Analysis of CMOS images with machine learning

through Fourier Analysis

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CMOS images

Raw Data

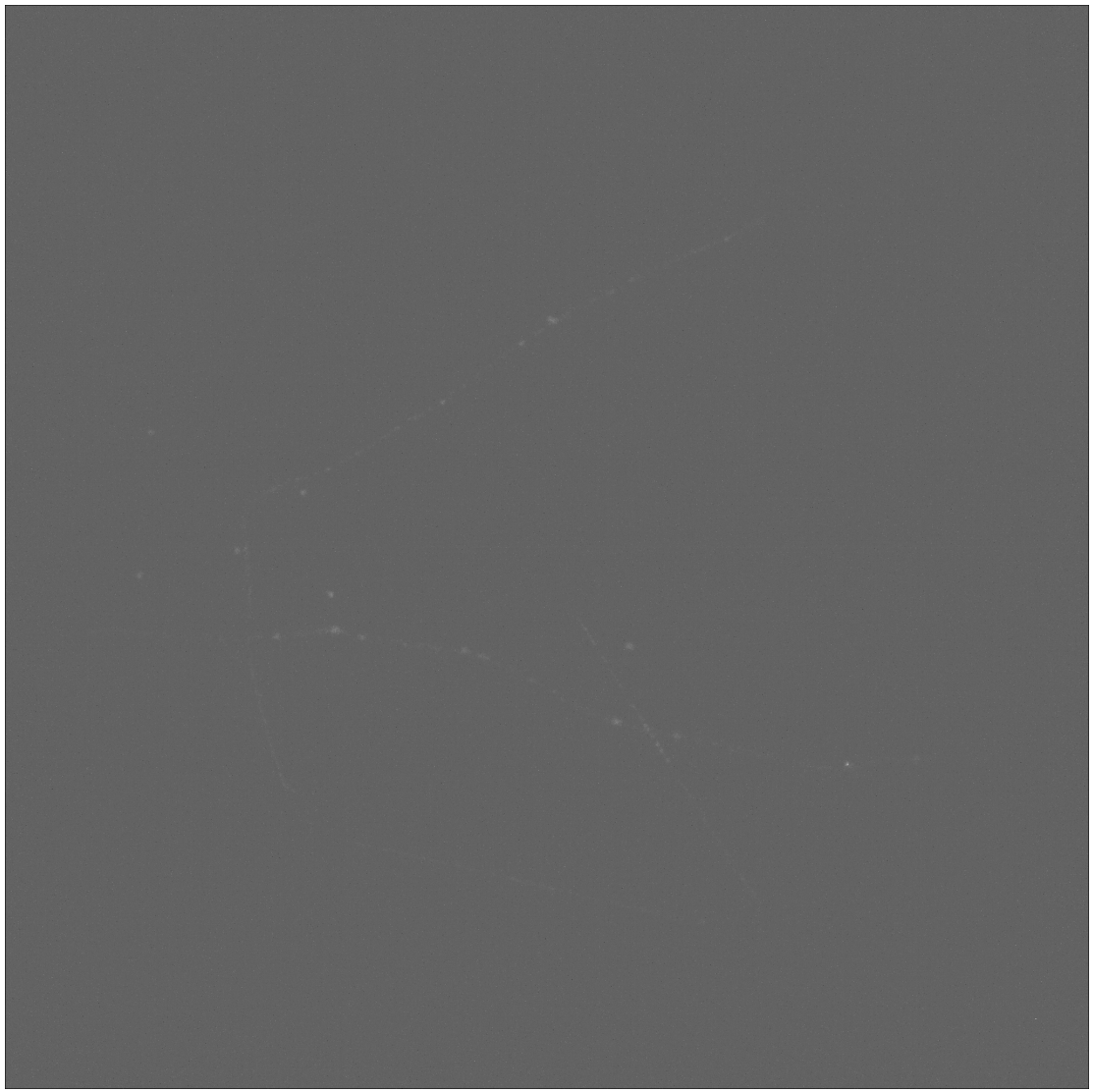
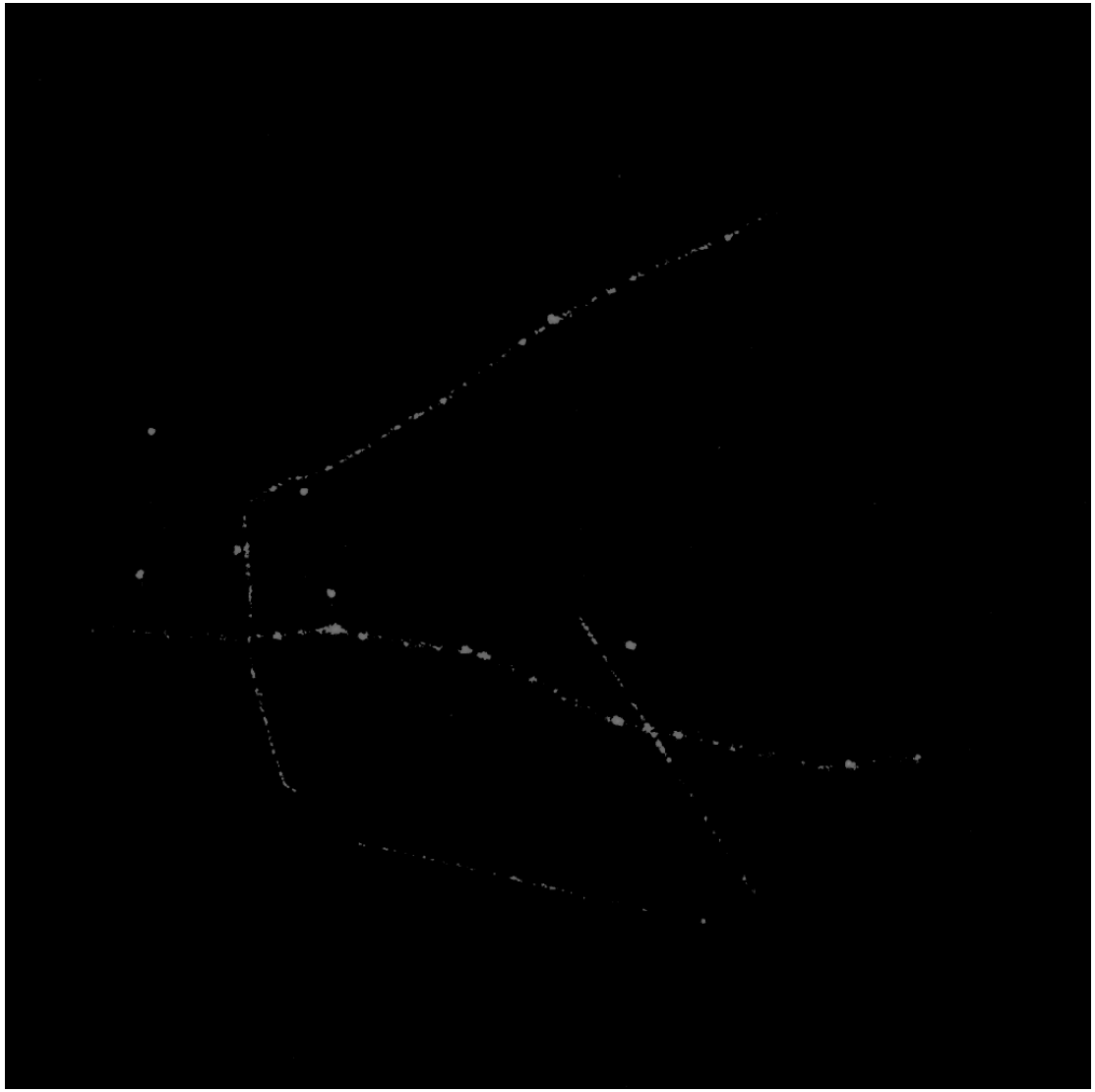


