Arc BLM activity before/after seed laser swap

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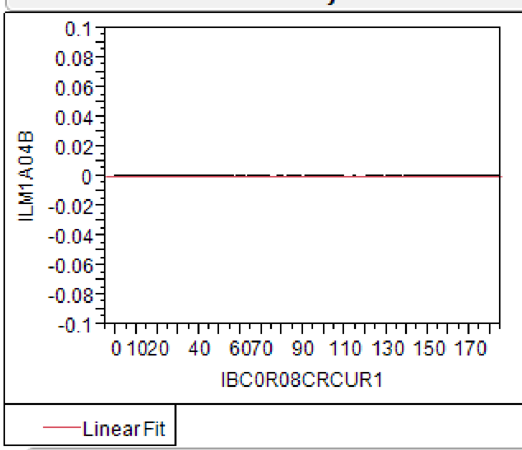
During the FY20 physics run, regions in the higher arcs have been activated in a manner never before seen. Chopper viewer images suggested a tail on the C beam was a cause of the difficulty. Accordingly, on March 19 while Hall C was down to switch experiments from a1n to d2n, the laser seeds for B and C were swapped. The B beam is defined by a narrow chopper slit and is low current so it it less likely than C beam, which passes through an open slit, to contain a tail. Response of selected BLMs in arcs 1 and 2 as a function of A and C current were compared for three six hour periods:

A. March 10 1400-2000 with both high current halls, before the laser seed swap
B. March 20 0700-1300 with Hall A the only high current hall
C. March 23 0100-0700 with both high current halls, after the laser seed swap

Arc 1 BLMs 04, 09, 16, 22, 29, 33 and 37 were downloaded for the six hour periods. Arc 2 BLMs 4, 10, 16, 23, 29, 32 and 36 were also downloaded. The less correlated BLMs are shown first and ignored thereafter.

Fit Y by X Group

Bivariate Fit of ILM1A04B By IBC0R08CRCUR1



Linear Fit

ILM1A04B = 0 + 0*IBC0R08CRCUR1

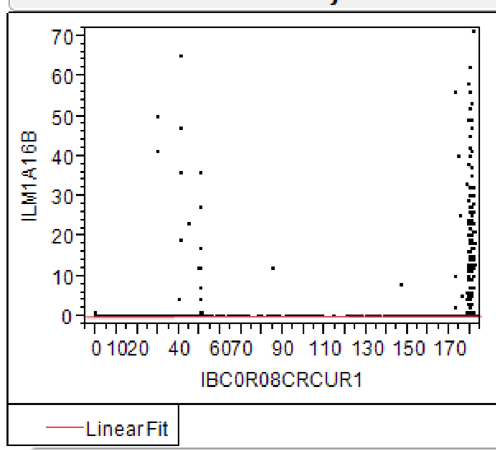
Summary of Fit

RSquare	.
RSquare Adj	.
Root Mean Square Error	0
Mean of Response	0
Observations (or Sum Wgts)	17268

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0	0	.	.
IBC0R08CRCUR1	0	0	.	.

Bivariate Fit of ILM1A16B By IBC0R08CRCUR1



Linear Fit

ILM1A16B = 0.0285057 + 0.001212*IBC0R08CRCUR1

Summary of Fit

RSquare	0.00183
RSquare Adj	0.001772
Root Mean Square Error	2.284086
Mean of Response	0.162729
Observations (or Sum Wgts)	17268

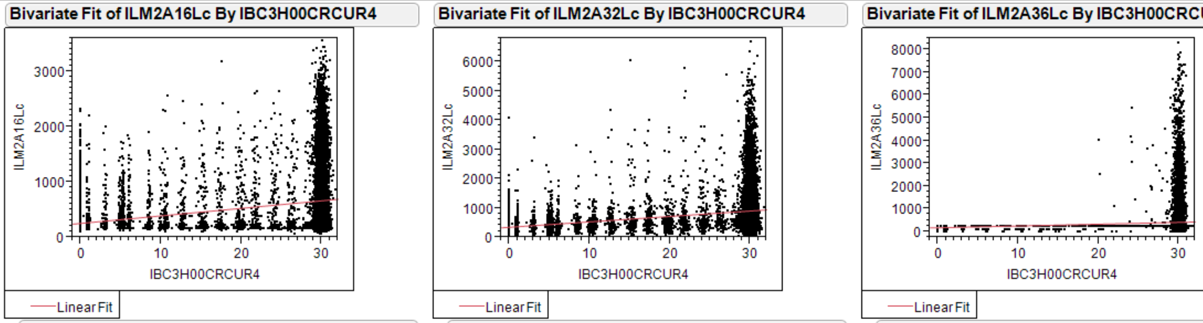
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0.0285057	0.029517	0.97	0.3342
IBC0R08CRCUR1	0.001212	0.000215	5.63	<.0001*

Figure 1. Arc 1 BLMs with no correlation to total current in arc. Period A, before seed change.

Fit Y by X Group

Bivariate Fit of ILM2A16Lc By IBC3H00CRCUR4	Bivariate Fit of ILM2A32Lc By IBC3H00CRCUR4	Bivariate Fit of ILM2A36Lc By IBC3H00CRCUR4



Linear Fit (ILM2A16Lc)

ILM2A16Lc = 258.17516 + 13.611495*IBC3H00CRCUR4

Summary of Fit

RSquare	0.097414
RSquare Adj	0.097366
Root Mean Square Error	538.8875
Mean of Response	538.0521
Observations (or Sum Wgts)	18994

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	258.17516	7.314635	35.30	<.0001*
IBC3H00CRCUR4	13.611495	0.300646	45.27	<.0001*

Linear Fit (ILM2A32Lc)

ILM2A32Lc = 355.45829 + 18.508235*IBC3H00CRCUR4

Summary of Fit

RSquare	0.122615
RSquare Adj	0.122569
Root Mean Square Error	643.9399
Mean of Response	736.021
Observations (or Sum Wgts)	18994

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	355.45829	8.740572	40.67	<.0001*
IBC3H00CRCUR4	18.508235	0.359254	51.52	<.0001*

Linear Fit (ILM2A36Lc)

ILM2A36Lc = 185.67088 + 7.8905441*IBC3H00CRCUR4

Summary of Fit

RSquare	0.02564
RSquare Adj	0.025588
Root Mean Square Error	632.6583
Mean of Response	347.9147
Observations (or Sum Wgts)	18994

