DEVELOPING A GRAPHICAL INTERFACE FOR IMAGE ANALYSIS OF Z-STACKS OF DIC IMAGES.

Presentation 2

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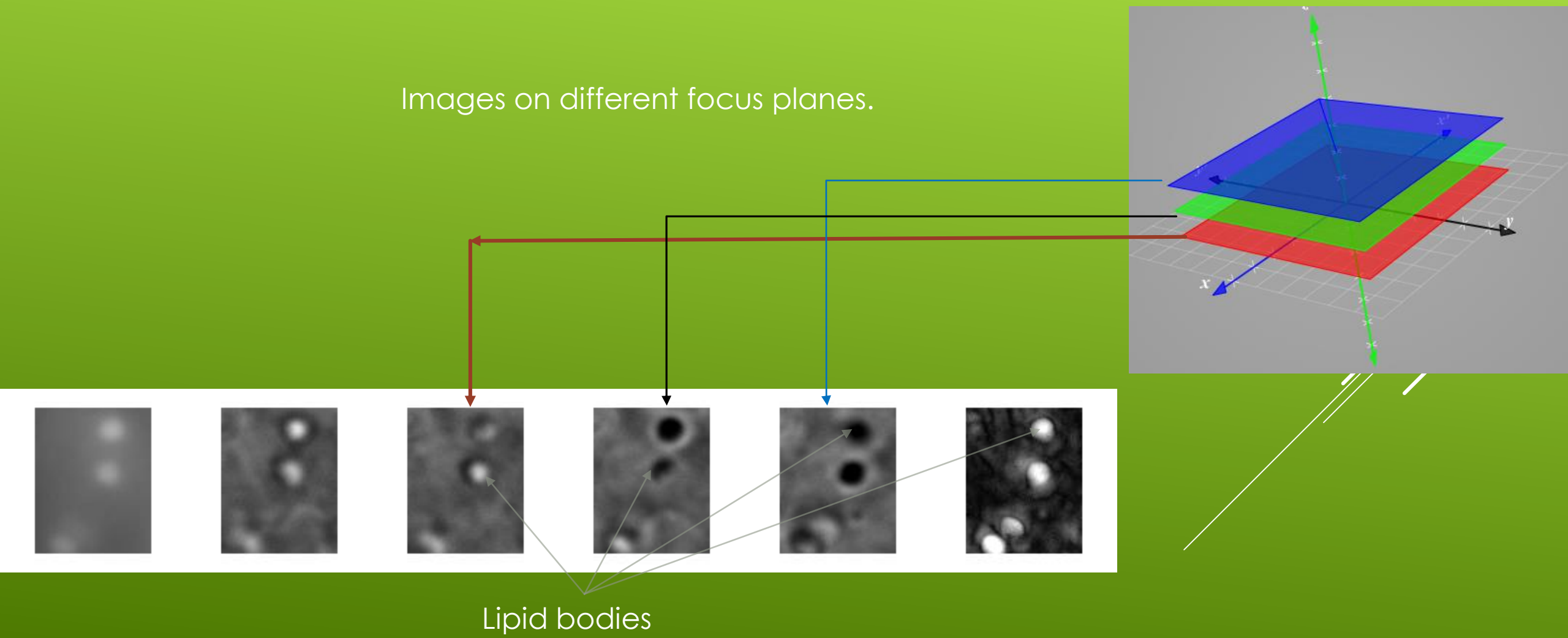
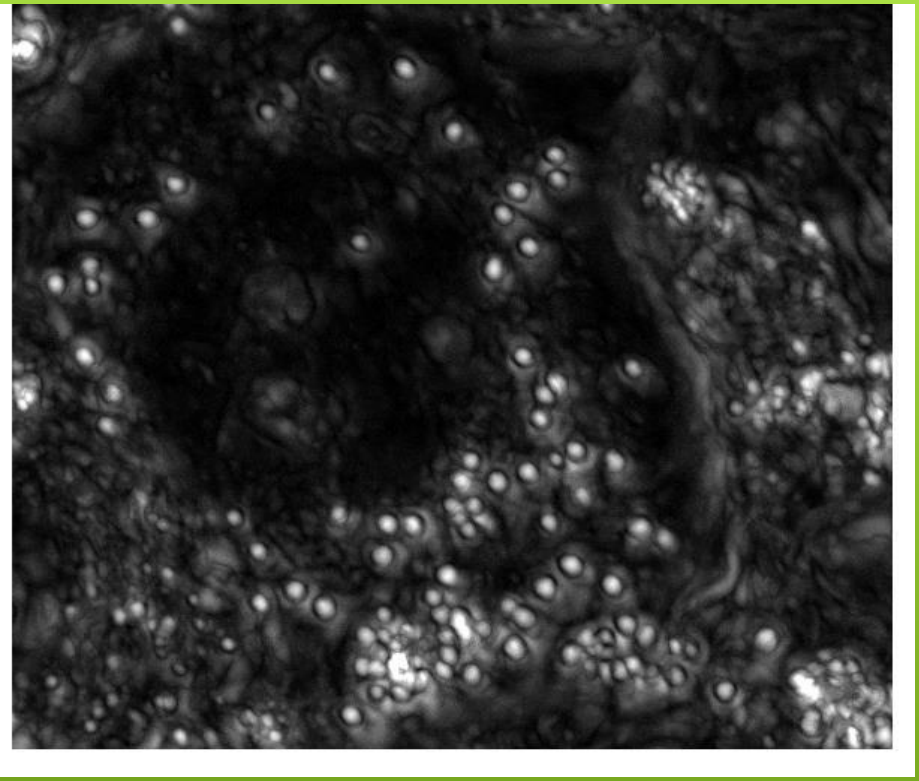
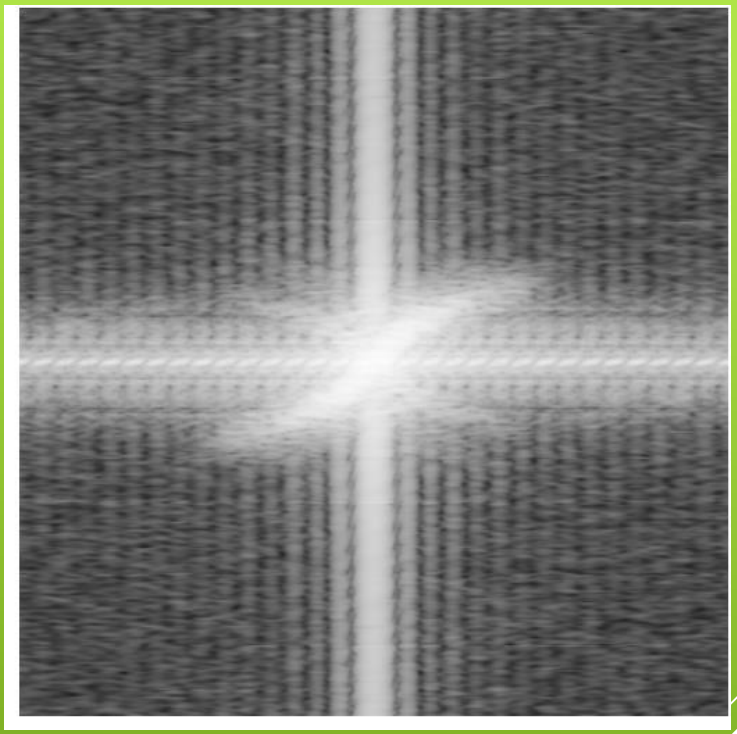
DIC: Differential interference contrast