Image Properties

- Gray Scale
- 2050×2050
- $M_{ij\text{min}} = 0$
- $M_{ij\text{max}} = 227$
- $\text{median}(M) = 99$

CMOS images

Processed Data



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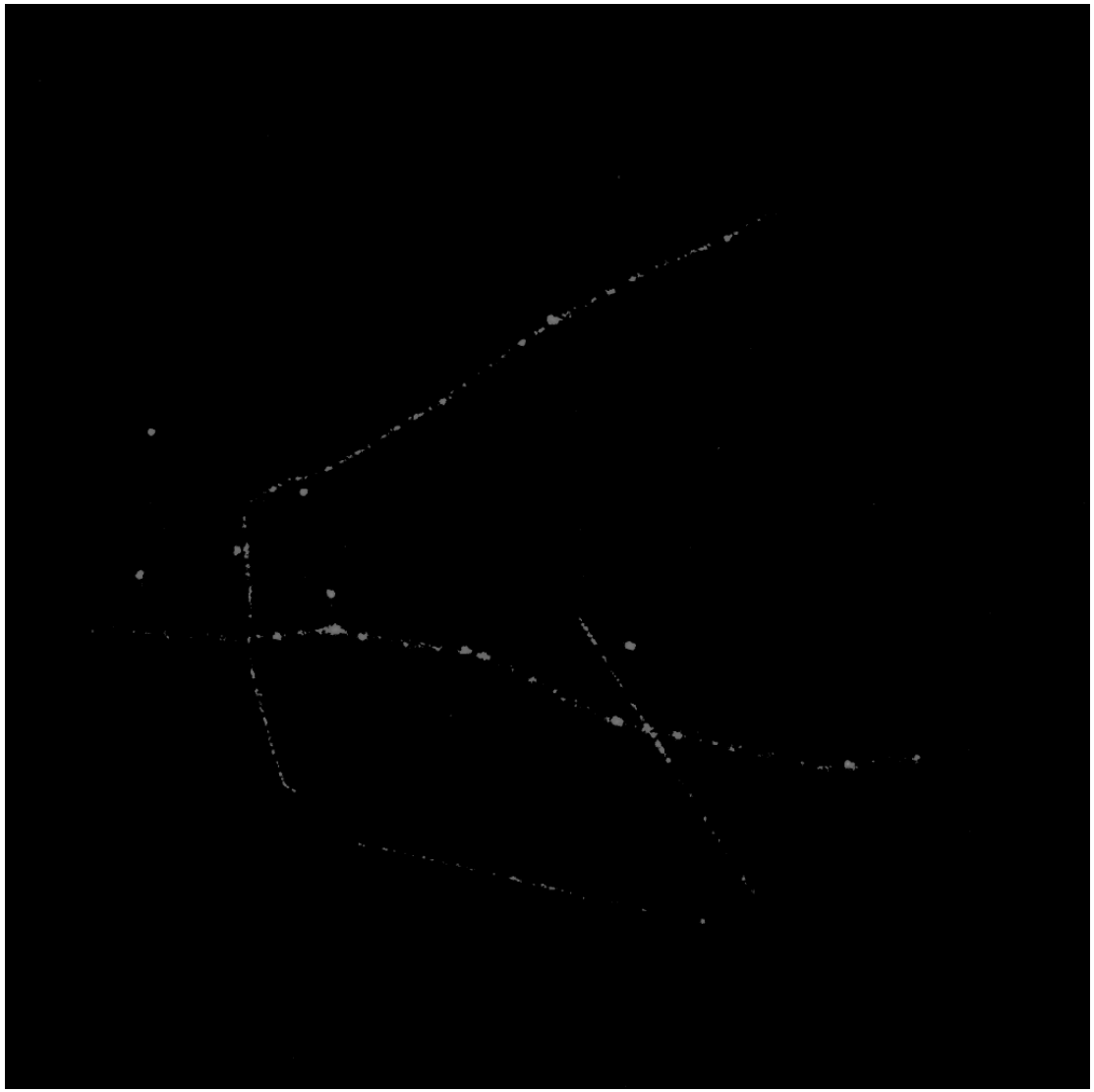
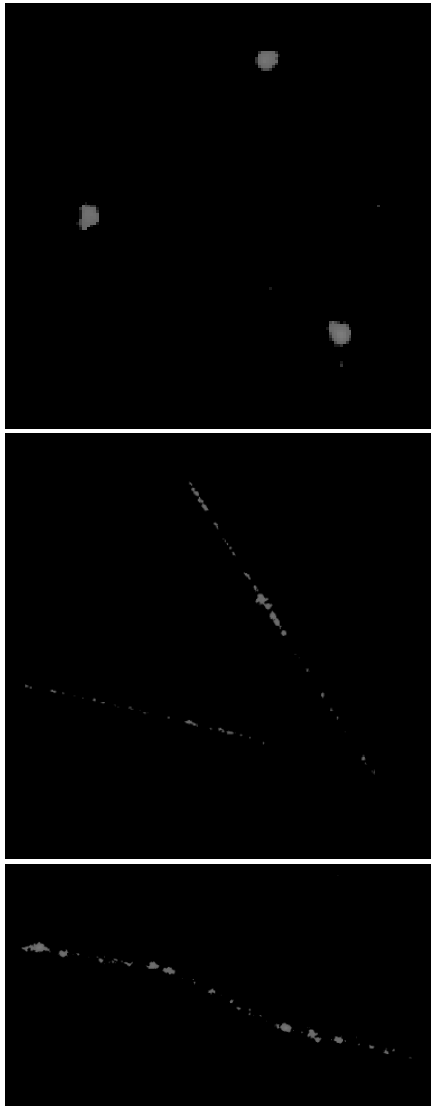
CMOS images