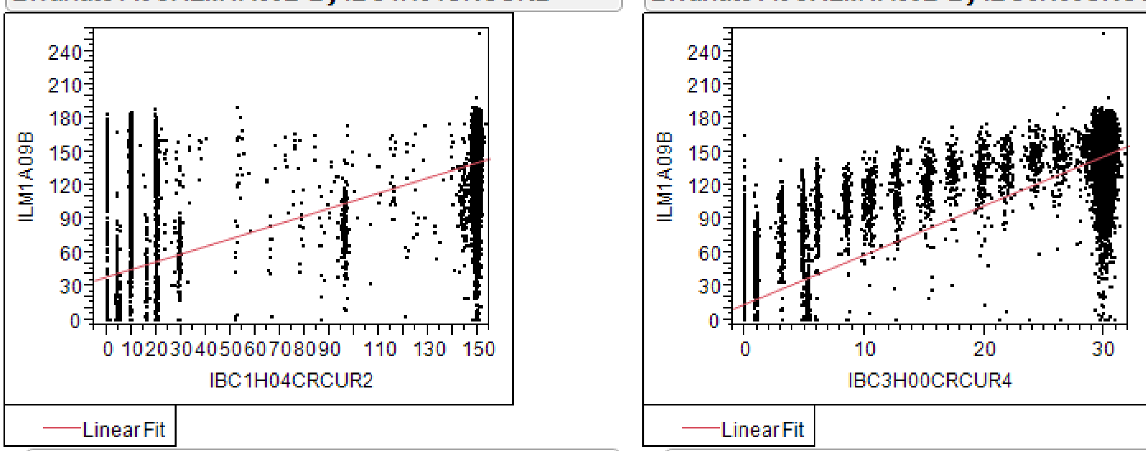
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	185.67088	8.587441	21.62	<.0001*
IBC3H00CRCUR4	7.8905441	0.35296	22.36	<.0001*

Figure 2. Arc 2 BLMs with little or no correlation to Hall C current. Period A, before seed change.

Fit Y by X Group

Bivariate Fit of ILM1A09B By IBC1H04CRCUR2	Bivariate Fit of ILM1A09B By IBC3H00CRCUR4



Linear Fit (IBC1H04CRCUR2)

ILM1A09B = 38.852998 + 0.6816915*IBC1H04CRCUR2

Summary of Fit

RSquare	0.548379
RSquare Adj	0.548353
Root Mean Square Error	43.5805
Mean of Response	100.7787
Observations (or Sum Wgts)	17268

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	38.852998	0.541202	71.79	<.0001*
IBC1H04CRCUR2	0.6816915	0.004708	144.79	<.0001*

Linear Fit (IBC3H00CRCUR4)

ILM1A09B = 14.72838 + 4.4086346*IBC3H00CRCUR4

Summary of Fit

RSquare	0.828629
RSquare Adj	0.828619
Root Mean Square Error	26.84565
Mean of Response	100.7787
Observations (or Sum Wgts)	17268

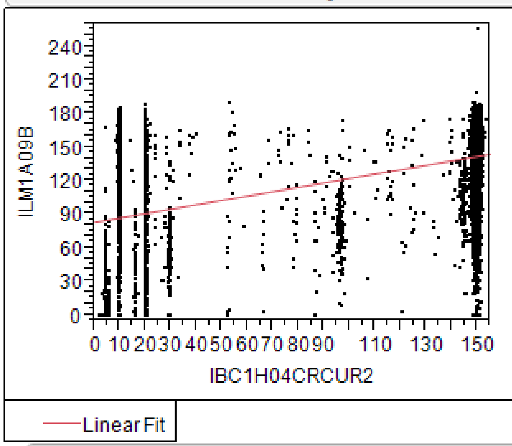
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	14.72838	0.361149	40.78	<.0001*
IBC3H00CRCUR4	4.4086346	0.015258	288.94	<.0001*

Figure 3. ILM1A09 vs Hall A and Hall C currents with both in the machine, before seed change. Correlation with Hall C (3H00) current is better than with Hall A, even though Hall A has five times the current for most of the period.

Fit Y by X Group

Bivariate Fit of ILM1A09B By IBC1H04CRCUR2



Linear Fit

ILM1A09B = 83.254394 + 0.39174*IBC1H04CRCUR2

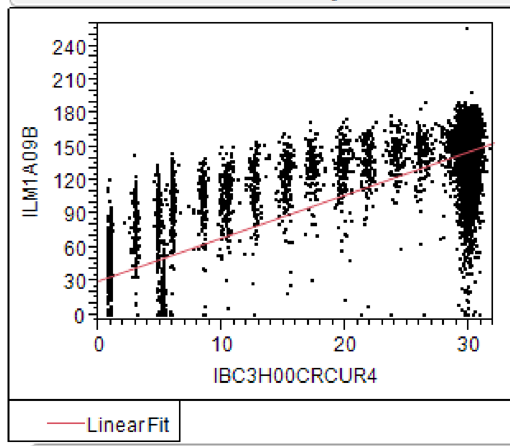
Summary of Fit

RSquare	0.265624
RSquare Adj	0.265568
Root Mean Square Error	37.78991
Mean of Response	129.133
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	83.254394	0.747908	111.32	<.0001*
IBC1H04CRCUR2	0.39174	0.005723	68.46	<.0001*

Bivariate Fit of ILM1A09B By IBC3H00CRCUR4



Linear Fit

ILM1A09B = 30.828419 + 3.8470484*IBC3H00CRCUR4

Summary of Fit

RSquare	0.616505
RSquare Adj	0.616476
Root Mean Square Error	27.30841
Mean of Response	129.133
Observations (or Sum Wgts)	12958

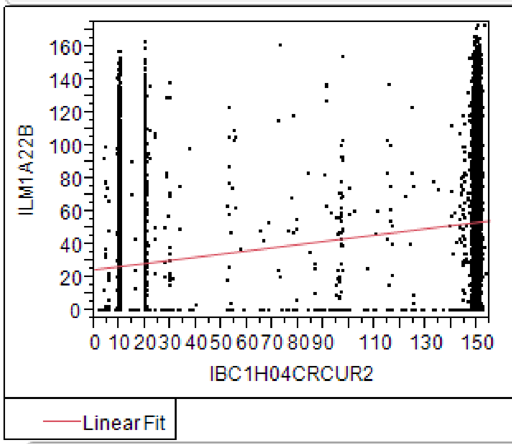
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	30.828419	0.722171	42.69	<.0001*
IBC3H00CRCUR4	3.8470484	0.026657	144.32	<.0001*

Figure 4. Same as figure 3 except points with both A and C currents under 1 μA are removed. Cutting out the near-zero currents reduced R^2 for Hall A current by just over half while it reduced R^2 for Hall C current by only a fourth. This suggests that Hall C beam was responsible for the majority of the BLM activity even in arc 1 where Hall A current is five times as great.

I will now proceed to waste space by showing similar plots for the other four arc 1 BLMs whose data for period A I have on hand.

