



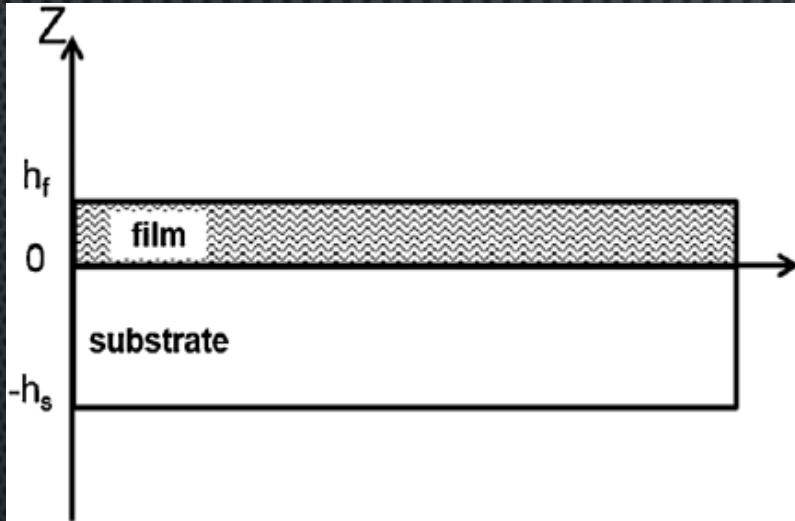
HOUGHTON COLLEGE INTERFEROMETER

NOAH KLEIN

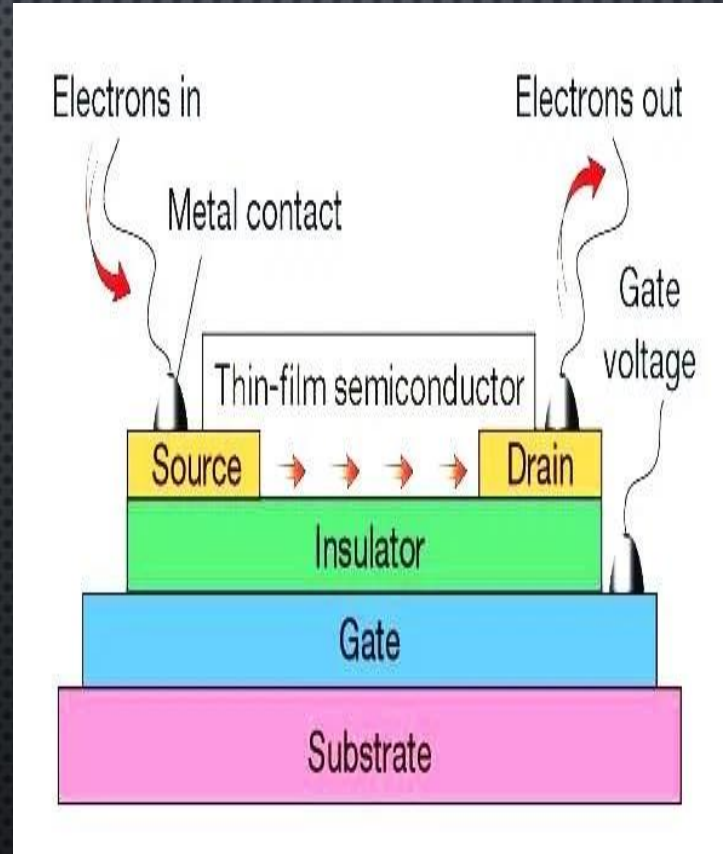
ADVISOR: BRANDON HOFFMAN



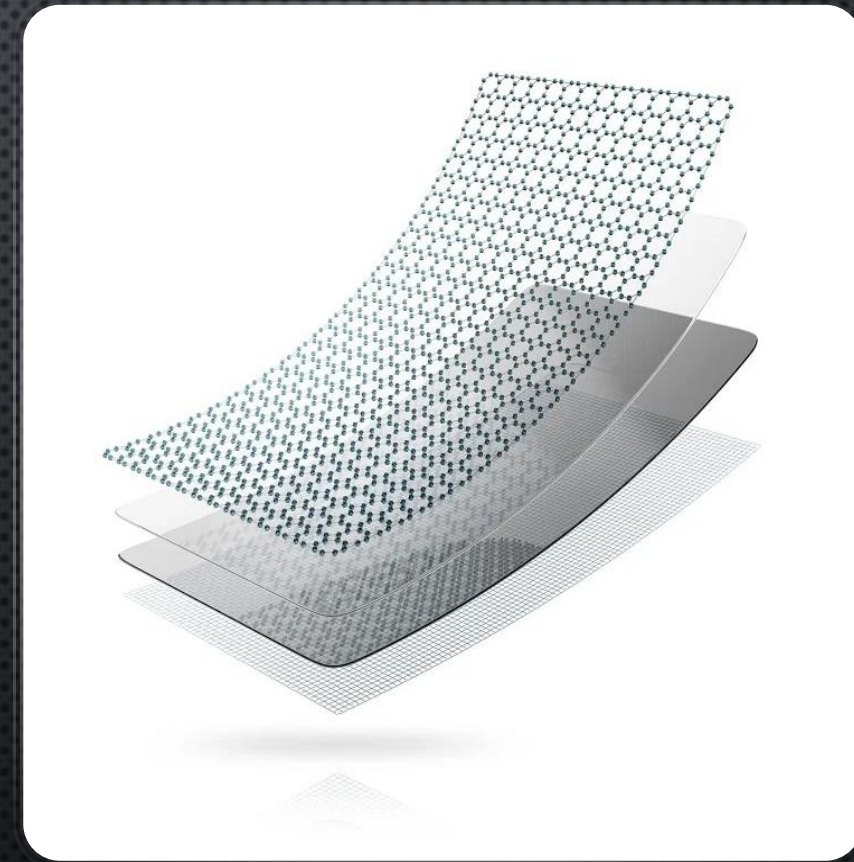
THIN FILMS



https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2FThe-schematic-drawing-of-thin-film-substrate-systems-in_fig1_258297328&psig=AOvVaw0i_FjC4WyBsFbXmpGbfSKb&ust=1649537654334000&source=images&cd=vfe&ved=0CAoQjRxqFwoTCKDOtOqshfcCFQAAAAAdAAAAABAr



<https://thinfilmsliterature.files.wordpress.com/2018/08/thin-film-semiconductor-solutions.jpg?w=640>



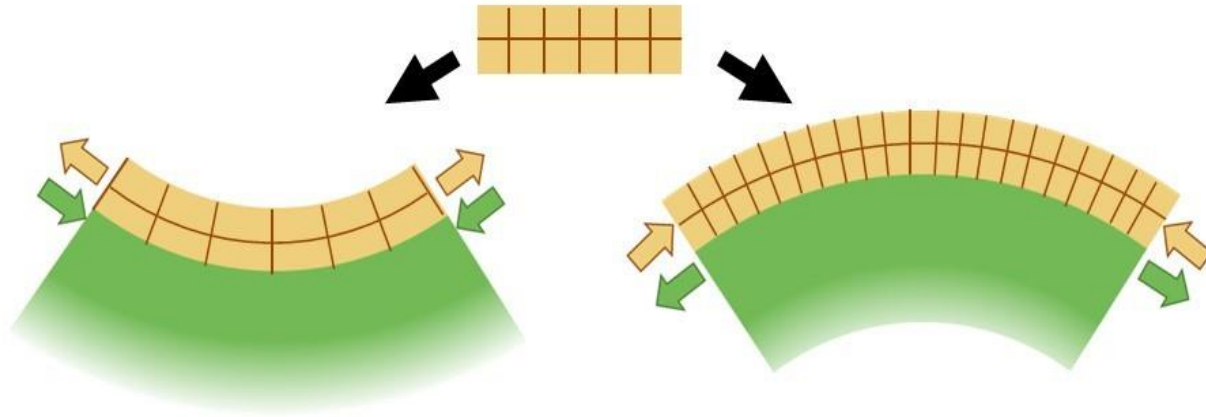
<https://www.azonano.com/article.aspx?ArticleID=5243>