Classification Schema





- Also another category for nuclear recoils

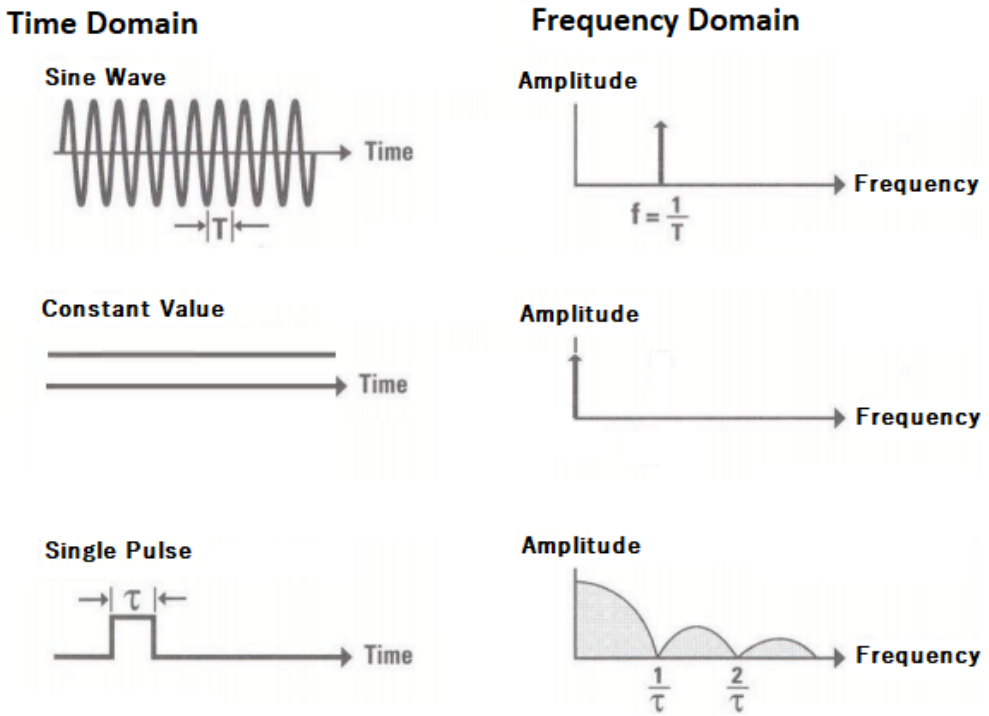
Fourier Analysis

Continuous and unidimensional case

Definition

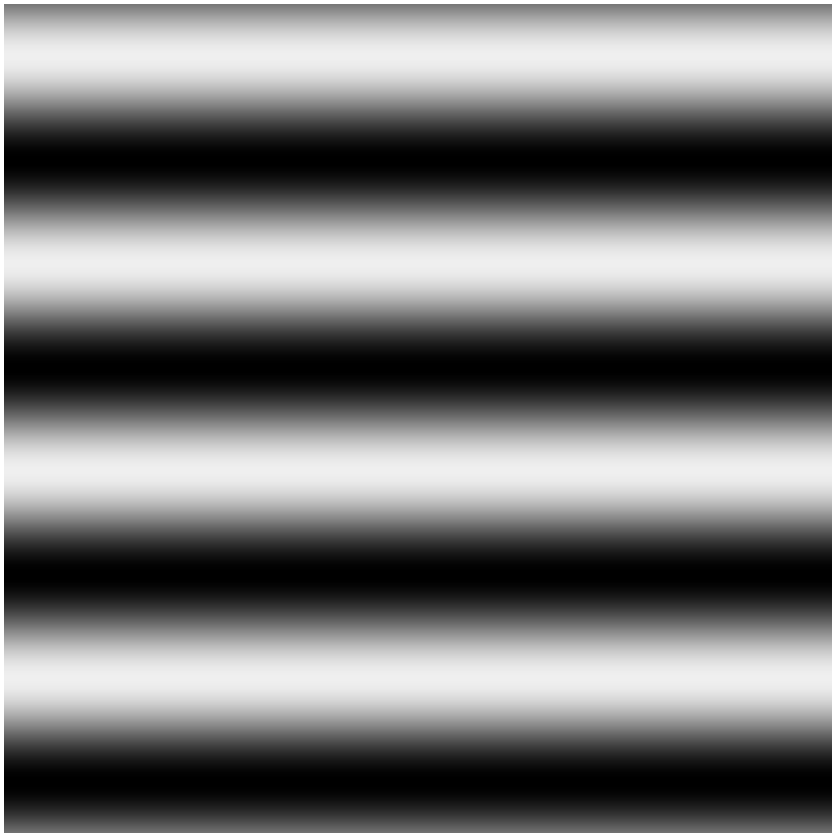
$$\mathcal{F}\{f(t)\} = F(\omega)$$

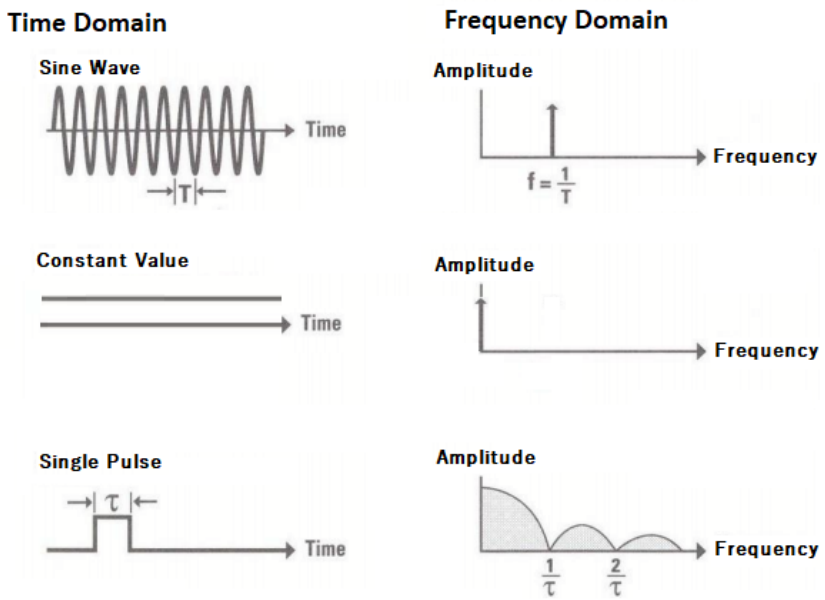
$$\mathcal{F}\{f(t)\} = \int_{-\infty}^{\infty} f(t)\mathrm{e}^{-\mathrm{j}\omega t}dt$$