Bivariate Fit of ILM1A22B By IBC1H04CRCUR2



Linear Fit

ILM1A22B = 25.117858 + 0.1912808*IBC1H04CRCUR2

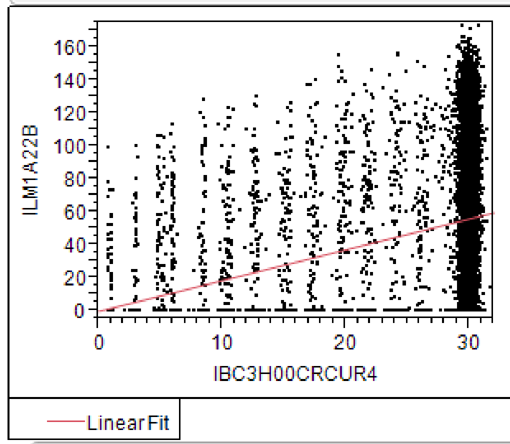
Summary of Fit

RSquare	0.055512
RSquare Adj	0.055439
Root Mean Square Error	45.77512
Mean of Response	47.51968
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	25.117858	0.905945	27.73	<.0001*
IBC1H04CRCUR2	0.1912808	0.006932	27.59	<.0001*

Bivariate Fit of ILM1A22B By IBC3H00CRCUR4



Linear Fit

ILM1A22B = -0.238753 + 1.8689776*IBC3H00CRCUR4

Summary of Fit

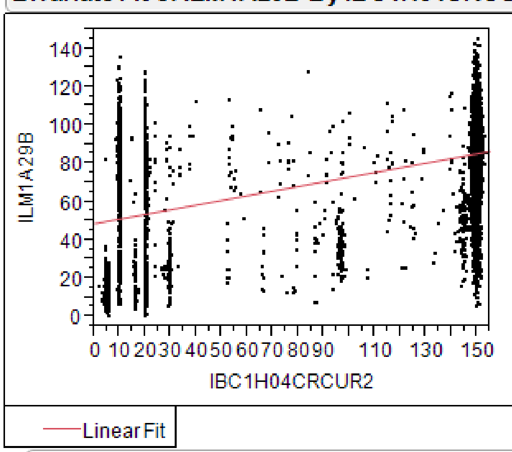
RSquare	0.127544
RSquare Adj	0.127477
Root Mean Square Error	43.99496
Mean of Response	47.51968
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-0.238753	1.163447	-0.21	0.8374
IBC3H00CRCUR4	1.8689776	0.042945	43.52	<.0001*

Figure 5. ILM1A22 is almost useless, so I won't show it again.

Bivariate Fit of ILM1A29B By IBC1H04CRCUR2



Linear Fit

ILM1A29B = 48.886997 + 0.2435606*IBC1H04CRCUR2

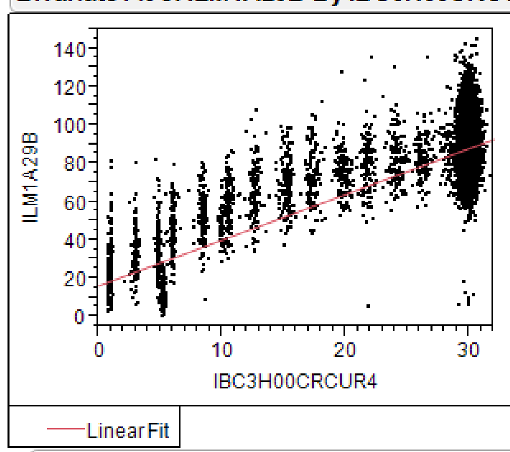
Summary of Fit

RSquare	0.305191
RSquare Adj	0.305137
Root Mean Square Error	21.32095
Mean of Response	77.41156
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	48.886997	0.421967	115.85	<.0001*
IBC1H04CRCUR2	0.2435606	0.003229	75.44	<.0001*

Bivariate Fit of ILM1A29B By IBC3H00CRCUR4



Linear Fit

ILM1A29B = 16.420115 + 2.3868381*IBC3H00CRCUR4

Summary of Fit

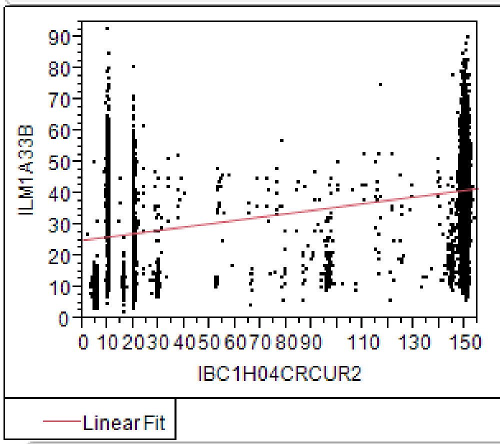
RSquare	0.705364
RSquare Adj	0.705341
Root Mean Square Error	13.88407
Mean of Response	77.41156
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	16.420115	0.367164	44.72	<.0001*
IBC3H00CRCUR4	2.3868381	0.013553	176.12	<.0001*

Figure 6. ILM1A29 has much better correlation with current

Bivariate Fit of ILM1A33B By IBC1H04CRCUR2



Linear Fit

ILM1A33B = 25.317656 + 0.106908*IBC1H04CRCUR2

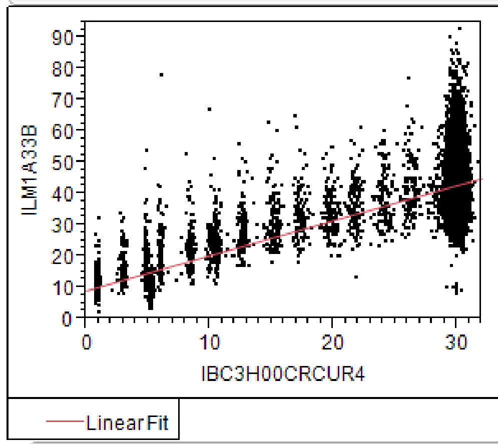
Summary of Fit

RSquare	0.218446
RSquare Adj	0.218386
Root Mean Square Error	11.73196
Mean of Response	37.83817
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	25.317656	0.23219	109.04	<.0001*
IBC1H04CRCUR2	0.106908	0.001777	60.18	<.0001*

Bivariate Fit of ILM1A33B By IBC3H00CRCUR4



Linear Fit

ILM1A33B = 9.103417 + 1.1245053*IBC3H00CRCUR4

Summary of Fit

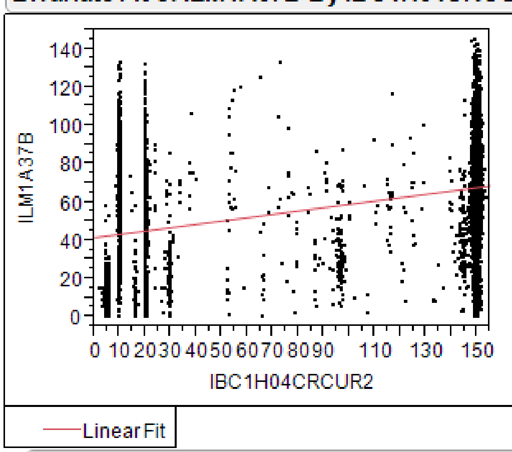
RSquare	0.581643
RSquare Adj	0.58161
Root Mean Square Error	8.583504
Mean of Response	37.83817
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	9.103417	0.226991	40.10	<.0001*
IBC3H00CRCUR4	1.1245053	0.008379	134.21	<.0001*