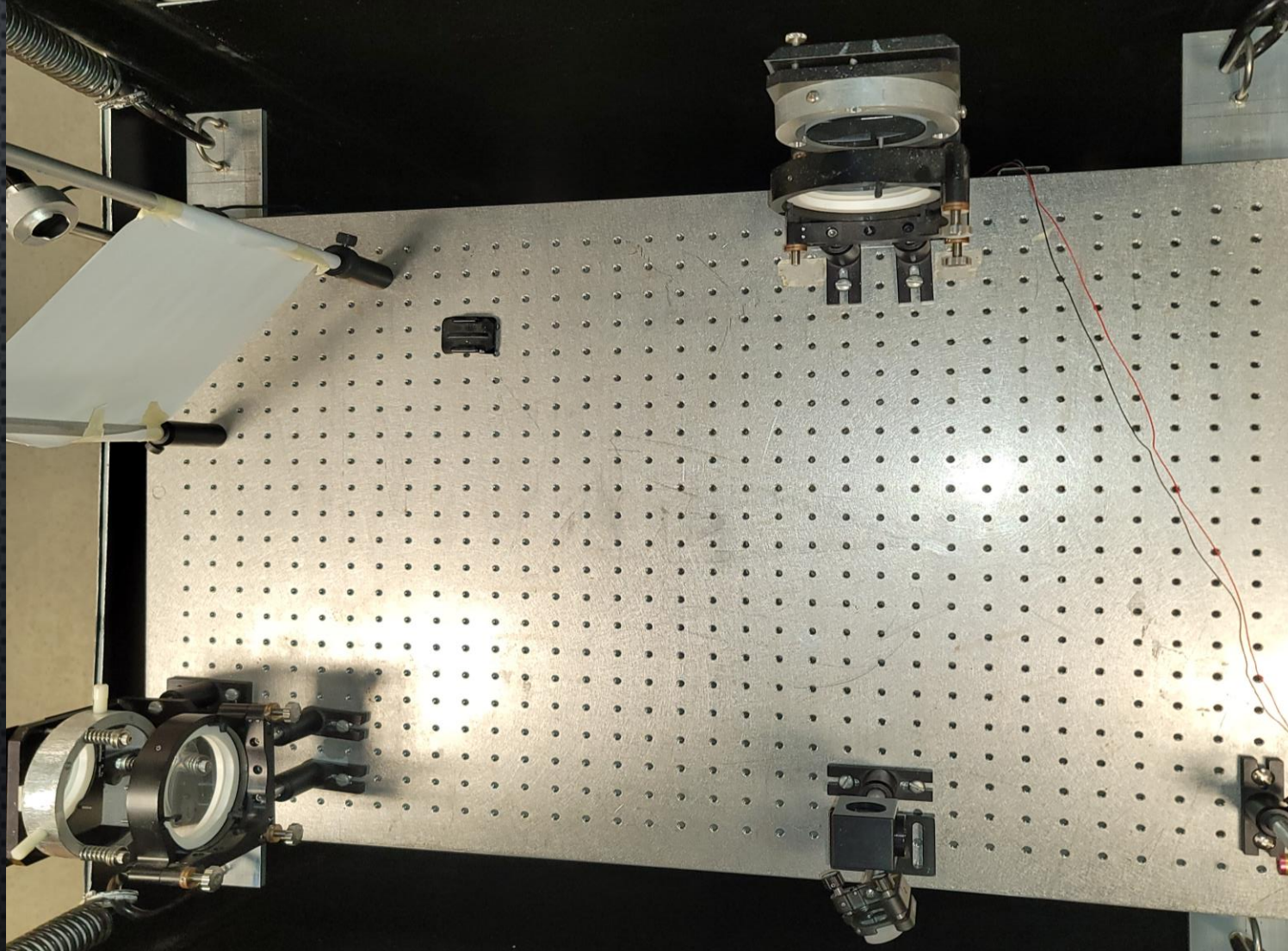
STRESS

$$\sigma_f = -\frac{Y_s}{1 - \nu_s} * \frac{K h_s^2}{6 h_f}$$

Relaxed crystal structure



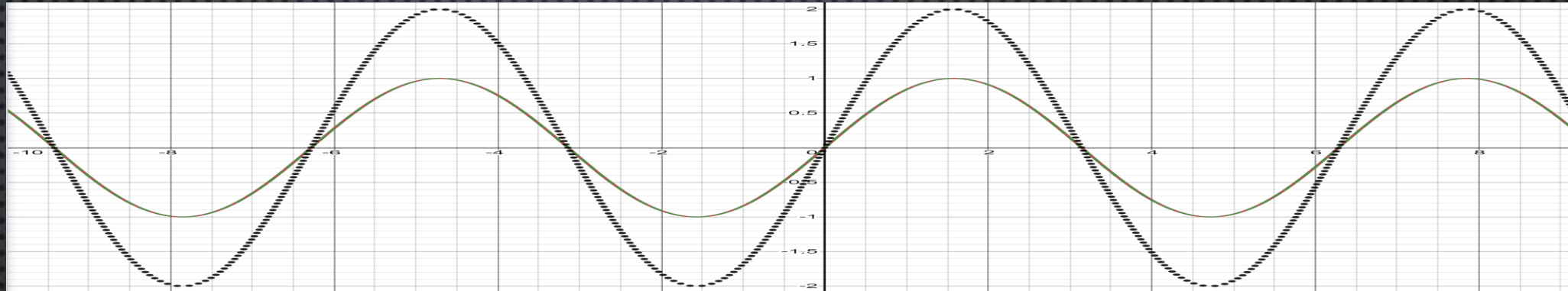
INTERFEROMETER



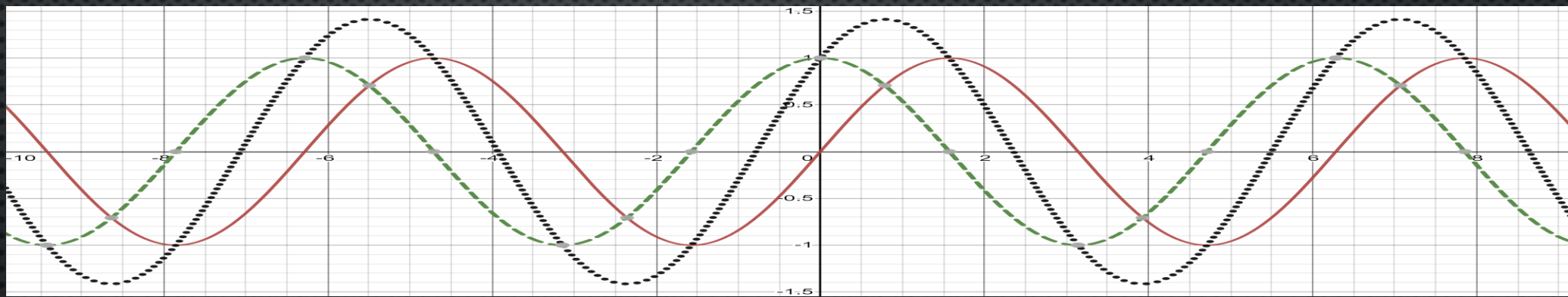
LIGHT WAVE INTERFERENCE

$$\sin(x) + \sin(x + a) = 2\cos\left[\frac{1}{2}(a)\right] \sin\left[\frac{1}{2}(2x + a)\right]$$