Optical microscopy technique that relies on phase shift of light.

Images on different focus planes.

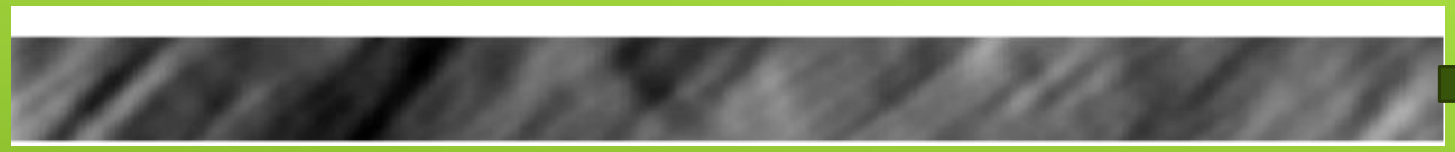




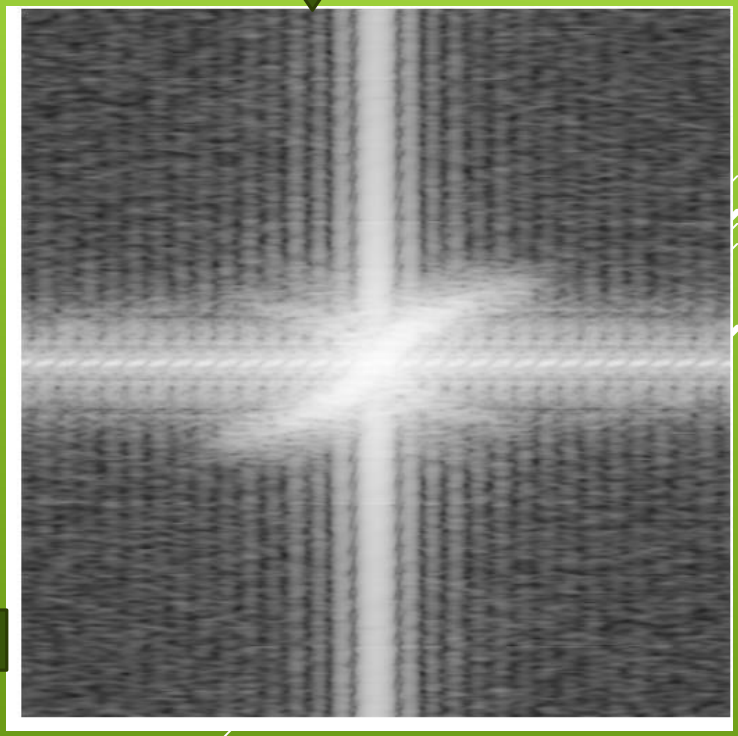


Project

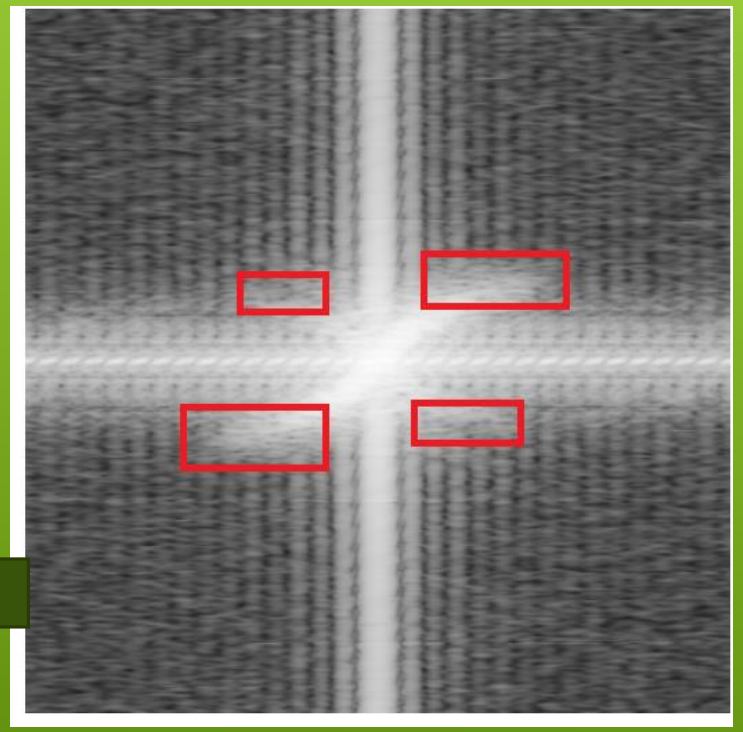
Z-stack