Figure 7. ILM1A33 vs currents

Bivariate Fit of ILM1A37B By IBC1H04CRCUR2



Linear Fit

ILM1A37B = 41.74789 + 0.1741027*IBC1H04CRCUR2

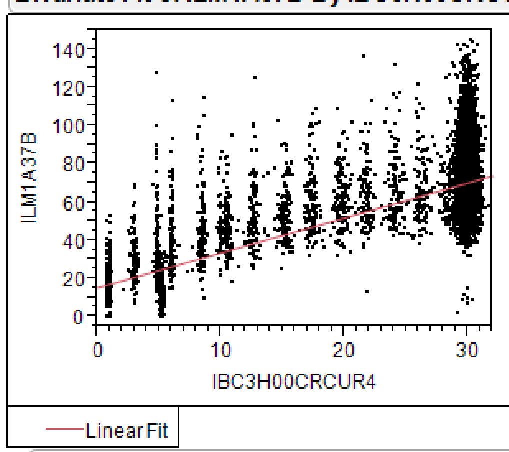
Summary of Fit

RSquare	0.187506
RSquare Adj	0.187443
Root Mean Square Error	21.02622
Mean of Response	62.13791
Observations (or Sum Wgts)	12958

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	41.74789	0.416134	100.32	<.0001*
IBC1H04CRCUR2	0.1741027	0.003184	54.68	<.0001*

Bivariate Fit of ILM1A37B By IBC3H00CRCUR4



Linear Fit

ILM1A37B = 15.49094 + 1.8254815*IBC3H00CRCUR4

Summary of Fit

RSquare	0.496098
RSquare Adj	0.49606
Root Mean Square Error	16.55861
Mean of Response	62.13791
Observations (or Sum Wgts)	12958

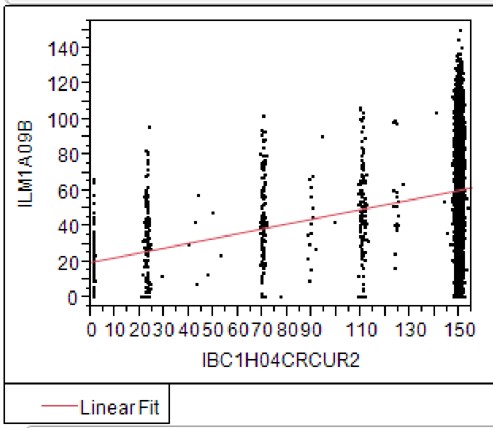
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	15.49094	0.437892	35.38	<.0001*
IBC3H00CRCUR4	1.8254815	0.016163	112.94	<.0001*

Figure 8. ILM1A29 vs currents

I conclude that before the laser seed swap that the Hall C beam was the cause of perhaps two-thirds the arc 1 BLM activity. I will now examine period B when Hall C was off for ILMs 9, 29, 33 and 37.

Bivariate Fit of ILM1A09B By IBC1H04CRCUR2



Linear Fit

ILM1A09B = 20.299517 + 0.2694911*IBC1H04CRCUR2

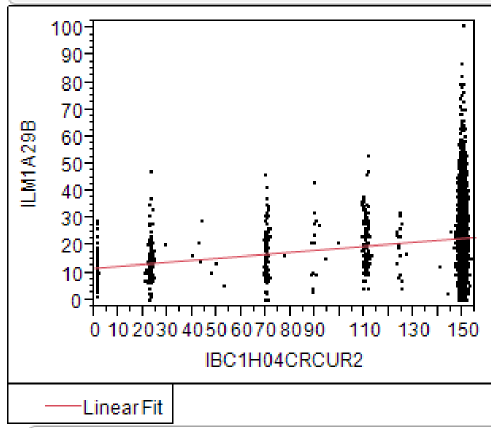
Summary of Fit

RSquare	0.037011
RSquare Adj	0.036941
Root Mean Square Error	27.41275
Mean of Response	59.76838
Observations (or Sum Wgts)	13885

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	20.299517	1.724444	11.77	<.0001*
IBC1H04CRCUR2	0.2694911	0.011667	23.10	<.0001*

Bivariate Fit of ILM1A29B By IBC1H04CRCUR2



Linear Fit

ILM1A29B = 11.932074 + 0.0734173*IBC1H04CRCUR2

Summary of Fit

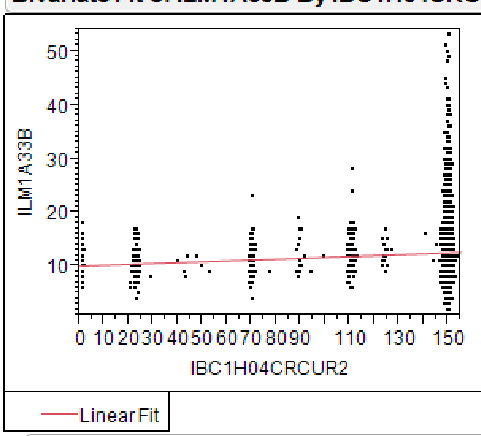
RSquare	0.020572
RSquare Adj	0.020501
Root Mean Square Error	10.1021
Mean of Response	22.68455
Observations (or Sum Wgts)	13885

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	11.932074	0.635489	18.78	<.0001*
IBC1H04CRCUR2	0.0734173	0.004299	17.08	<.0001*

Figure 9: BLMs 9 and 29 with only Hall A, B and D beam in the machine.

Bivariate Fit of ILM1A33B By IBC1H04CRCUR2



Linear Fit

ILM1A33B = 10.160844 + 0.016412*IBC1H04CRCUR2

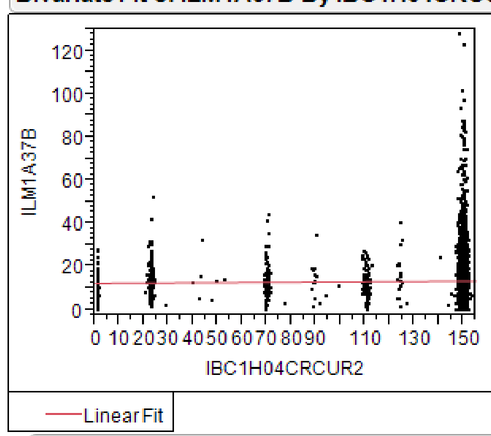
Summary of Fit

RSquare	0.007932
RSquare Adj	0.007861
Root Mean Square Error	3.660131
Mean of Response	12.56449
Observations (or Sum Wgts)	13885

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	10.160844	0.230247	44.13	<.0001*
IBC1H04CRCUR2	0.016412	0.001558	10.54	<.0001*