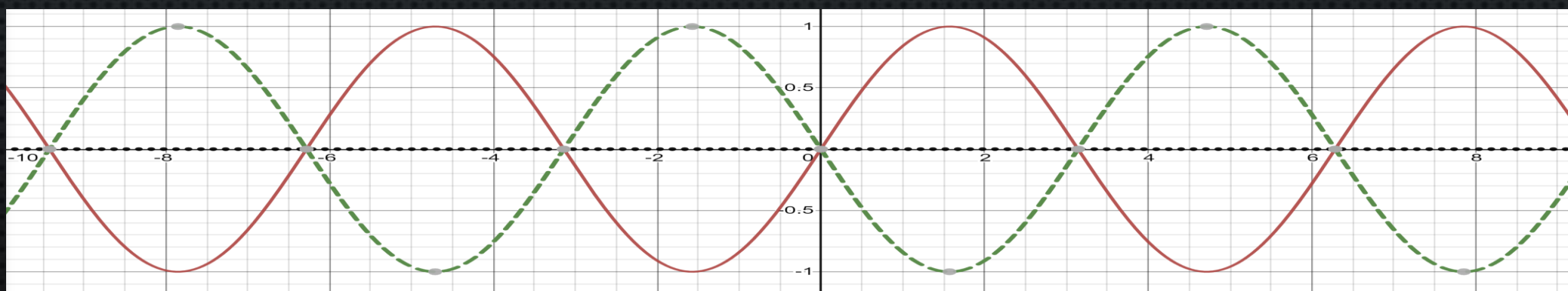
$a=0$



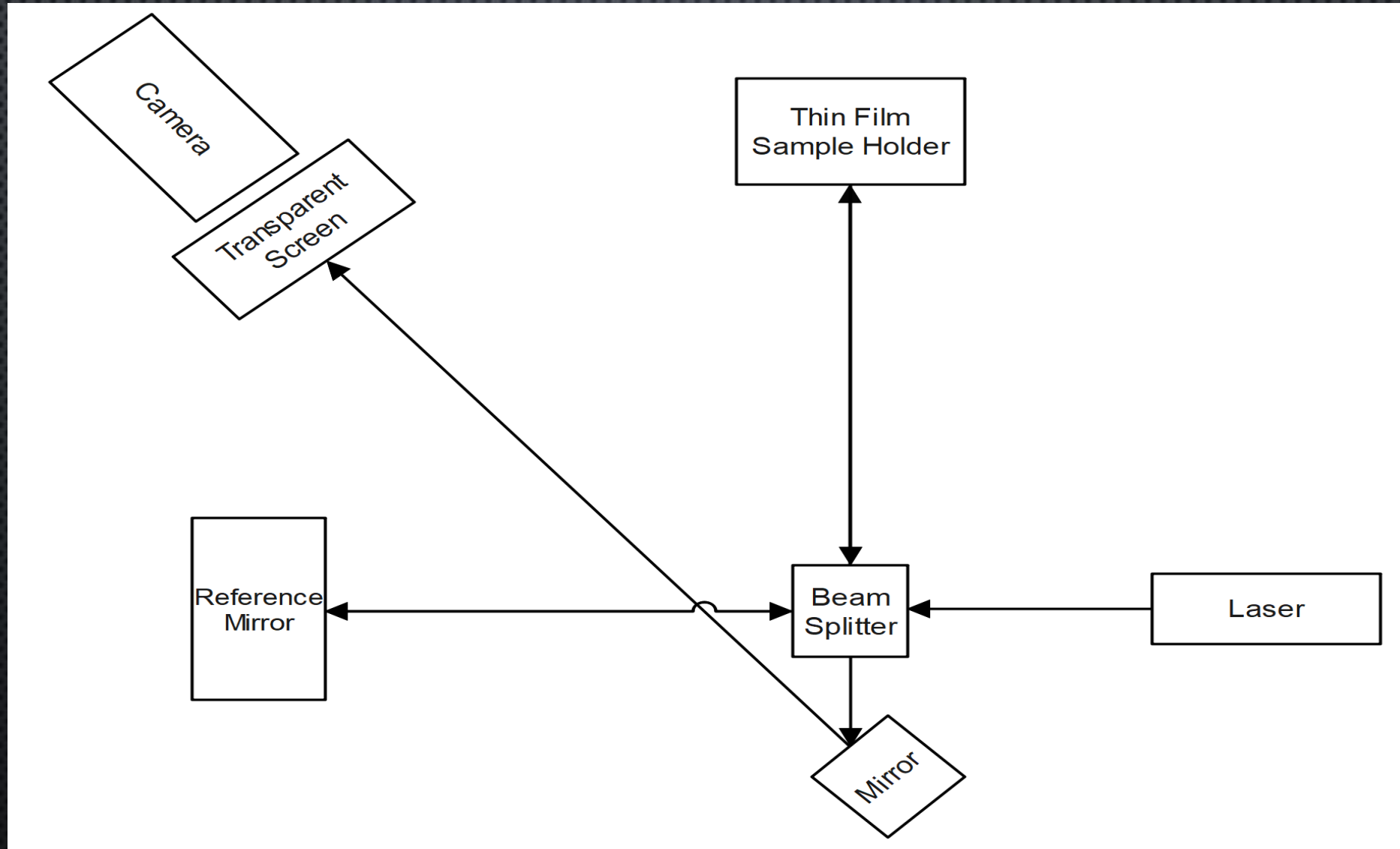
$a=\frac{\pi}{2}$



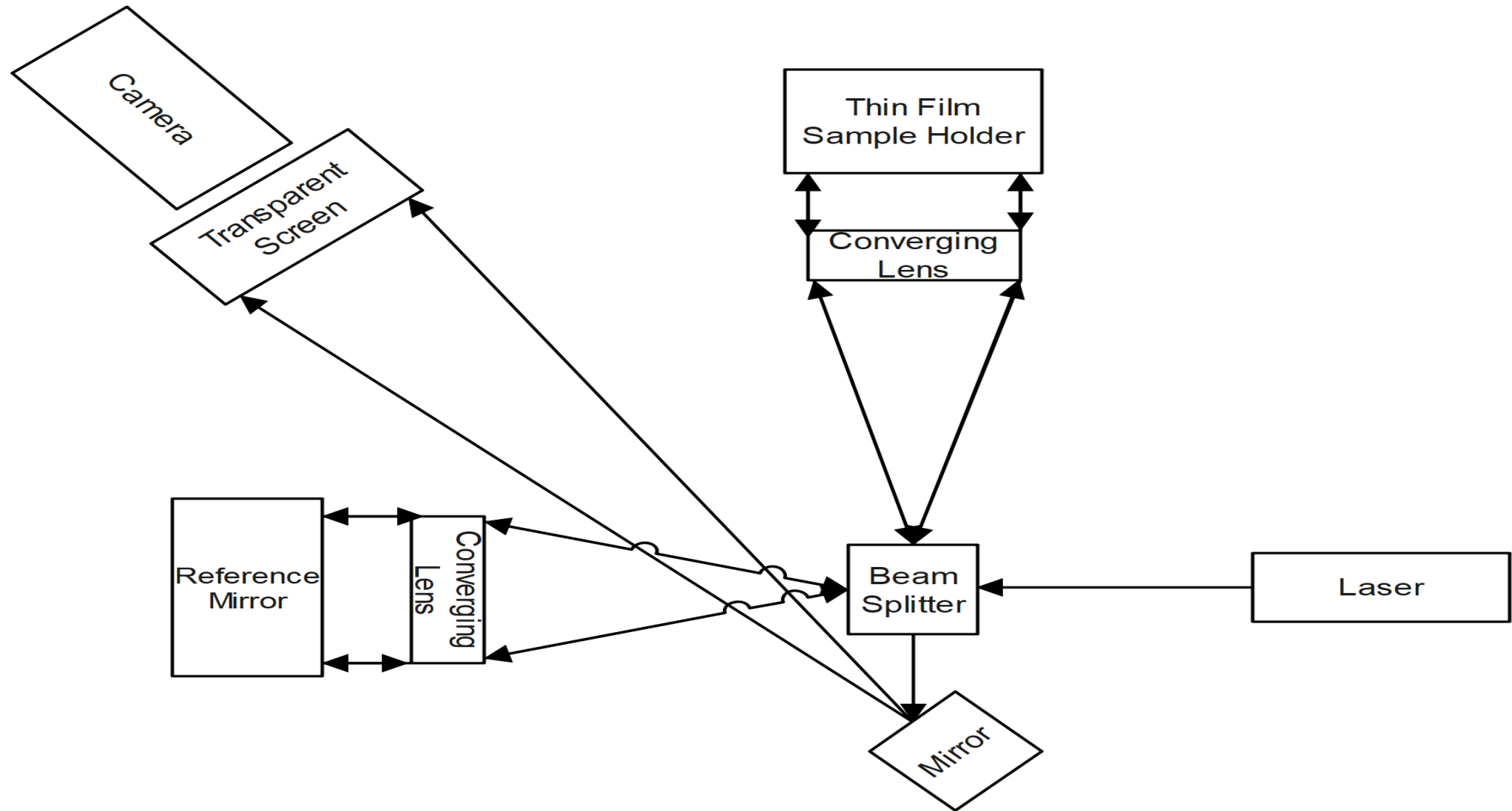