Fourier transform

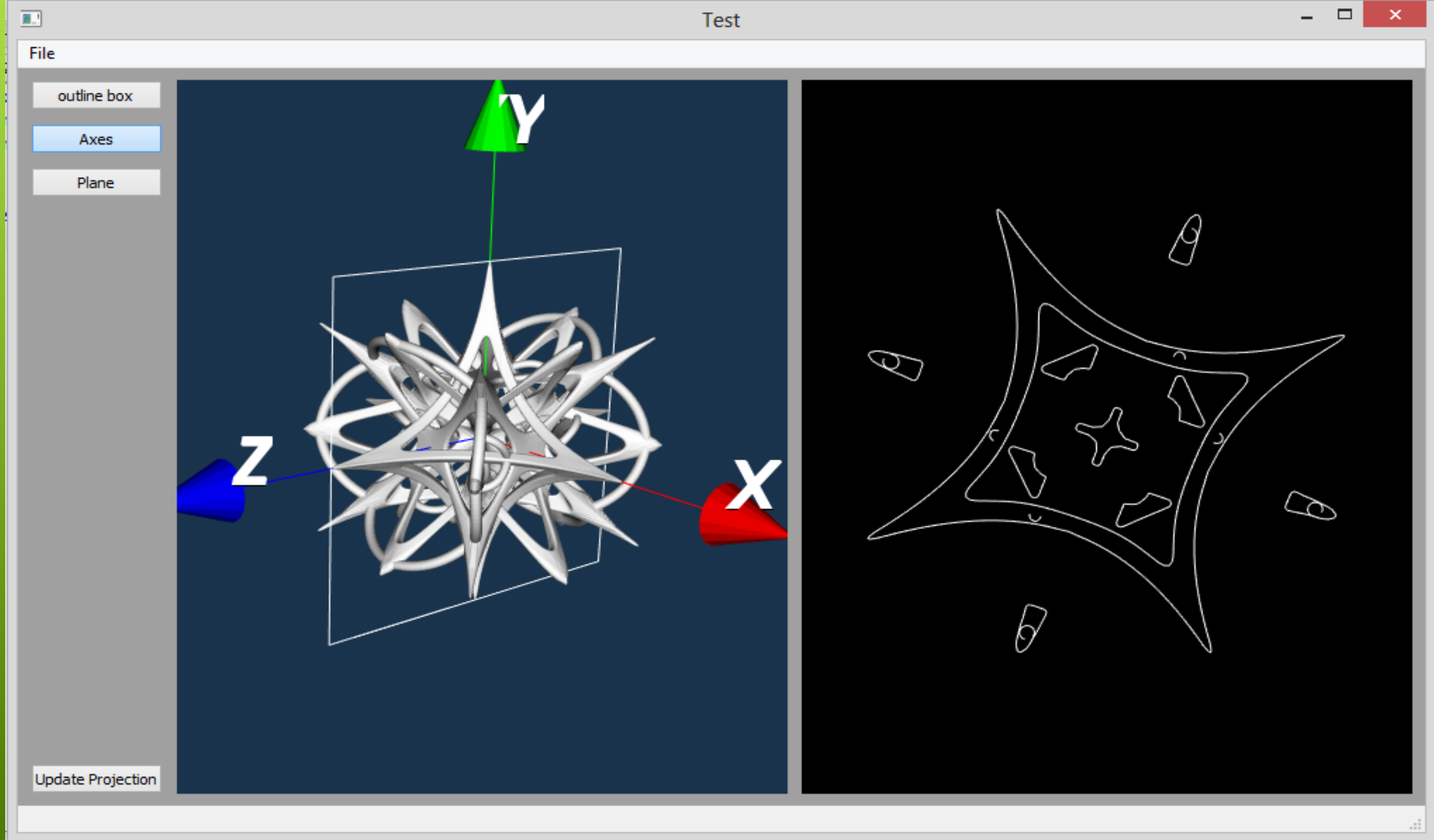


Suppress non-orthogonal component



Inverse Fourier Transform

Expected result

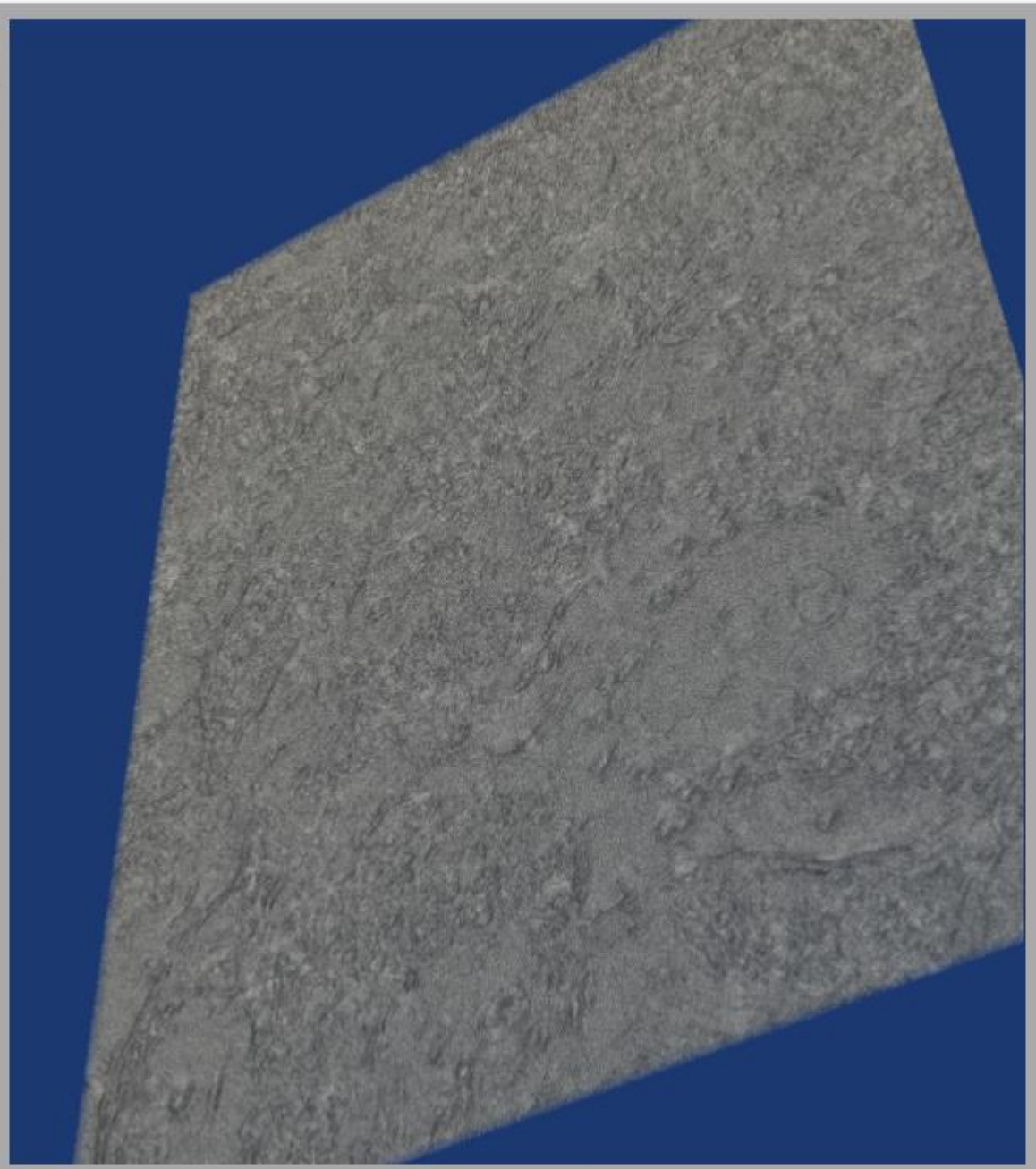

Test
File
outline box
Axes
Plane
Update Projection
Y
Z
X