Bivariate Fit of ILM1A37B By IBC1H04CRCUR2



Linear Fit

ILM1A37B = 12.374647 + 0.0071137*IBC1H04CRCUR2

Summary of Fit

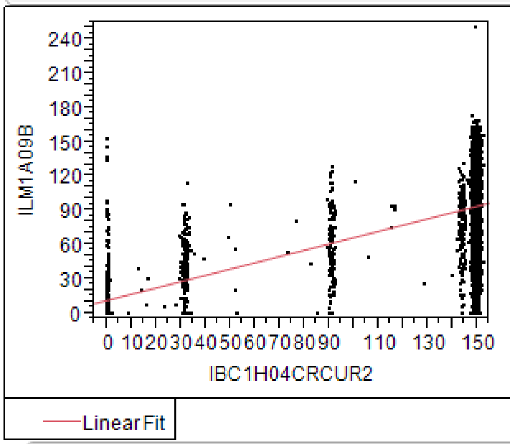
RSquare	0.000305
RSquare Adj	0.000233
Root Mean Square Error	8.123467
Mean of Response	13.41649
Observations (or Sum Wgts)	13885

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	12.374647	0.51102	24.22	<.0001*
IBC1H04CRCUR2	0.0071137	0.003457	2.06	0.0397*

Figure 10. BLMs 33 and 37 with only Hall A, B and D beams in the machine

Bivariate Fit of ILM1A09B By IBC1H04CRCUR2



Linear Fit

ILM1A09B = 11.535827 + 0.5504416*IBC1H04CRCUR2

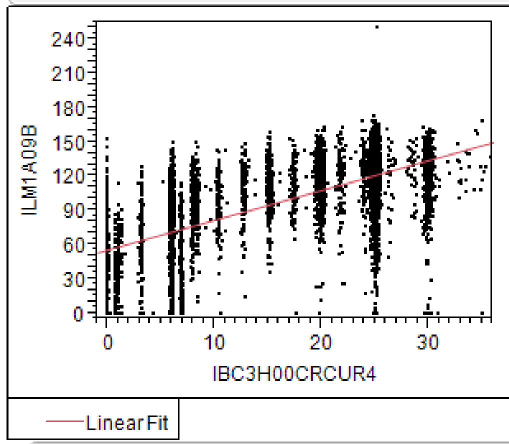
Summary of Fit

RSquare	0.170744
RSquare Adj	0.17069
Root Mean Square Error	35.33363
Mean of Response	90.43407
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	11.535827	1.426526	8.09	<.0001*
IBC1H04CRCUR2	0.5504416	0.009753	56.44	<.0001*

Bivariate Fit of ILM1A09B By IBC3H00CRCUR4



Linear Fit

ILM1A09B = 55.861949 + 2.6115412*IBC3H00CRCUR4

Summary of Fit

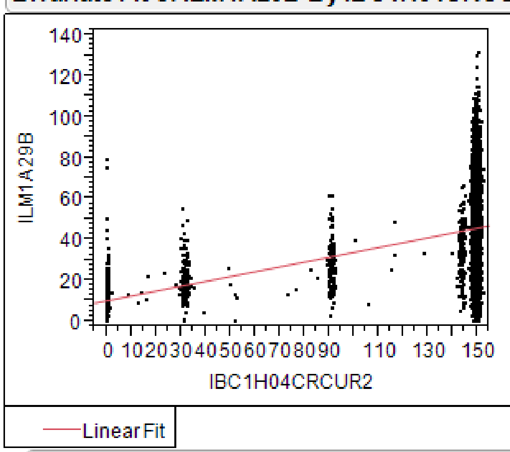
RSquare	0.495262
RSquare Adj	0.495229
Root Mean Square Error	27.5662
Mean of Response	90.43407
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	55.861949	0.357566	156.23	<.0001*
IBC3H00CRCUR4	2.6115412	0.021197	123.21	<.0001*

Figure 11. BLM after seed swap with four halls operating, period C. Points removed if both A,C<1.

Bivariate Fit of ILM1A29B By IBC1H04CRCUR2



Linear Fit

ILM1A29B = 10.399231 + 0.2362657*IBC1H04CRCUR2

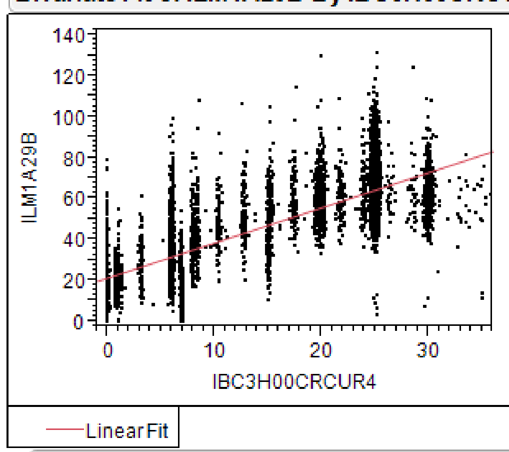
Summary of Fit

RSquare	0.101109
RSquare Adj	0.101051
Root Mean Square Error	20.51934
Mean of Response	44.26467
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	10.399231	0.828428	12.55	<.0001*
IBC1H04CRCUR2	0.2362657	0.005664	41.71	<.0001*

Bivariate Fit of ILM1A29B By IBC3H00CRCUR4



Linear Fit

ILM1A29B = 21.588224 + 1.7129545*IBC3H00CRCUR4

Summary of Fit

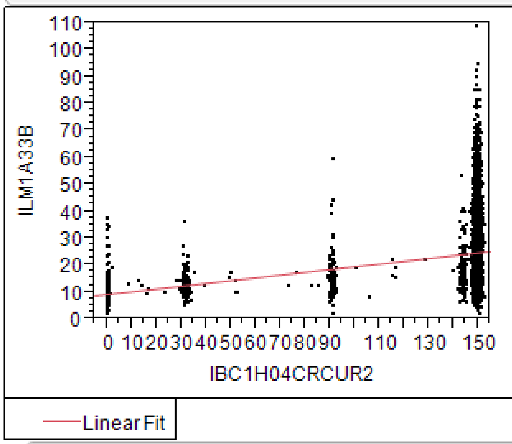
RSquare	0.684858
RSquare Adj	0.684838
Root Mean Square Error	12.14963
Mean of Response	44.26467
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	21.588224	0.157595	136.99	<.0001*
IBC3H00CRCUR4	1.7129545	0.009342	183.35	<.0001*

Figure 12. BLM 1A29 after seed swap with four halls operating.