$a=\pi$



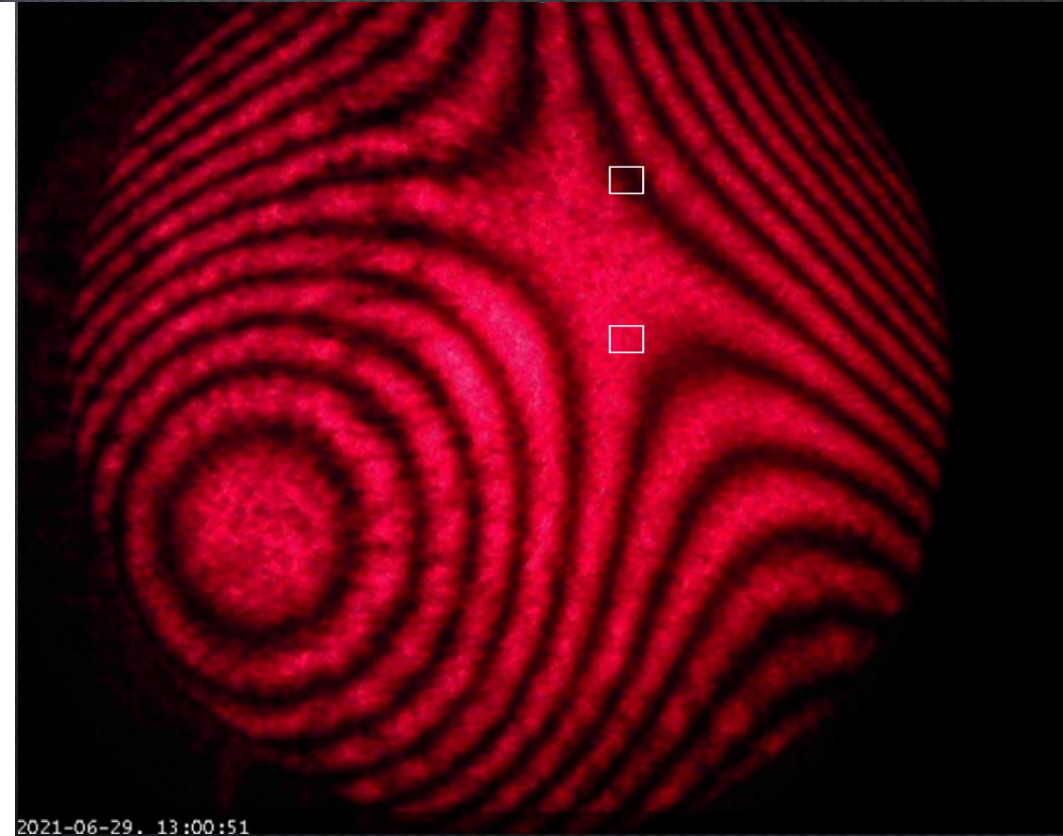
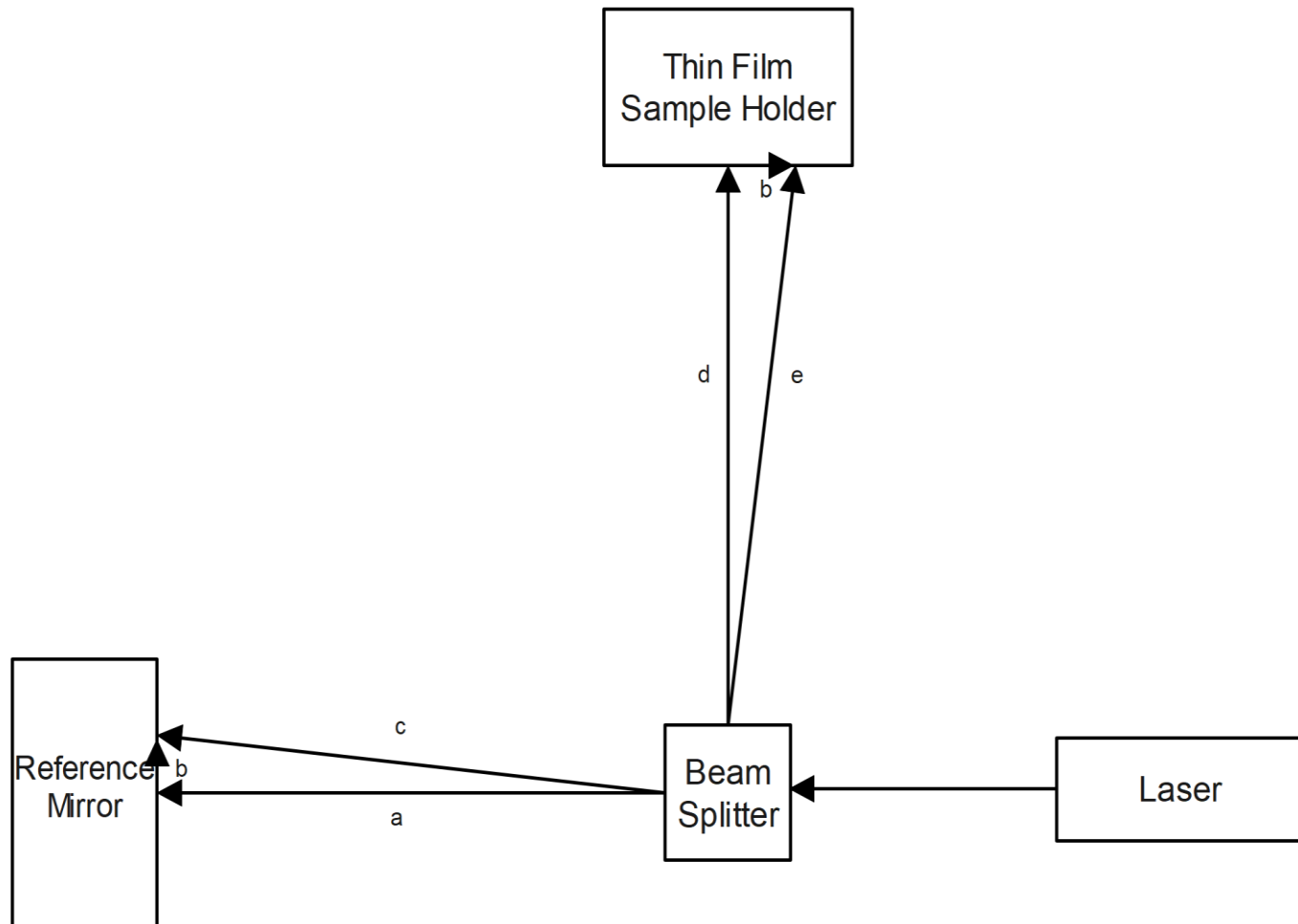
PHASE STEPPING INTERFEROMETER