Fourier Analysis

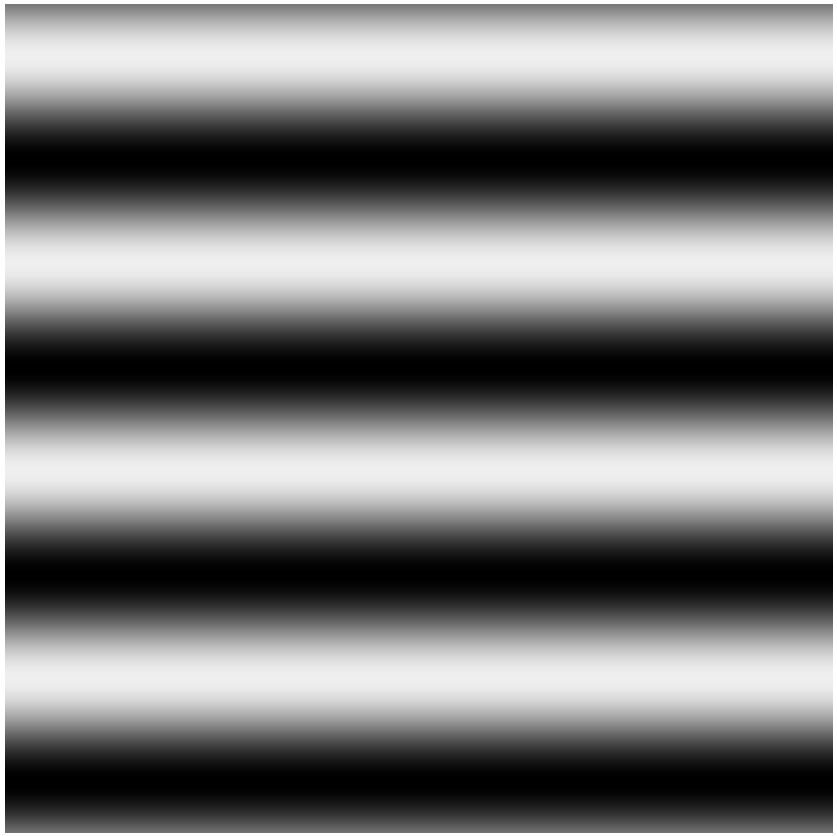
Discrete and two-dimensional case

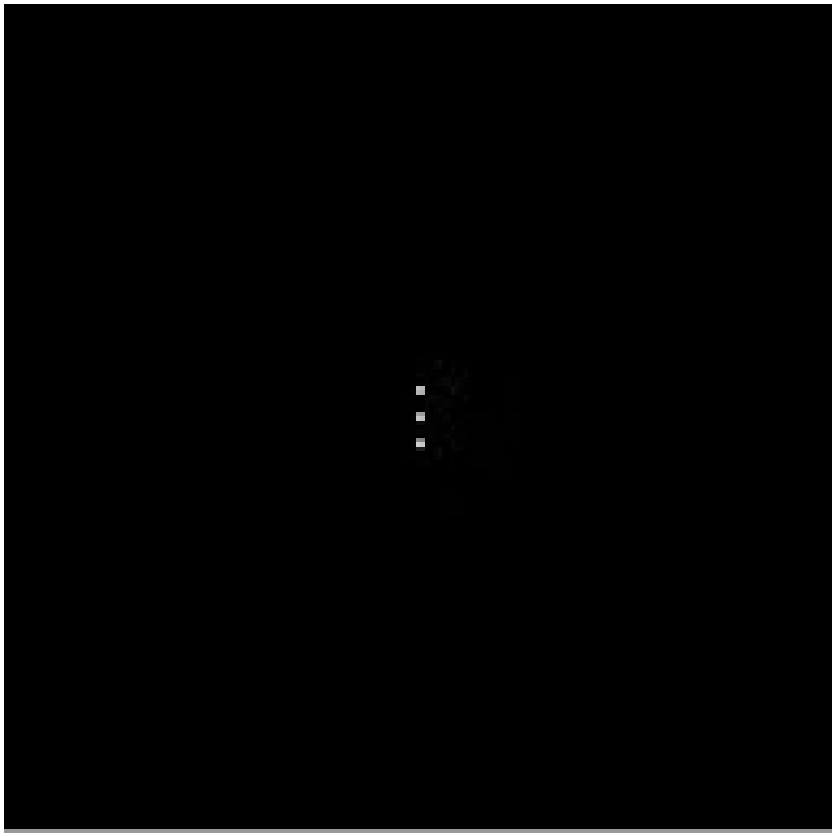




Fourier Analysis

Discrete and two-dimensional case