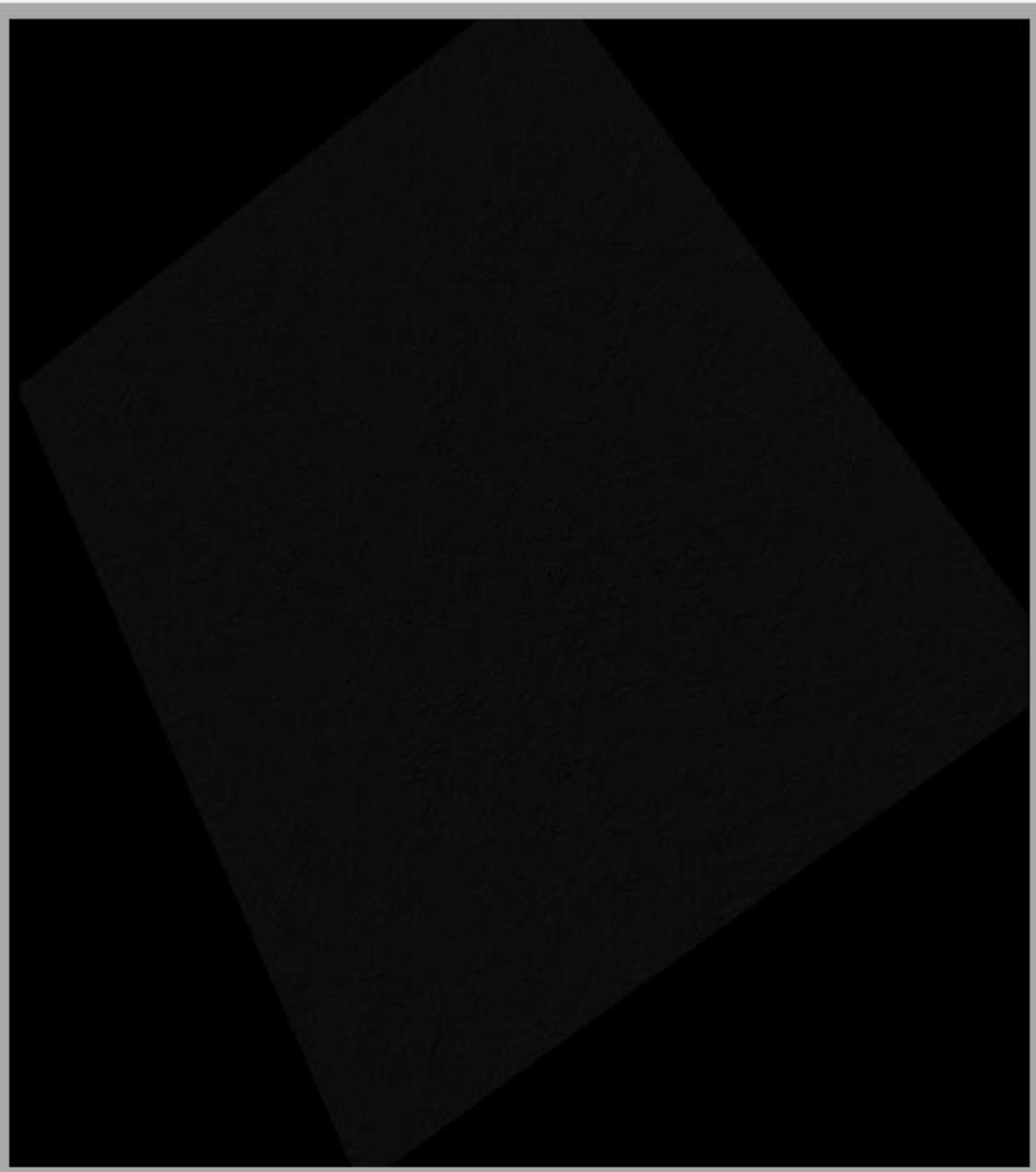
Test

File

Axes

Update Projection





- Fourier Series

$$f(x) = \sum_{n=-\infty}^{\infty} c_n e^{inx}.$$

- Discrete Fourier Transform

$$X_k = \sum_{n=0}^{N-1} x_n \cdot e^{-i 2\pi k n / N}.$$

- Discrete Hartley Transform

$$H_k = \sum_{n=0}^{N-1} x_n \left[\cos\left(\frac{2\pi}{N} nk\right) + \sin\left(\frac{2\pi}{N} nk\right) \right] \qquad k = 0, \ldots, N-1$$

- Shannon's Theorem:

Highest frequency is one half of the frequency of sampling.