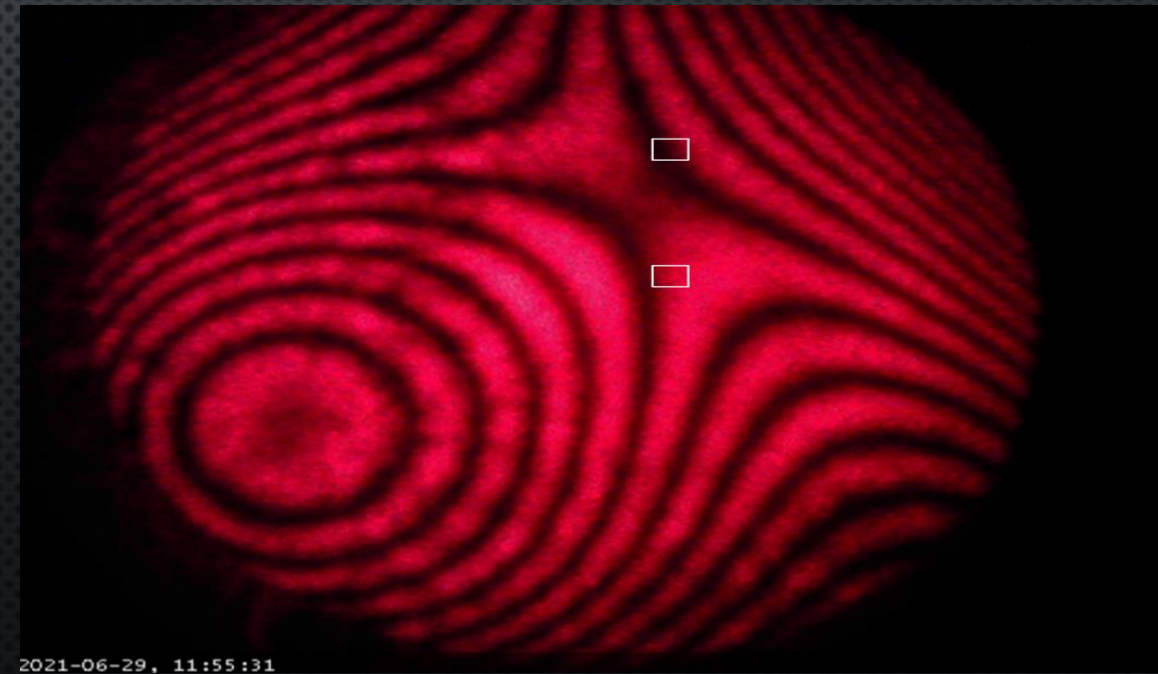
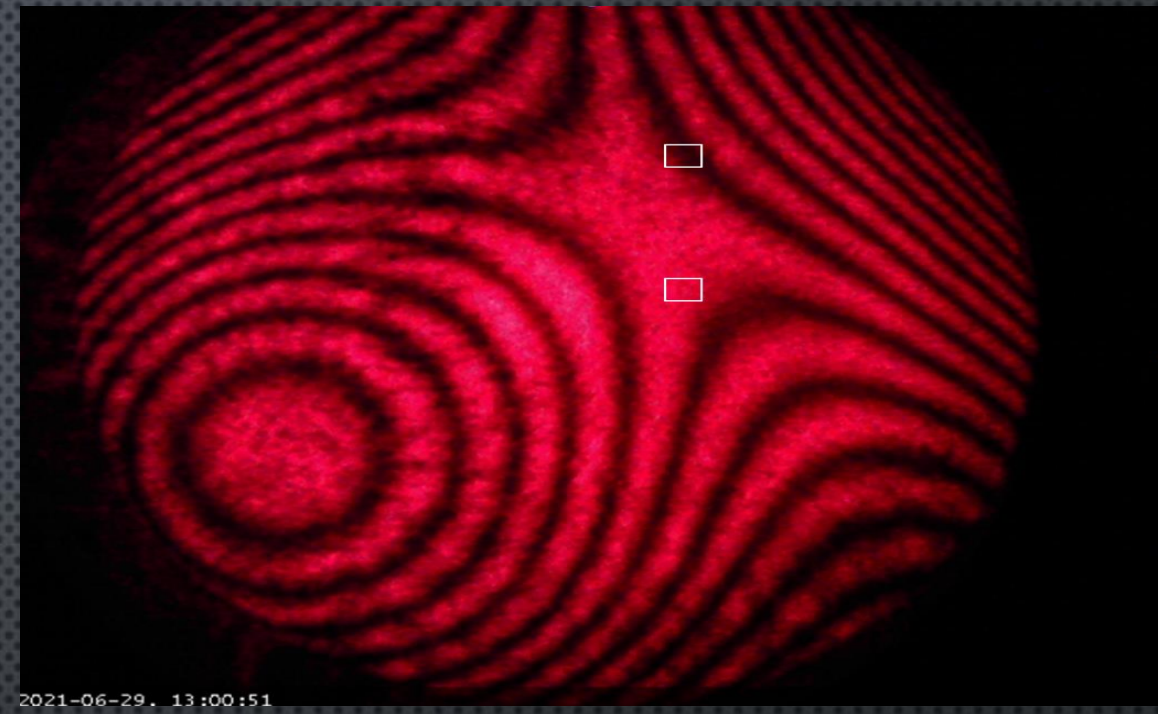
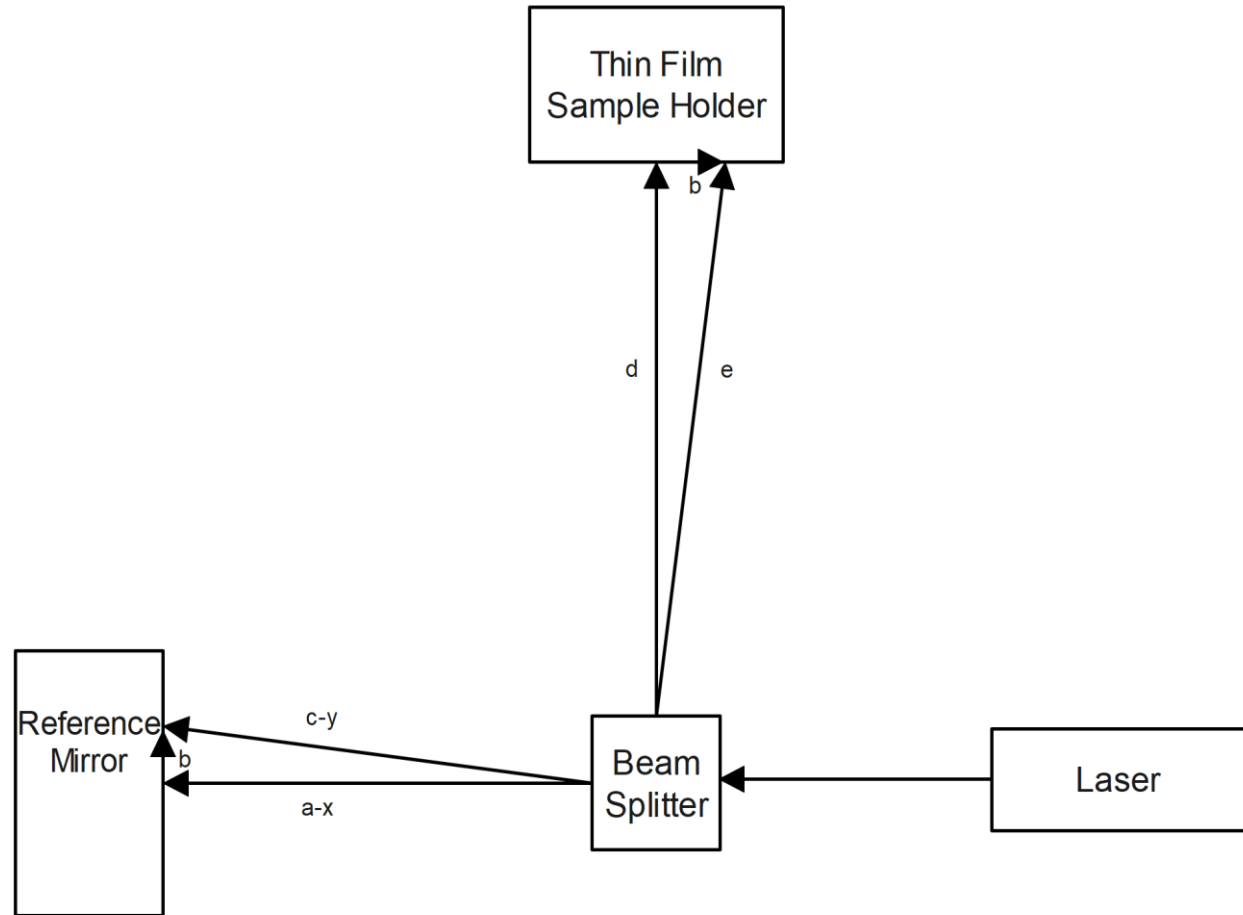
PHASE STEPPING INTERFEROMETER



