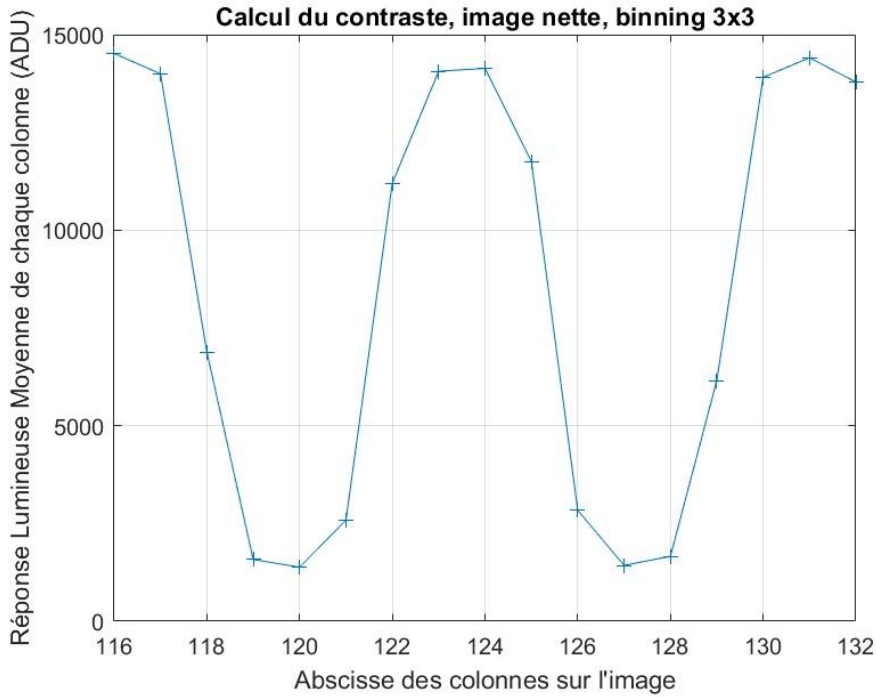
Quand le Binning augmente la résolution diminue

## Contrast (1)





## Contraste (2)

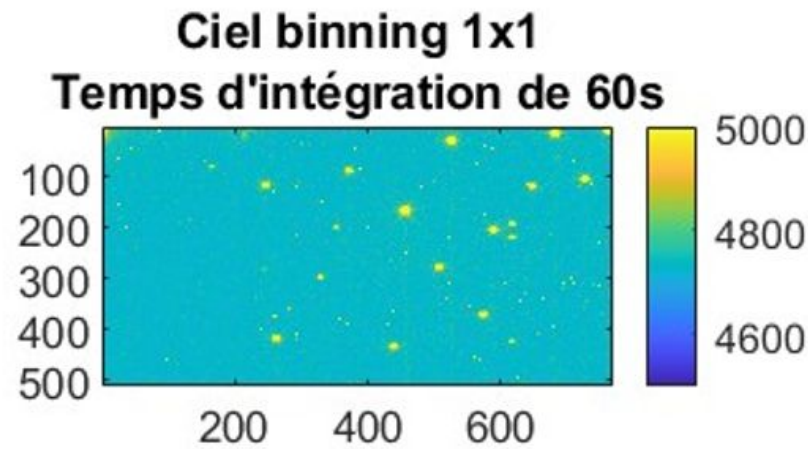
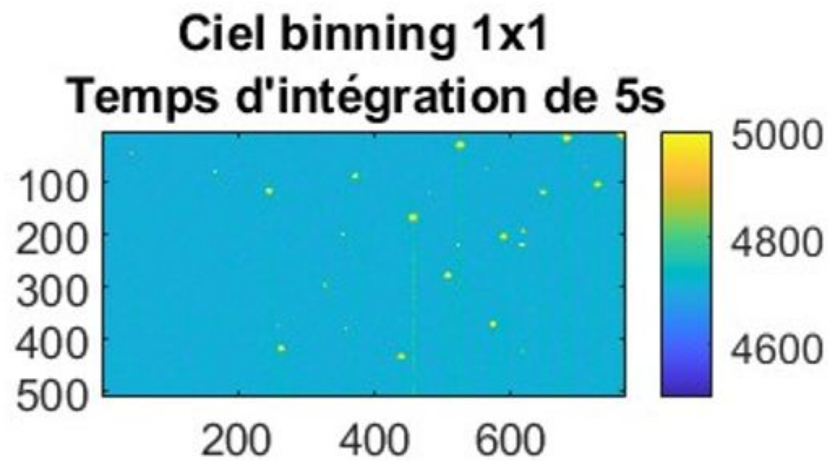