Bivariate Fit of ILM1A33B By IBC1H04CRCUR2



Linear Fit

ILM1A33B = 9.2466152 + 0.1027901*IBC1H04CRCUR2

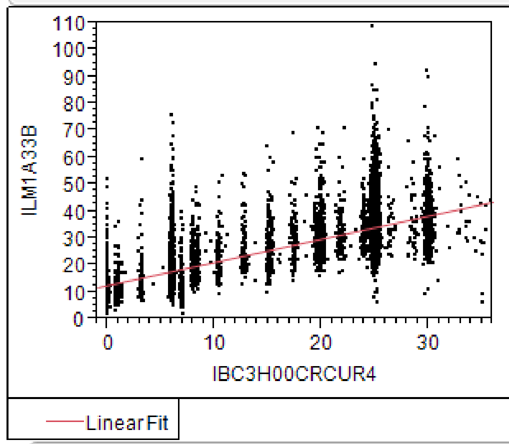
Summary of Fit

RSquare	0.065565
RSquare Adj	0.065504
Root Mean Square Error	11.30306
Mean of Response	23.98016
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	9.2466152	0.456339	20.26	<.0001*
IBC1H04CRCUR2	0.1027901	0.00312	32.95	<.0001*

Bivariate Fit of ILM1A33B By IBC3H00CRCUR4



Linear Fit

ILM1A33B = 12.61012 + 0.8588805*IBC3H00CRCUR4

Summary of Fit

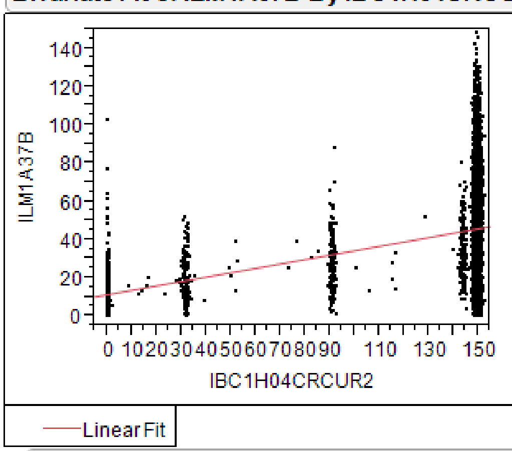
RSquare	0.589864
RSquare Adj	0.589837
Root Mean Square Error	7.48834
Mean of Response	23.98016
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	12.61012	0.097133	129.82	<.0001*
IBC3H00CRCUR4	0.8588805	0.005758	149.16	<.0001*

Figure 13. BLM 1A33 after seed swap with four halls operating.

Bivariate Fit of ILM1A37B By IBC1H04CRCUR2



Linear Fit

ILM1A37B = 11.527014 + 0.2293161*IBC1H04CRCUR2

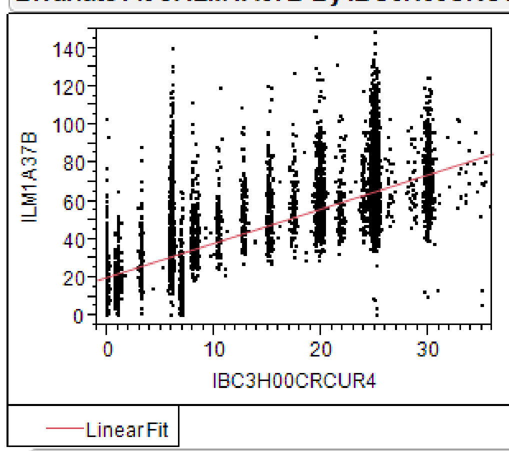
Summary of Fit

RSquare	0.075267
RSquare Adj	0.075208
Root Mean Square Error	23.41232
Mean of Response	44.39633
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	11.527014	0.945227	12.19	<.0001*
IBC1H04CRCUR2	0.2293161	0.006462	35.48	<.0001*

Bivariate Fit of ILM1A37B By IBC3H00CRCUR4



Linear Fit

ILM1A37B = 20.782735 + 1.7837455*IBC3H00CRCUR4

Summary of Fit

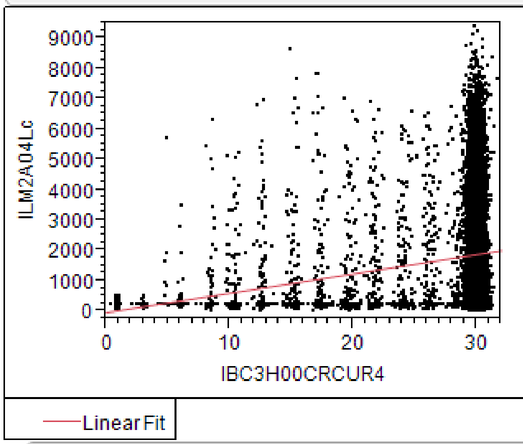
RSquare	0.586843
RSquare Adj	0.586817
Root Mean Square Error	15.64926
Mean of Response	44.39633
Observations (or Sum Wgts)	15472

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	20.782735	0.20299	102.38	<.0001*
IBC3H00CRCUR4	1.7837455	0.012033	148.23	<.0001*

Figure 14. BLM 1A37 after seed swap with four halls operating.

Bivariate Fit of ILM2A04Lc By IBC3H00CRCUR4



Linear Fit

ILM2A04Lc = -29.8276 + 63.768781*IBC3H00CRCUR4

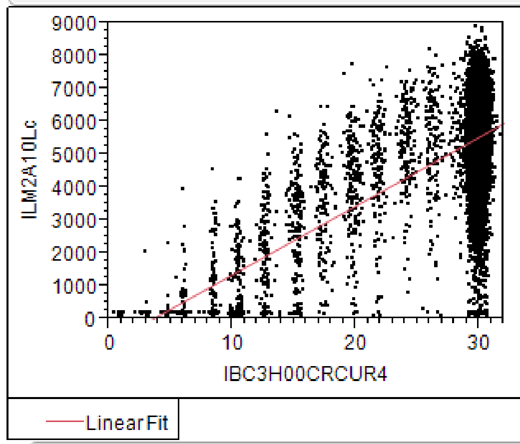
Summary of Fit

RSquare	0.09154
RSquare Adj	0.09148
Root Mean Square Error	1736.97
Mean of Response	1622.402
Observations (or Sum Wgts)	15070

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-29.8276	44.70081	-0.67	0.5046
IBC3H00CRCUR4	63.768781	1.636543	38.97	<.0001*

Bivariate Fit of ILM2A10Lc By IBC3H00CRCUR4



Linear Fit

ILM2A10Lc = -731.4927 + 208.94058*IBC3H00CRCUR4

Summary of Fit

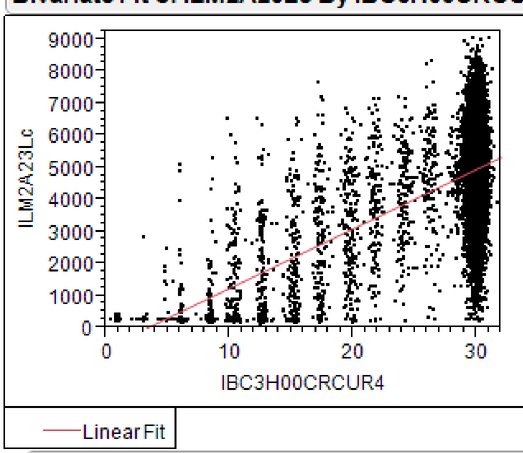
RSquare	0.689438
RSquare Adj	0.689417
Root Mean Square Error	1212.512
Mean of Response	4682.095
Observations (or Sum Wgts)	15070

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-731.4927	31.20394	-23.44	<.0001*
IBC3H00CRCUR4	208.94058	1.142409	182.89	<.0001*

Figure 15. Arc 2 BLMs with Hall C > 1 μA before seed change. Note scale difference vs arc 1.