INTERFERENCE PATTERN

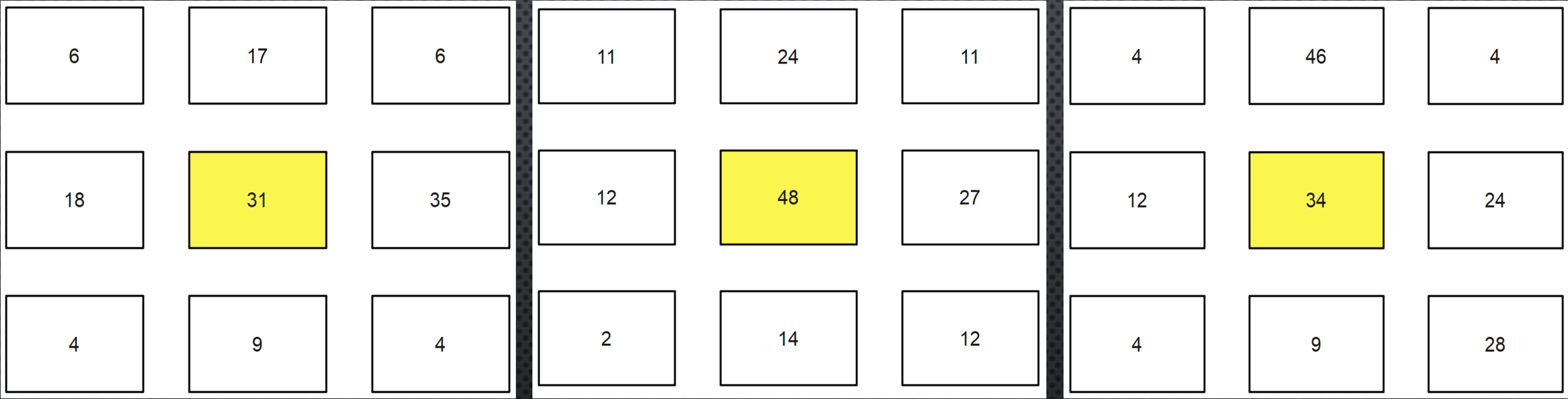


INTERFERENCE PATTERN



THE CODE

- 3D INTENSITY ARRAY

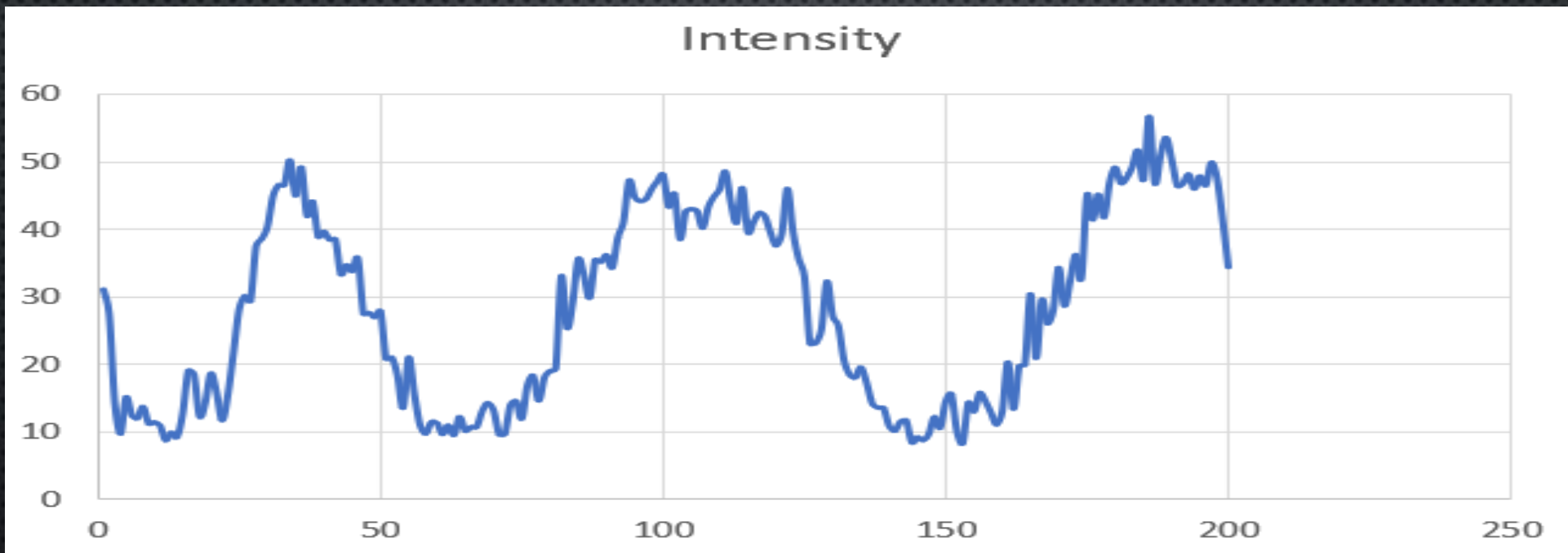


31.114	27.564	14.264	9.723	15.115	12.491	11.994	13.703	11.216	11.424	10.931	8.733	9.868	9.226	12.636	19.022	18.525	12.283	14.264	18.671	15.834	11.709	15.472	21.732	28.144	30.124
29.412	37.534	38.61	40.397	44.963	46.595	46.598	50.252	45.034	49.189	42.093	44.107	38.96	39.687	38.465	38.542	33.416	34.691	33.824	35.691	27.51	27.641	27.011	27.862	20.813	21.022
18.393	13.558	21.035	15.567	11.017	9.727	11.437	11.293	9.655	10.94	9.511	12.206	10.153	10.718	10.718	13.061	14.264	13.205	9.655	9.723	13.983	14.549	11.922	16.892	18.304	14.613
18.027	19.014	19.312	33.045	25.418	29.124	35.614	33.19	29.834	35.465	35.171	36.19	34.333	38.817	41.171	47.244	44.739	44.169	44.531	46.034	47.16	48.094	43.386	45.244	38.591	42.664
43.03	42.74	40.244	43.317	44.867	45.962	48.61	43.968	40.968	46.166	39.61	41.094	42.459	41.968	39.542	37.616	39.335	46.034	39.614	35.621	33.064	23.09	23.171	25.094	32.282	27.156
25.732	20.615	18.49	18.041	19.544	17.268	14.201	13.567	13.49	10.863	10.153	11.504	11.641	8.448	9.226	8.733	9.655	12.206	10.578	14.477	15.544	10.008	8.303	14.268	12.989	15.756
14.549	12.844	11.071	12.989	20.297	13.414	19.738	20.012	30.418	20.935	29.545	26.069	27.915	34.322	28.694	32.321	36.24	32.751	45.03	41.459	45.161	41.817	46.963	49.166	46.885	47.657
49.241	51.74	47.382	56.741	46.885	50.938	53.609	50.24	46.463	46.817	48.166	46.034	47.897	46.543	49.95	47.589	41.412	34.412								

THE CODE

$$A \sin(\omega x + \varphi) + B$$

31.114	27.564	14.264	9.723	15.115	12.491	11.994	13.703	11.216	11.424	10.931	8.733	9.868	9.226	12.636	19.022	18.525	12.283	14.264	18.671	15.834	11.709	15.472	21.732	28.144	30.124
29.412	37.534	38.61	40.397	44.963	46.595	46.598	50.252	45.034	49.189	42.093	44.107	38.96	39.687	38.465	38.542	33.416	34.691	33.824	35.691	27.51	27.641	27.011	27.862	20.813	21.022
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18.027	19.014	19.312	33.045	25.418	29.124	35.614	33.19	29.834	35.465	35.171	36.19	34.333	38.817	41.171	47.244	44.739	44.169	44.531	46.034	47.16	48.094	43.386	45.244	38.591	42.664
43.03	42.74	40.244	43.317	44.867	45.962	48.61	43.968	40.968	46.166	39.61	41.094	42.459	41.968	39.542	37.616	39.335	46.034	39.614	35.621	33.064	23.09	23.171	25.094	32.282	27.156
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49.241	51.74	47.382	56.741	46.885	50.938	53.609	50.24	46.463	46.817	48.166	46.034	47.897	46.543	49.95	47.589	41.412	34.412								



