IDENTIFYING JITTER SOURCES IN THE LCLS LINAC

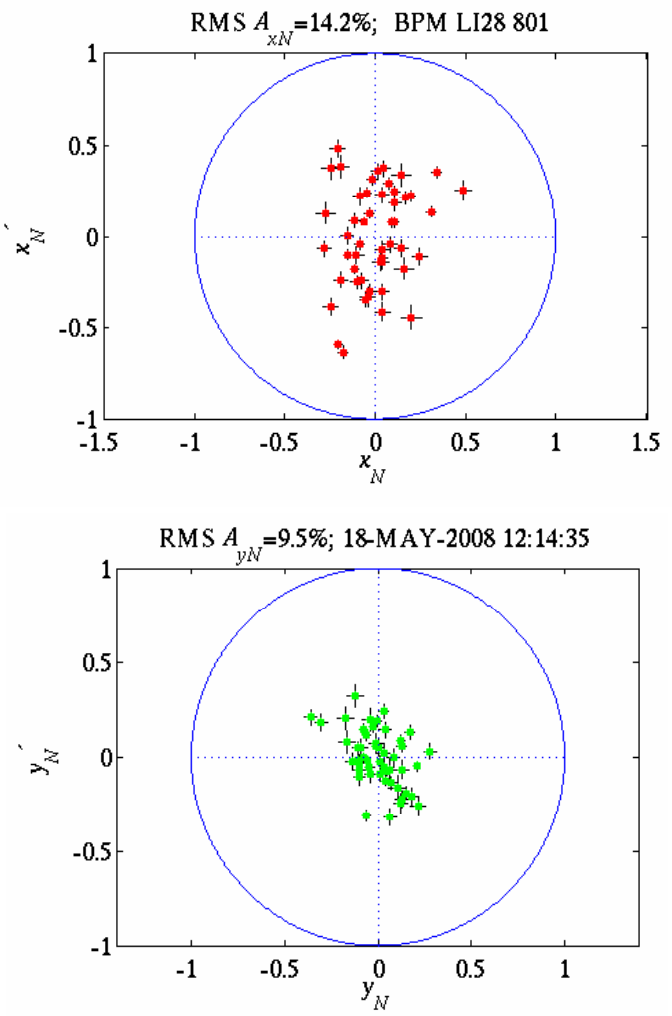
TUP048

Franz-Josef Decker* Sep 30, 2008

Techniques for jitter identification

1. Correlations
2. Frequency Analysis
3. SVD

LCLS Jitter, achieved		**goal:**
Intensity:	1.5 %	<2.0 %
Energy:	0.03%	<0.1 %
Time:	45 fs	<100 fs
Trans-	15 % σ_x	<10 %
verse:	10 % σ_y	<10 %