Bivariate Fit of ILM2A23Lc By IBC3H00CRCUR4



Linear Fit

ILM2A23Lc = -611.5163 + 185.65788*IBC3H00CRCUR4

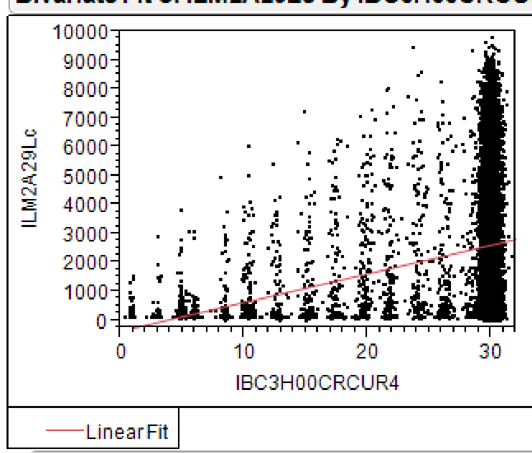
Summary of Fit

RSquare	0.608778
RSquare Adj	0.608752
Root Mean Square Error	1286.865
Mean of Response	4198.824
Observations (or Sum Wgts)	15070

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-611.5163	33.11738	-18.47	<.0001*
IBC3H00CRCUR4	185.65788	1.212462	153.12	<.0001*

Bivariate Fit of ILM2A29Lc By IBC3H00CRCUR4



Linear Fit

ILM2A29Lc = -349.11 + 99.010305*IBC3H00CRCUR4

Summary of Fit

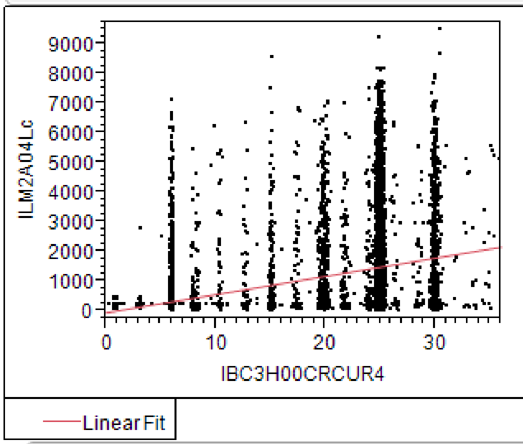
RSquare	0.141124
RSquare Adj	0.141067
Root Mean Square Error	2111.945
Mean of Response	2216.217
Observations (or Sum Wgts)	15070

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-349.11	54.35078	-6.42	<.0001*
IBC3H00CRCUR4	99.010305	1.989839	49.76	<.0001*

Figure 16. Arc 2 BLMs with Hall C > 1 μA before seed change.

Bivariate Fit of ILM2A04Lc By IBC3H00CRCUR4



Linear Fit

ILM2A04Lc = -32.93605 + 61.486685*IBC3H00CRCUR4

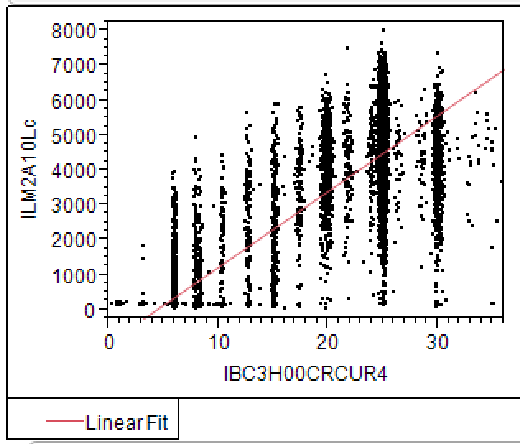
Summary of Fit

RSquare	0.164469
RSquare Adj	0.164411
Root Mean Square Error	1311.012
Mean of Response	956.3217
Observations (or Sum Wgts)	14611

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-32.93605	21.3997	-1.54	0.1238
IBC3H00CRCUR4	61.486685	1.146597	53.63	<.0001*

Bivariate Fit of ILM2A10Lc By IBC3H00CRCUR4



Linear Fit

ILM2A10Lc = -938.995 + 217.91905*IBC3H00CRCUR4

Summary of Fit

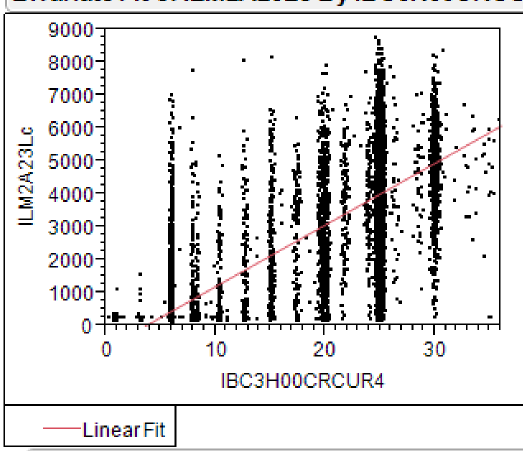
RSquare	0.812572
RSquare Adj	0.812559
Root Mean Square Error	990.074
Mean of Response	2567.099
Observations (or Sum Wgts)	14611

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-938.995	16.16101	-58.10	<.0001*
IBC3H00CRCUR4	217.91905	0.865908	251.67	<.0001*

Figure 17. Arc 2 BLMs after seed change with Hall C > 1 μA.

Bivariate Fit of ILM2A23Lc By IBC3H00CRCUR4



Linear Fit

ILM2A23Lc = -663.3052 + 187.40937*IBC3H00CRCUR4

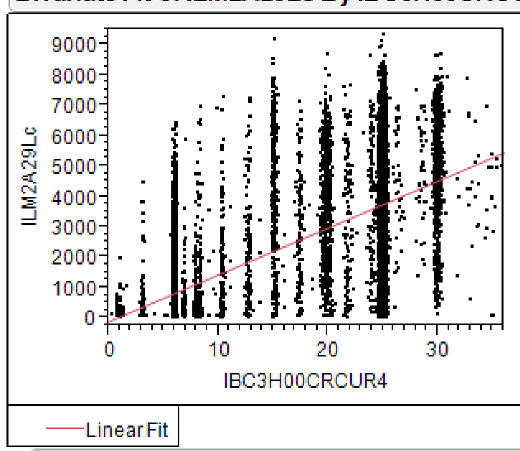
Summary of Fit

RSquare	0.658067
RSquare Adj	0.658044
Root Mean Square Error	1277.945
Mean of Response	2351.919
Observations (or Sum Wgts)	14611

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-663.3052	20.85994	-31.80	<.0001*
IBC3H00CRCUR4	187.40937	1.117677	167.68	<.0001*

Bivariate Fit of ILM2A29Lc By IBC3H00CRCUR4



Linear Fit

ILM2A29Lc = -96.5539 + 154.0953*IBC3H00CRCUR4

Summary of Fit

RSquare	0.426369
RSquare Adj	0.426329
Root Mean Square Error	1690.826
Mean of Response	2382.681
Observations (or Sum Wgts)	14611

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-96.5539	27.59941	-3.50	0.0005*
IBC3H00CRCUR4	154.0953	1.478778	104.20	<.0001*

Figure 18. Arc 2 BLMs after seed change with Hall C > 1 μA.