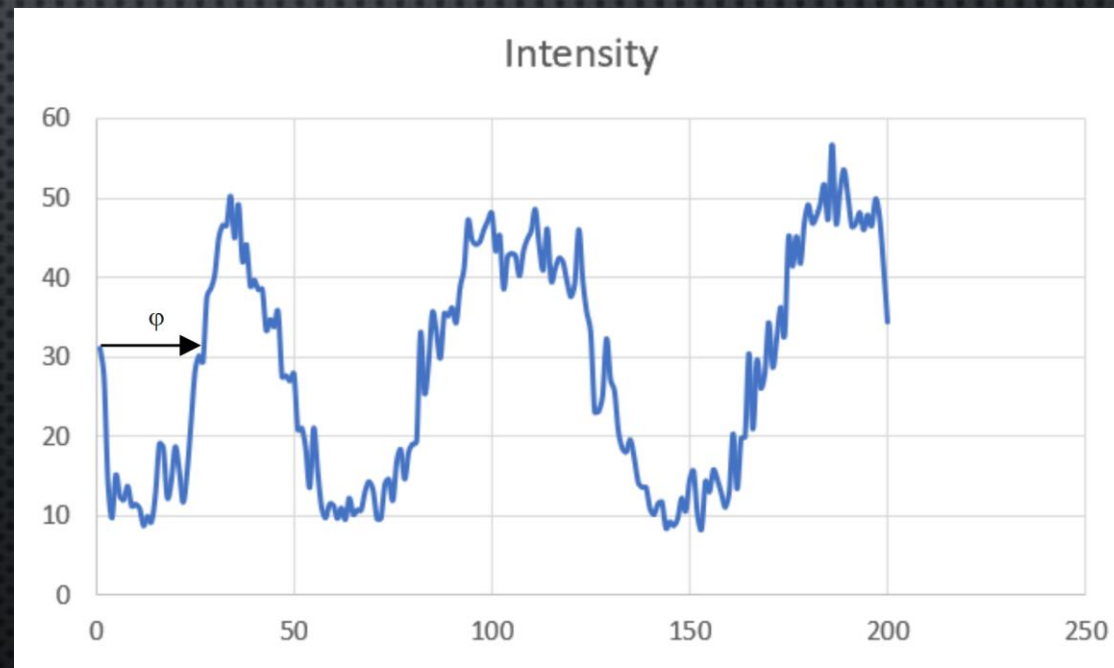
THE CODE

Fit Parameters
For Each Pixel

Create A 2D
Array of ϕ
Values

Multiply by
Wavelength
over 4π

Plot The 2D
Array



DECREASING NOISE



16:31:20



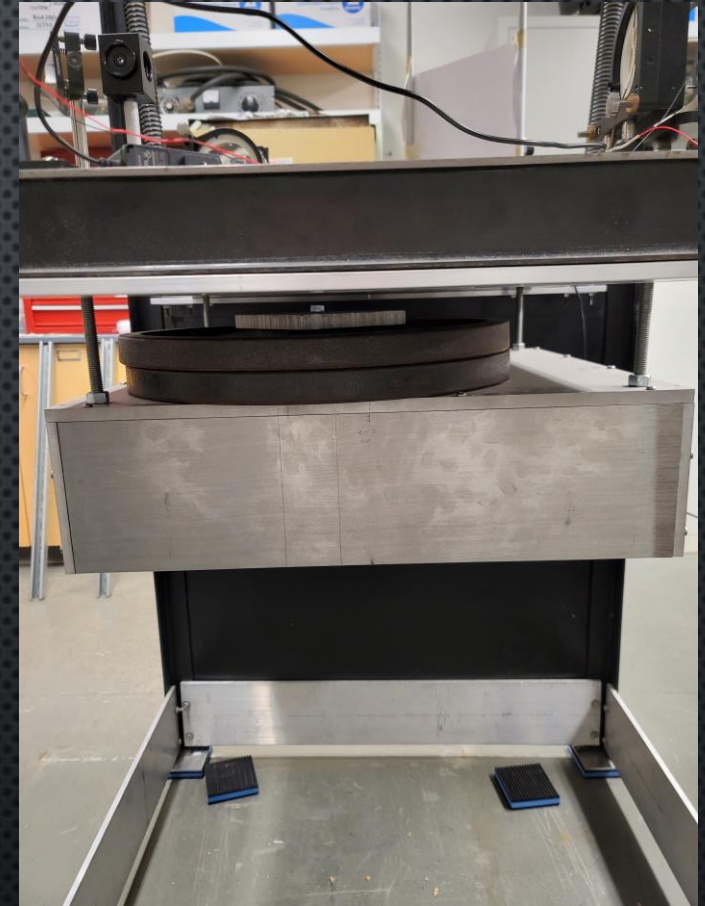
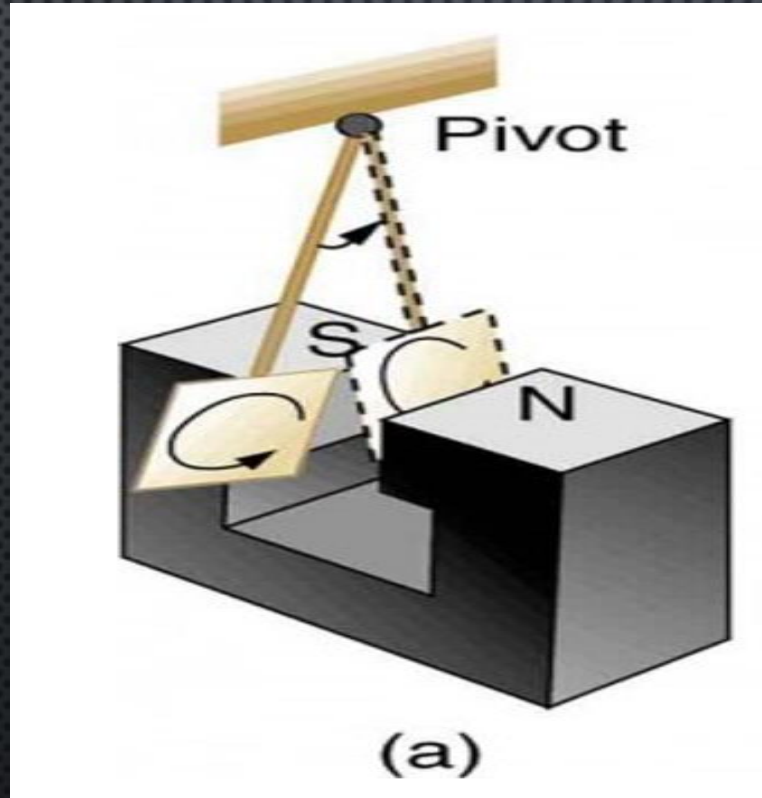
16:31:31



16:31:49

EDDY CURRENT TABLE (E.C.T.)

- SPRINGS
- SLOW/STOP MOVEMENT
- DECREASE NOISE



https://s3-us-west-2.amazonaws.com/courses-images-archive-read-only/wp-content/uploads/sites/222/2014/12/20110817/Figure_24_04_01.jpg

E.C.T.