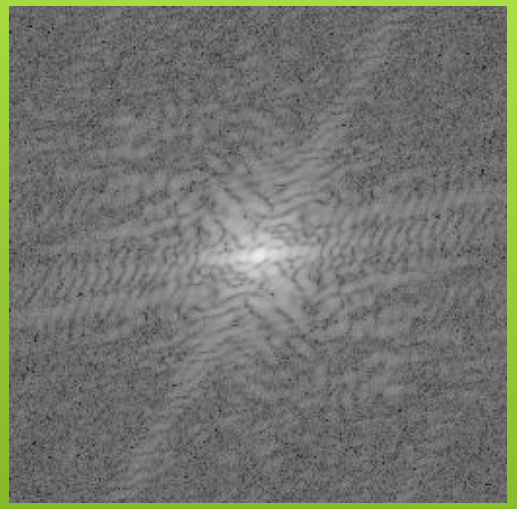
(Which is why we expected a square (2D) or cubic (3D) output.)

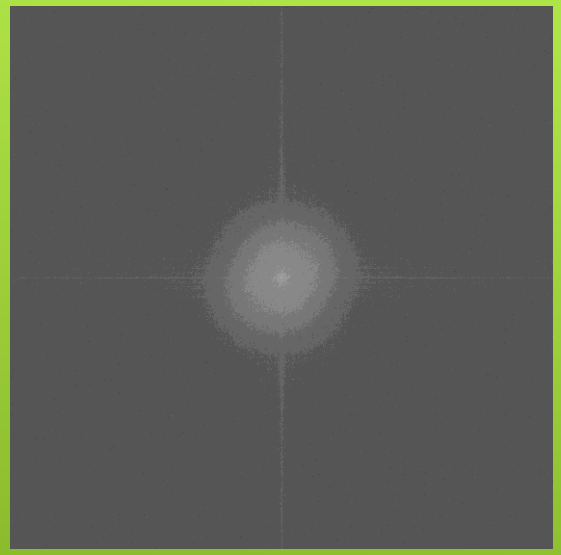
- 1D DFT/DHT

$$X_k = \sum_{n=0}^{N-1} x_n \cdot e^{-i2\pi kn/N}, \quad K = 0, 1 \ldots N-1$$

A multidimensional DFT is the composition of 1D FFT, hence we get an input of the same size as the output.