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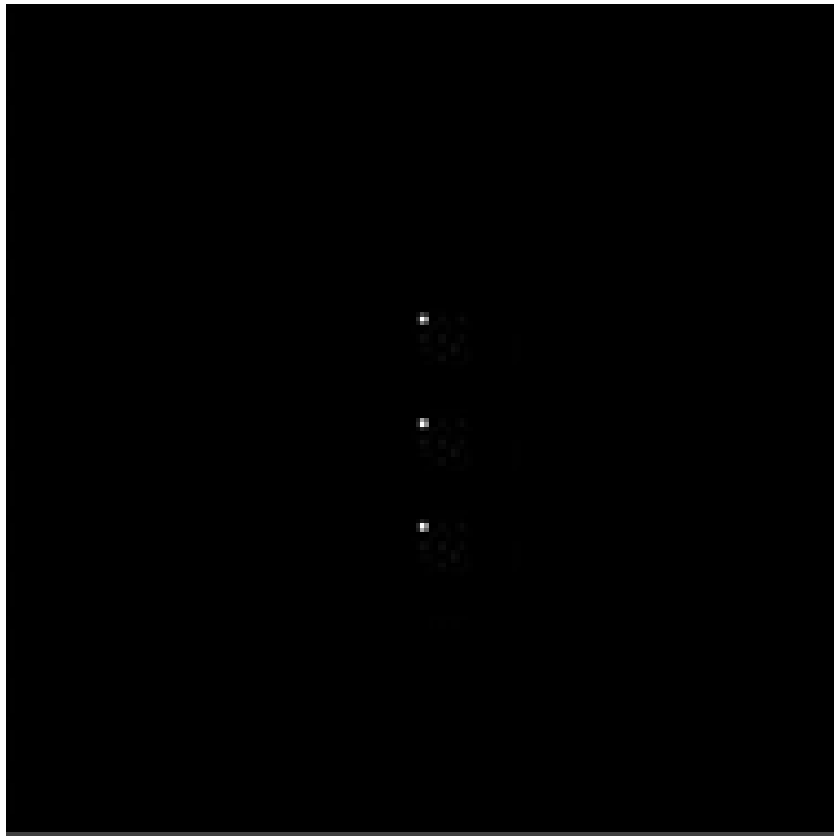
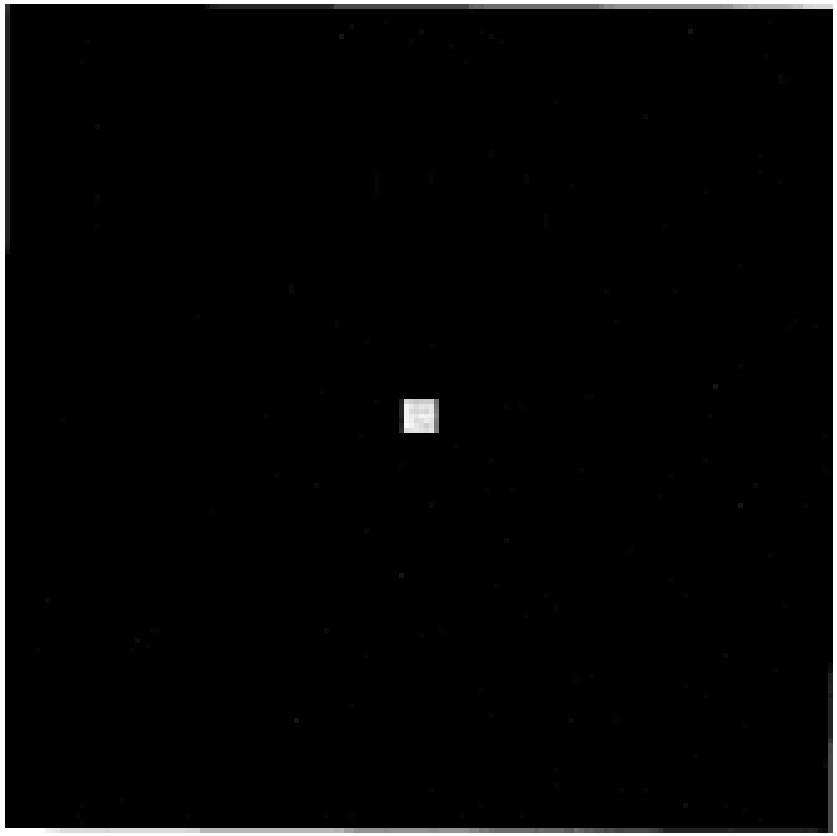
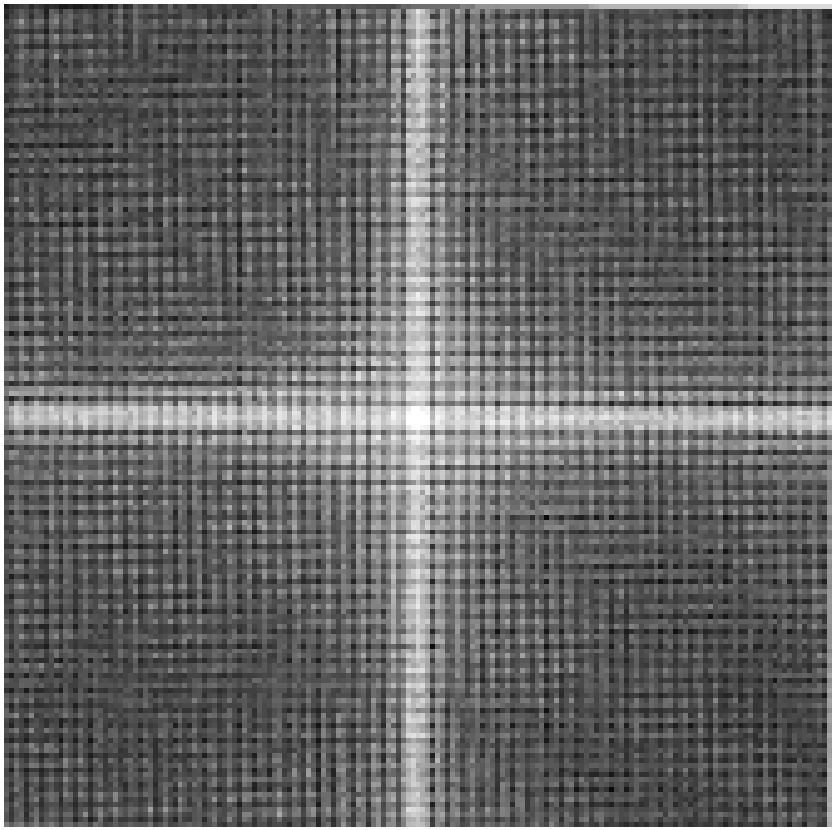