Binning = regroupement de pixels = diminution du contraste



CONTEXTE	CARACTÉRISATION	CONCLUSION 1	EVALUATION QUALITÉ IMAGE	CONCLUSION 2
<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/>

Image fond de ciel







# Remerciements

Magalie Estribeau et Lucrezia Migliorin pour leur encadrement

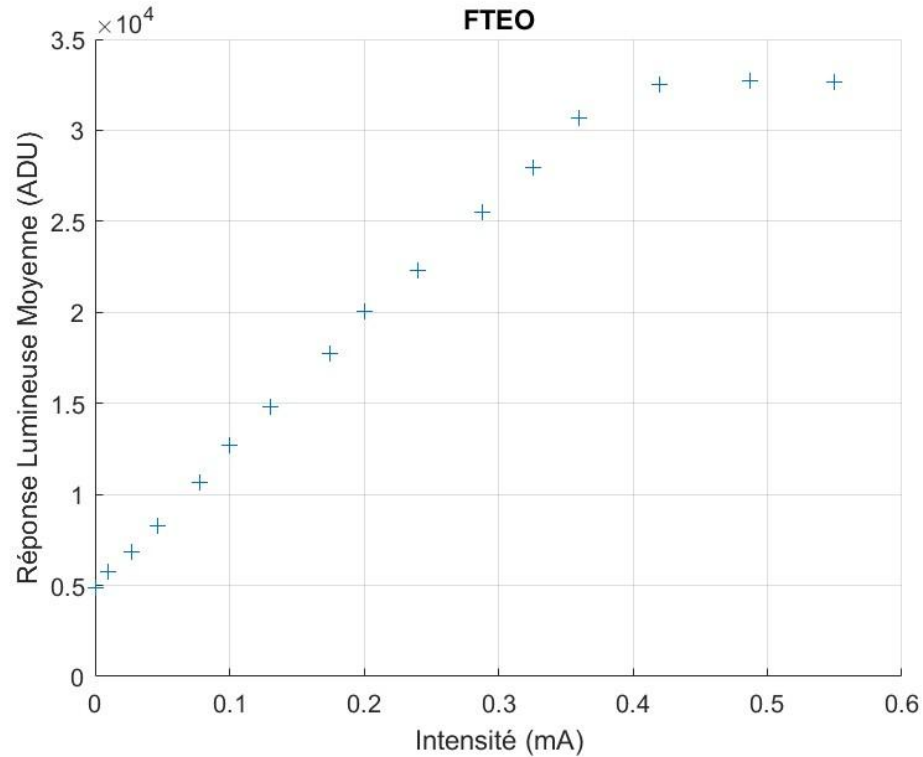
Les équipes techniques du DEOS qui ont mis en place la caméra

## Questions ?

## Annexe 1 - Conversion ADU en V

$$\text{Signal (V)} = \text{Signal(ADU)} \times \frac{\text{Plage entrée CAN (V)}}{(2^{\text{Nbits CAN}} - 1) \times \text{Gain}}$$

## Annexe 2 - FTEO, ordonnée en ADU



## Annexe 3 - Courant d'obscurité, ordonnée en ADU