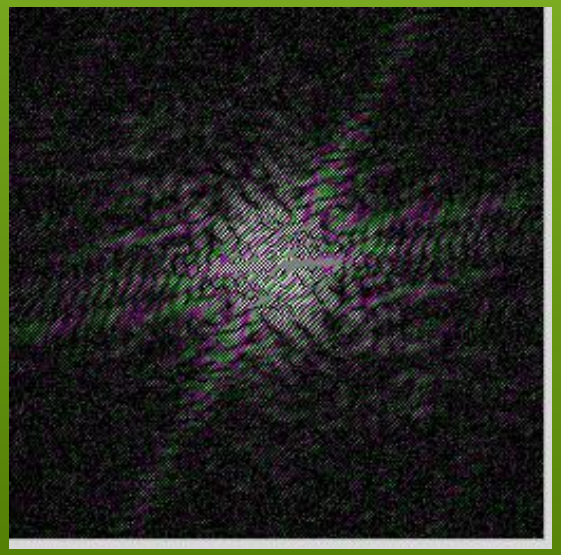
imagej

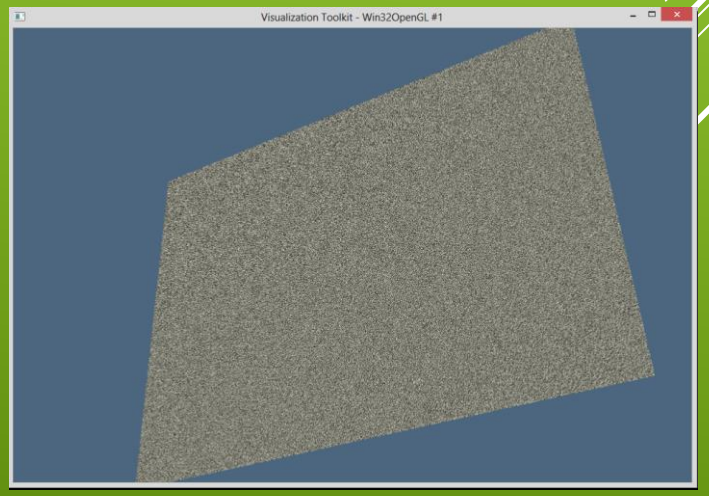


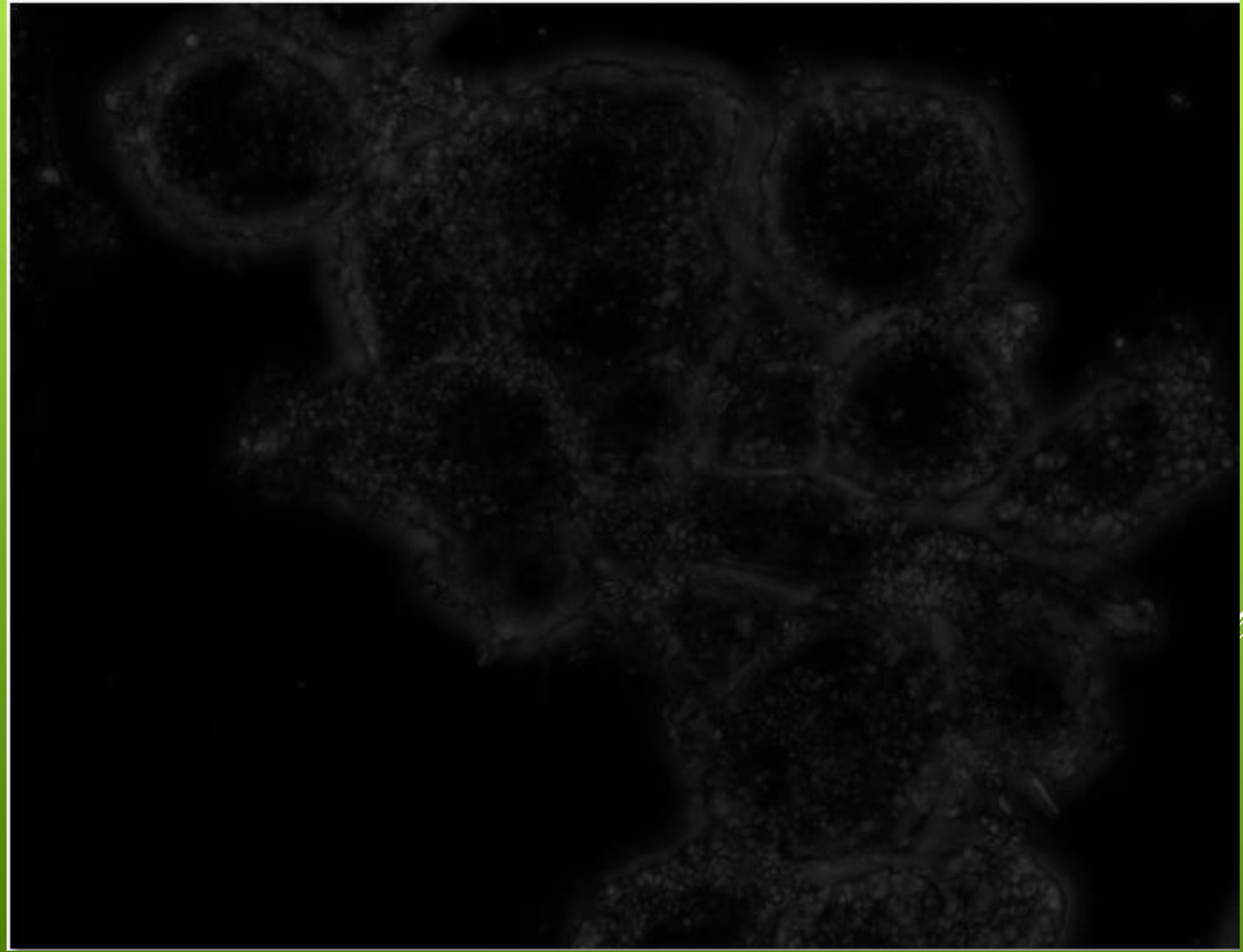


???

result







Thank you for listening.