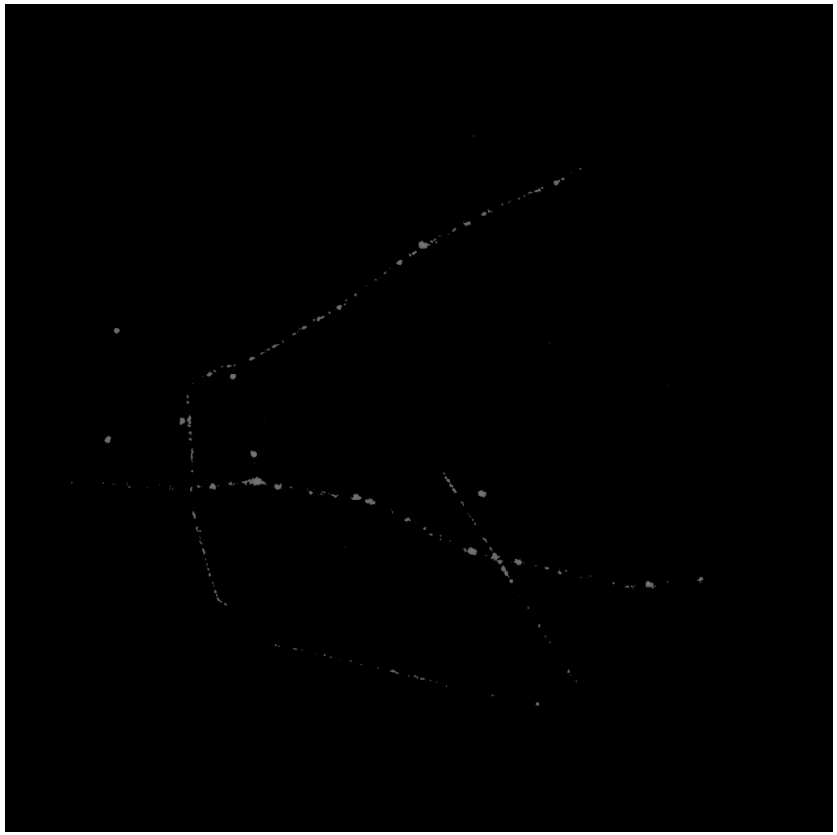
Fourier Analysis

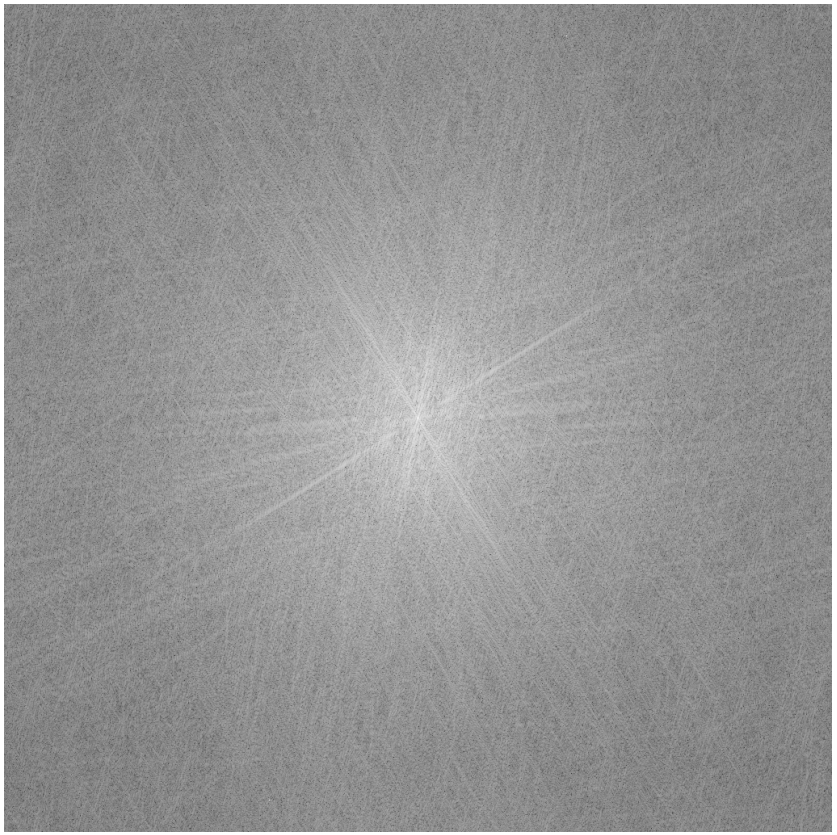
Discrete and two-dimensional case



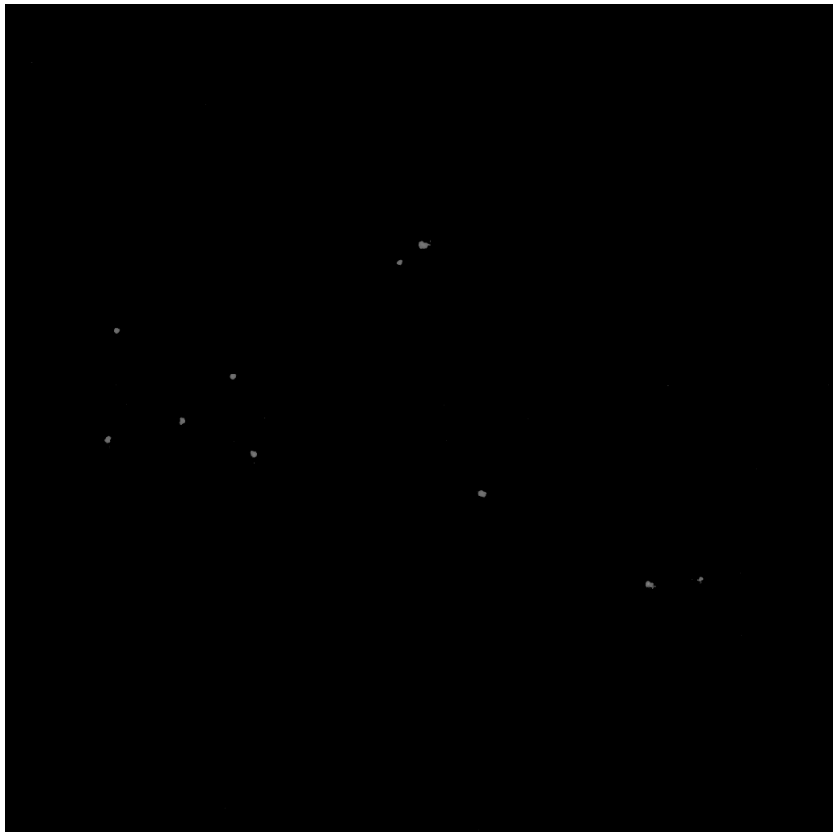


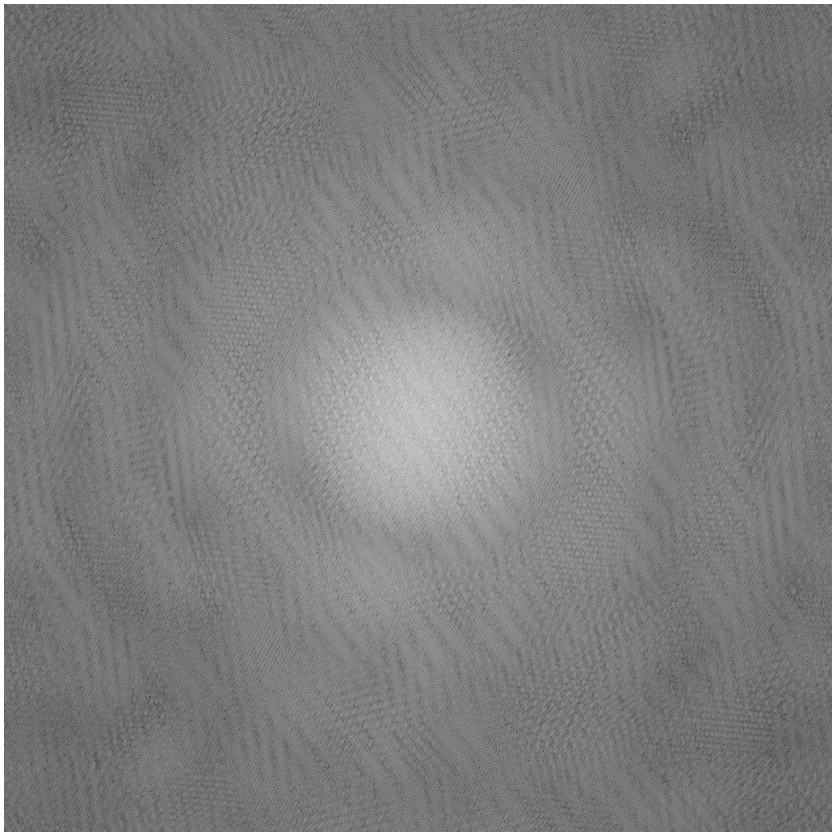