- LESS CYCLES
- RESTORES PATTERN



HOUSING

- AIRFLOW
- DESIGN
- PAINT
- RESULTS

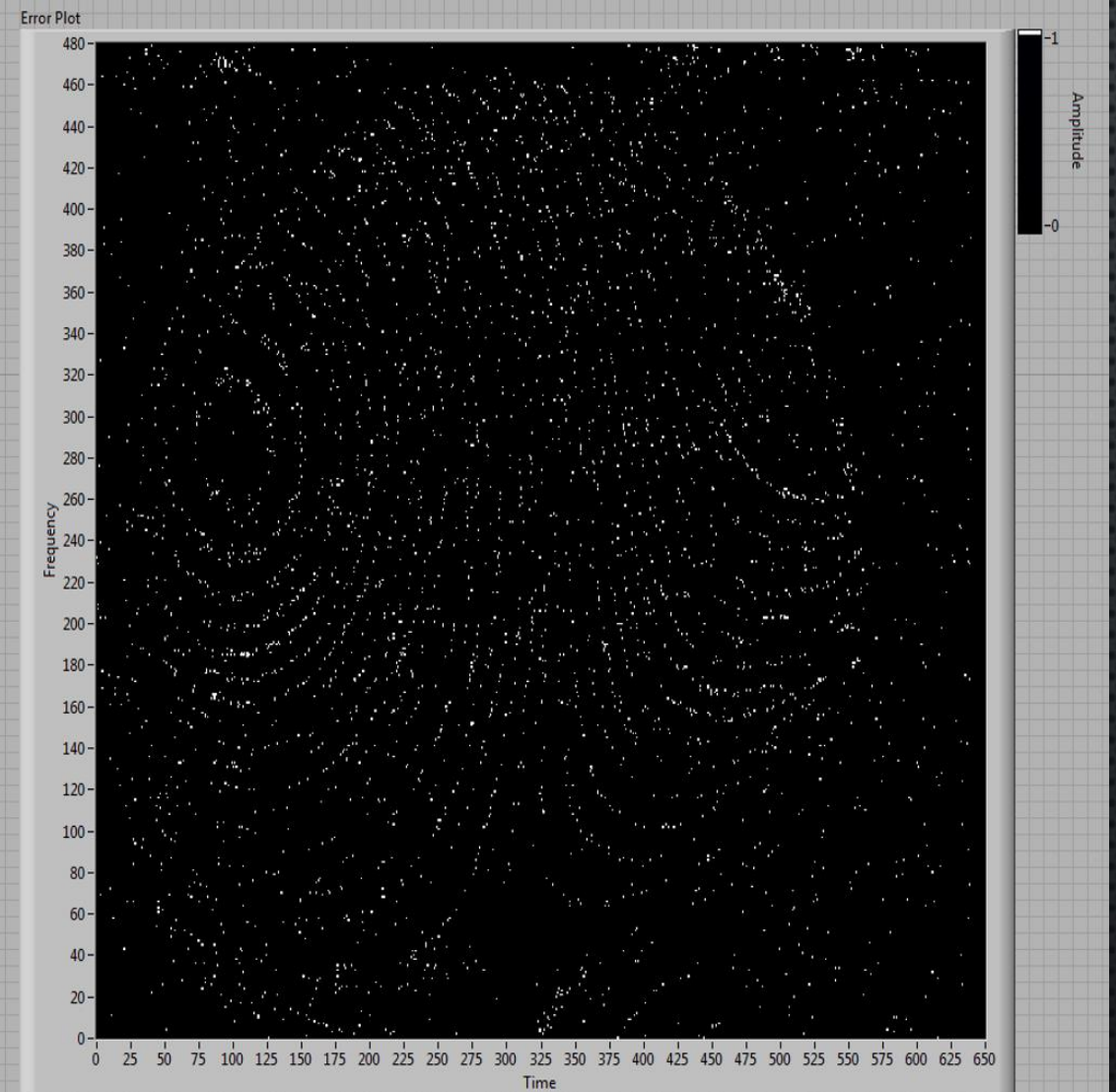
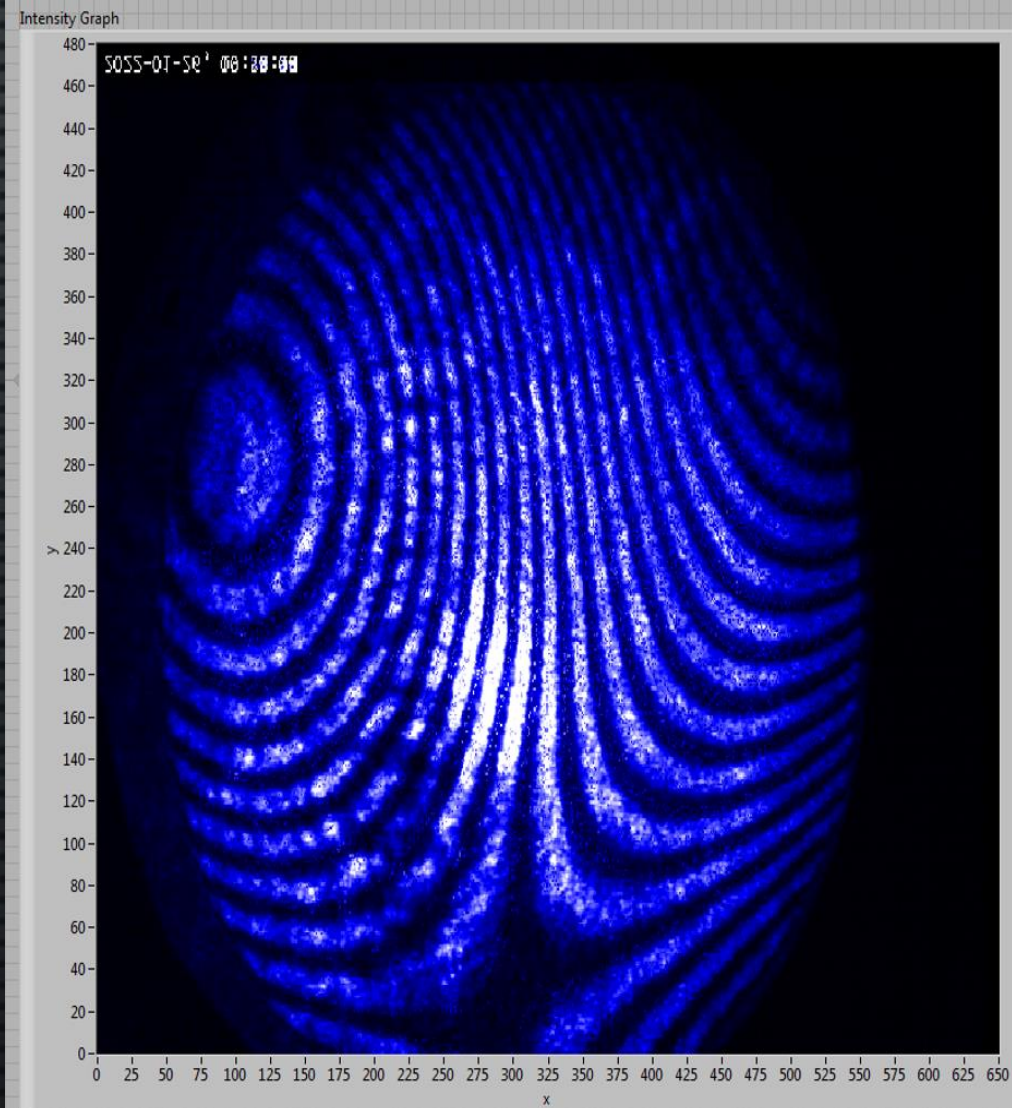


NOISE DECREASED

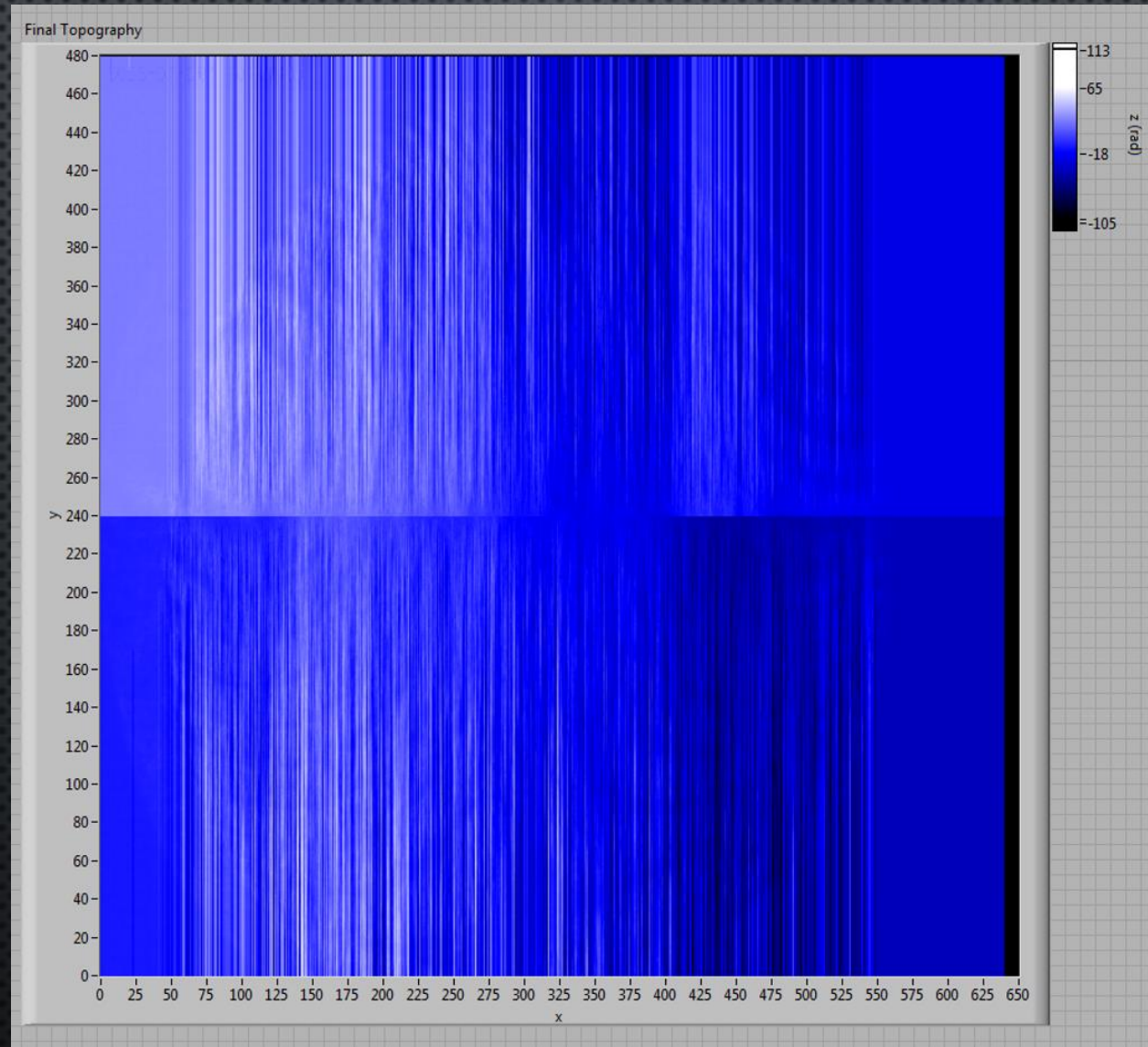
65
Minutes



MOVING FORWARD



MOVING FORWARD



THANK YOU!

- QUESTIONS