*for the LCLS commissioning team

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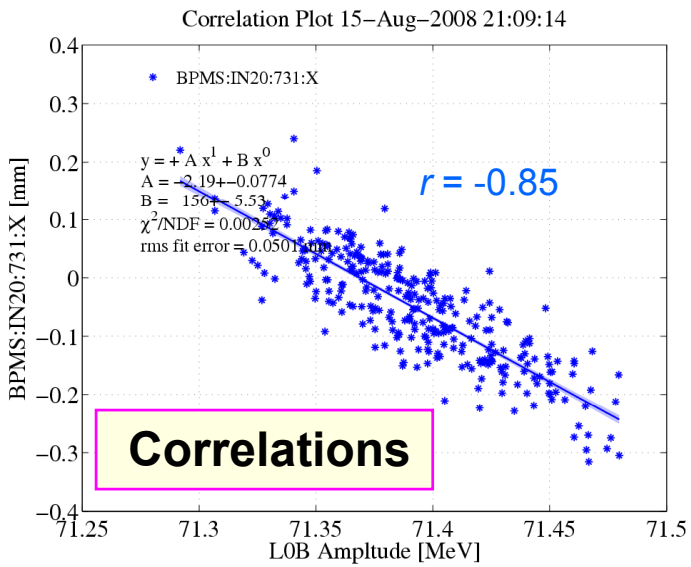
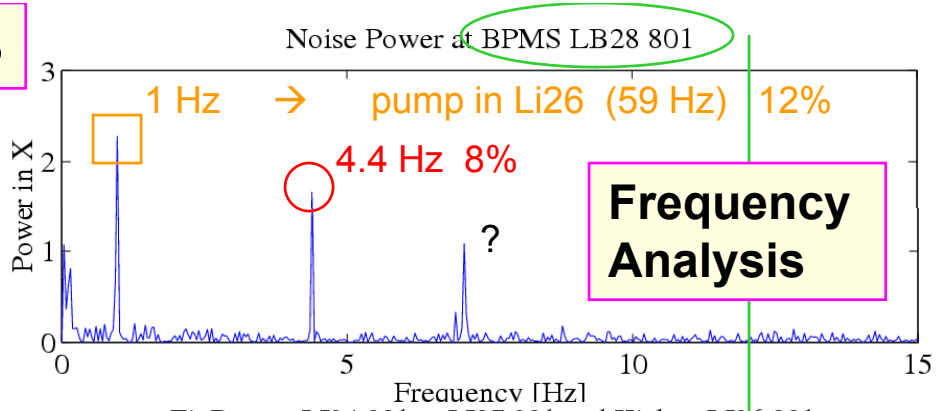
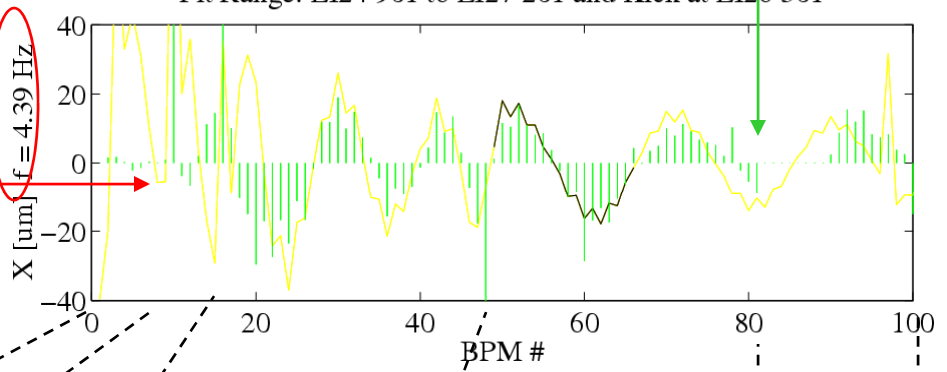


Cause

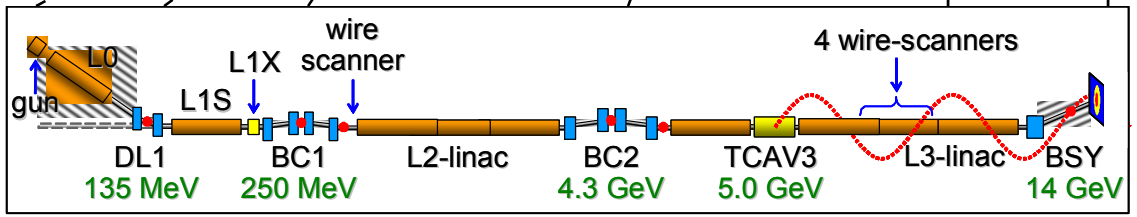


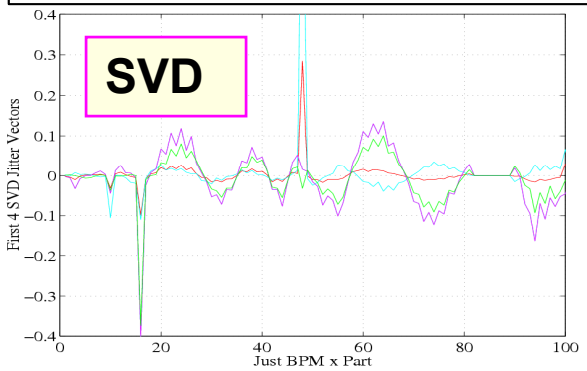


Jitter power r^2 of the correlation

Source:→ Measurement ↓	L0B amplitude	L1S phase	L1S ampl.	L0A ampl.
DL1 energy	73	0	0	12
BC1 energy	10	4	1	
BC2 energy	12	26	5	
BSY energy	13	24	5	
Li21beamphase	4	9	2	
BL Li21_A	3	17	2	
BL Li21_B	11	31	5	
Li28 401 x	15	8	6	all
Li28 801 x	9	13	3	in %

4.4 Hz
white noise





[*U*, *S*, *V*] = SVD (*X*)

SVD: 400 eigenvectors
FFT: a few (3-4) sources