Fourier Analysis of CMOS images



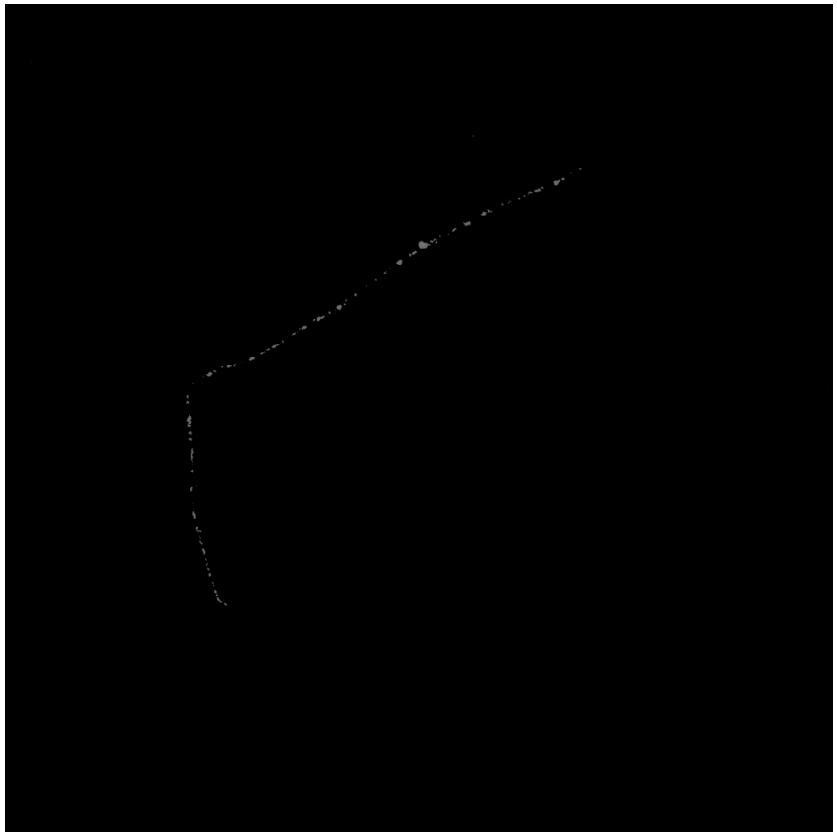


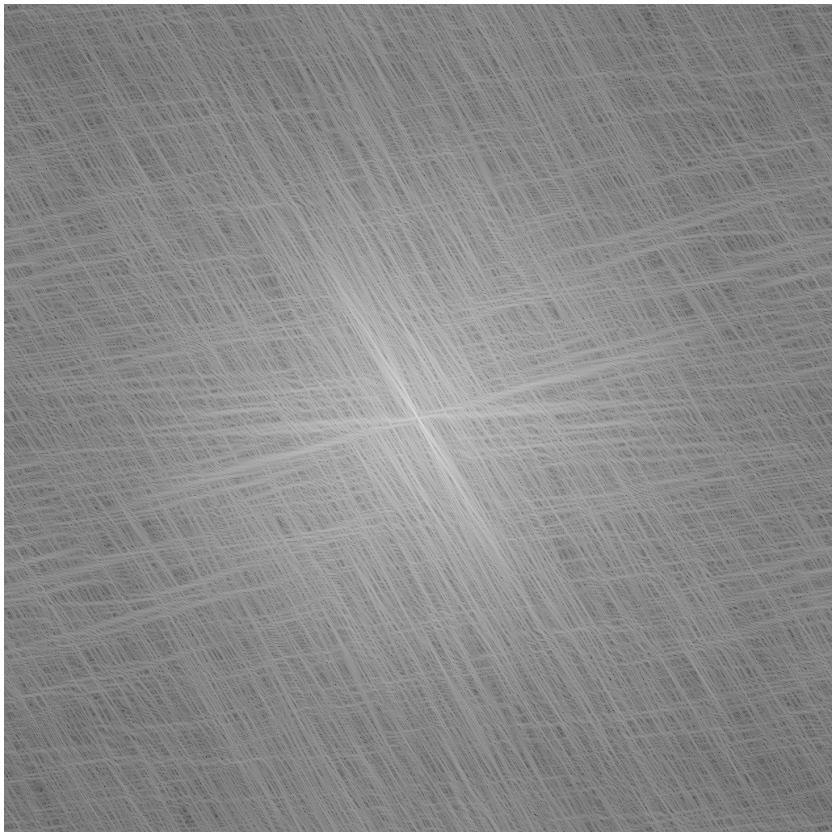
Fourier Analysis of CMOS images





Fourier Analysis of CMOS images