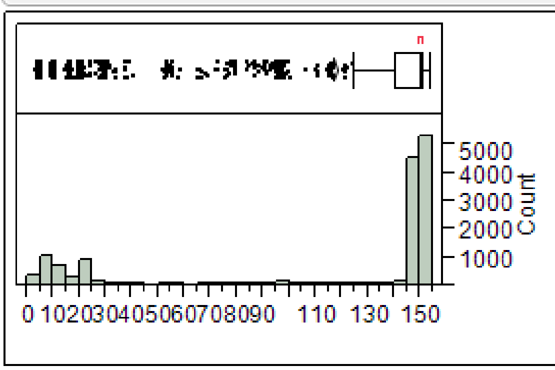
Unfortunately, if I evaluate the linear fits at 30 uA I find that there is modestly less BLM activity attributable to Hall C beam in arc 1 and no significant change in arc 2. Compare the last two columns in the table below. Scale of BLM response is very different in Arc 1 vs Arc 2.

Table 1. Linear fit coefficients and values at 30 uA before and after the laser seed change.

BLM	before_intercept	before_slope	after_intercept	after_slope	before@30uA	after@30uA
1A09	30.83	3.85	55.86	2.61	146	134
1A29	16.42	2.39	21.59	1.71	88	73
1A33	9.10	1.12	12.61	0.86	43	38
1A37	15.49	1.83	20.78	1.78	70	74
2A04	-29.83	63.77	-32.94	61.49	1883	1812
2A10	-731.49	208.94	-939.00	217.92	5537	5599
2A23	-611.52	185.66	-663.31	187.41	4958	4959
2A29	-349.11	99.01	-96.55	154.10	2621	4526

Conclusion: none

IBC1H04CRCUR2



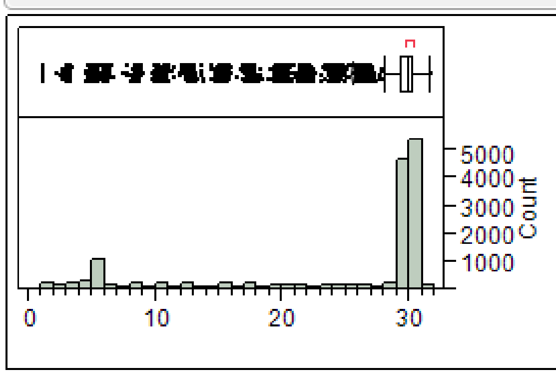
Quantiles

100.0%	maximum	153.42
99.5%		151.83
97.5%		151.38
90.0%		150.84
75.0%	quartile	150.36
50.0%	median	149.73
25.0%	quartile	139.935
10.0%		10.02
2.5%		5.46
0.5%		4.5
0.0%	minimum	3.36

Moments

Mean	117.11485
Std Dev	58.014416
Std Err Mean	0.509644
Upper 95% Mean	118.11382
Lower 95% Mean	116.11587
N	12958

IBC3H00CRCUR4



Quantiles

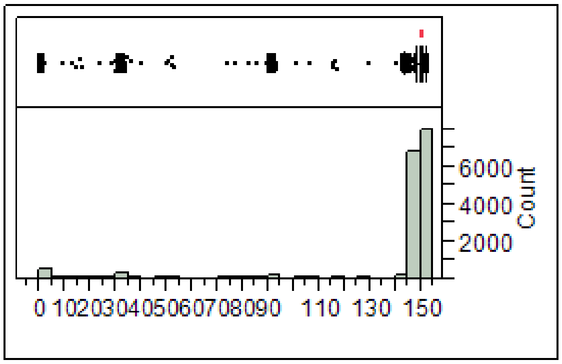
100.0%	maximum	31.71
99.5%		31.02
97.5%		30.72
90.0%		30.45
75.0%	quartile	30.18
50.0%	median	29.85
25.0%	quartile	29.28
10.0%		5.34
2.5%		4.71
0.5%		1.05
0.0%	minimum	1.02

Moments

Mean	25.55324
Std Dev	8.9999641
Std Err Mean	0.0790627
Upper 95% Mean	25.708214
Lower 95% Mean	25.398265
N	12958

Figure 19. Distributions of currents in period A, the “before” sample

IBC1H04CRCUR2



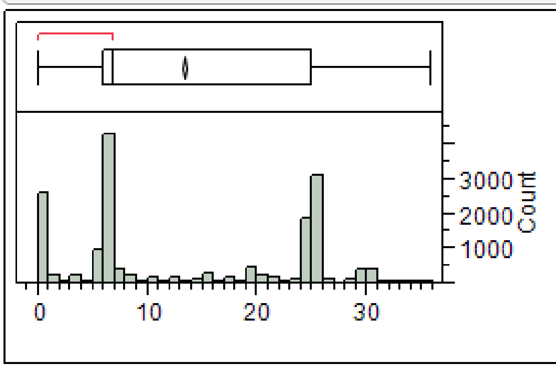
Quantiles

100.0%	maximum	153
99.5%		151.8
97.5%		151.325
90.0%		150.87
75.0%	quartile	150.45
50.0%	median	150
25.0%	quartile	149.46
10.0%		148.86
2.5%		1.08
0.5%		0
0.0%	minimum	0

Moments

Mean	143.33627
Std Dev	29.126696
Std Err Mean	0.2341628
Upper 95% Mean	143.79526
Lower 95% Mean	142.87728
N	15472

IBC3H00CRCUR4



Quantiles

100.0%	maximum	35.79
99.5%		30.3
97.5%		30
90.0%		25.23
75.0%	quartile	24.99
50.0%	median	6.9
25.0%	quartile	6.03
10.0%		0
2.5%		0
0.5%		0
0.0%	minimum	0

Moments

Mean	13.238208
Std Dev	10.455637
Std Err Mean	0.0840577
Upper 95% Mean	13.402971
Lower 95% Mean	13.073445
N	15472

Figure 20. Distribution of currents in period C, the “after” sample.

This data is provided the readers so they may decide whether to ask the author to make additional cuts on the data. Recall that these sets have both A and C currents ≥ 1 µA. Still no conclusion.