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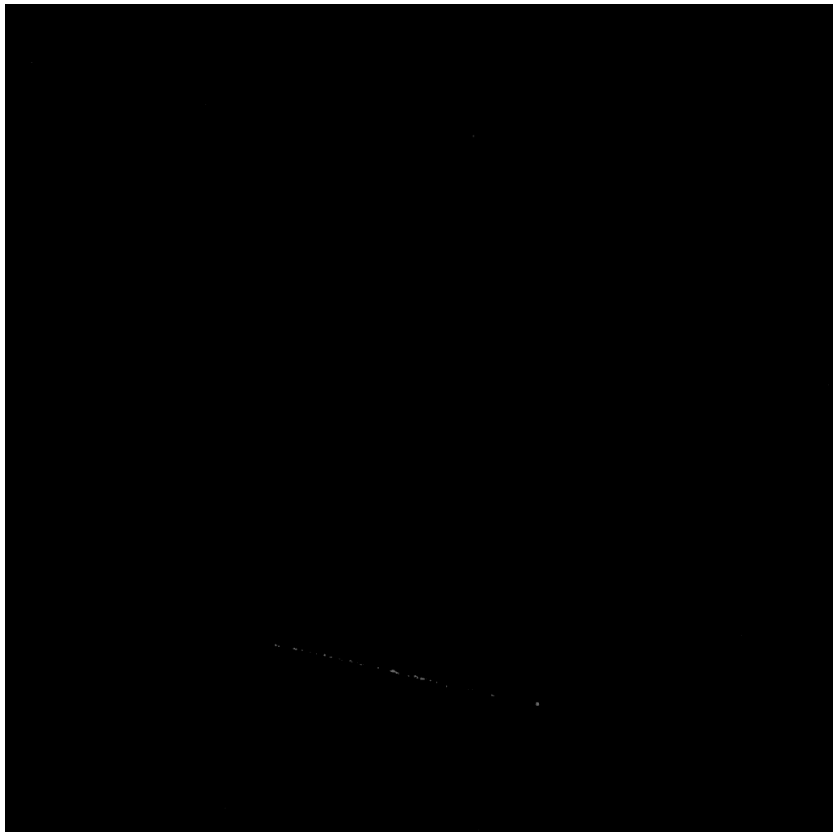

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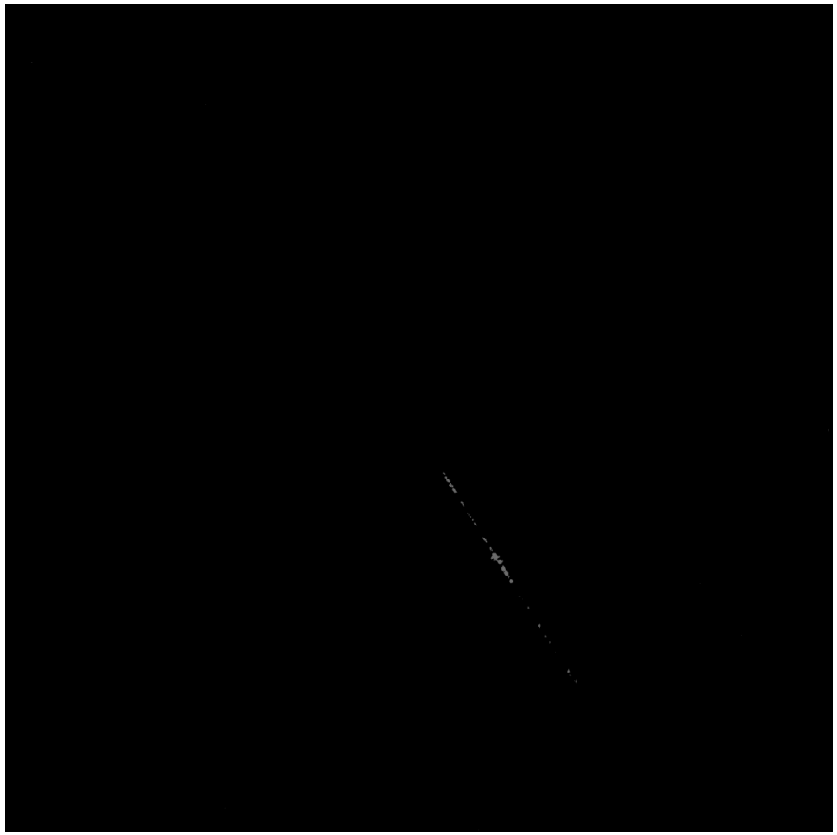

Questions?