Photo cathode laser timing response measurements

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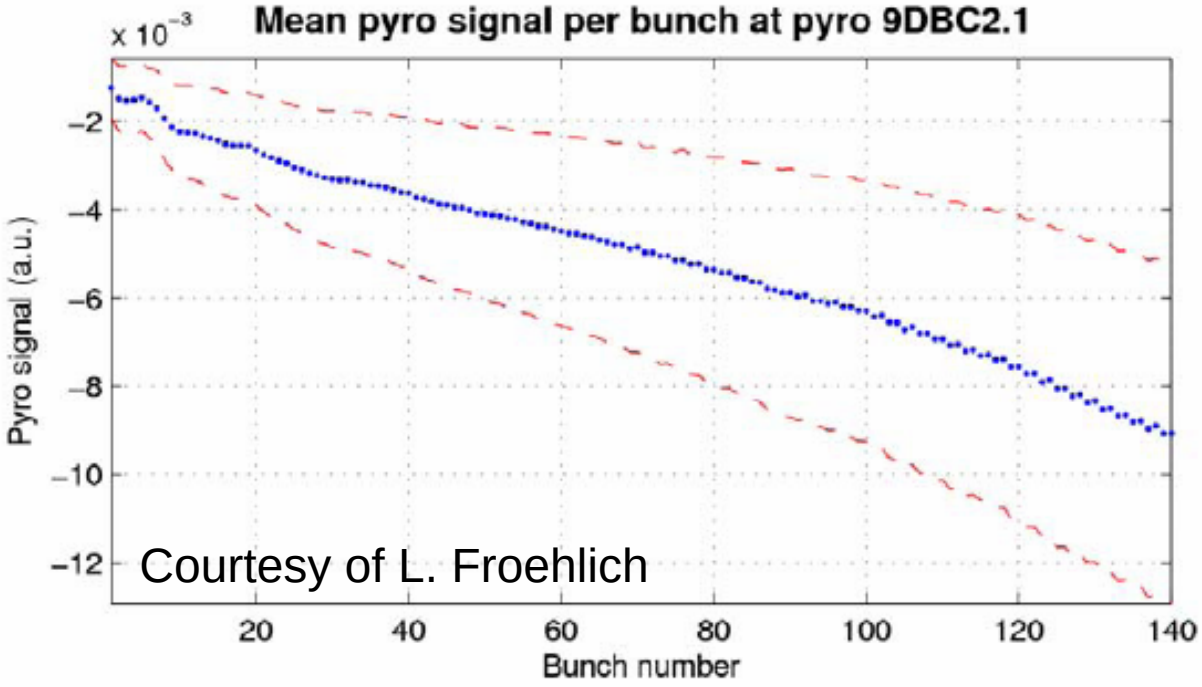
June 19th, 2006

FLASH Seminar

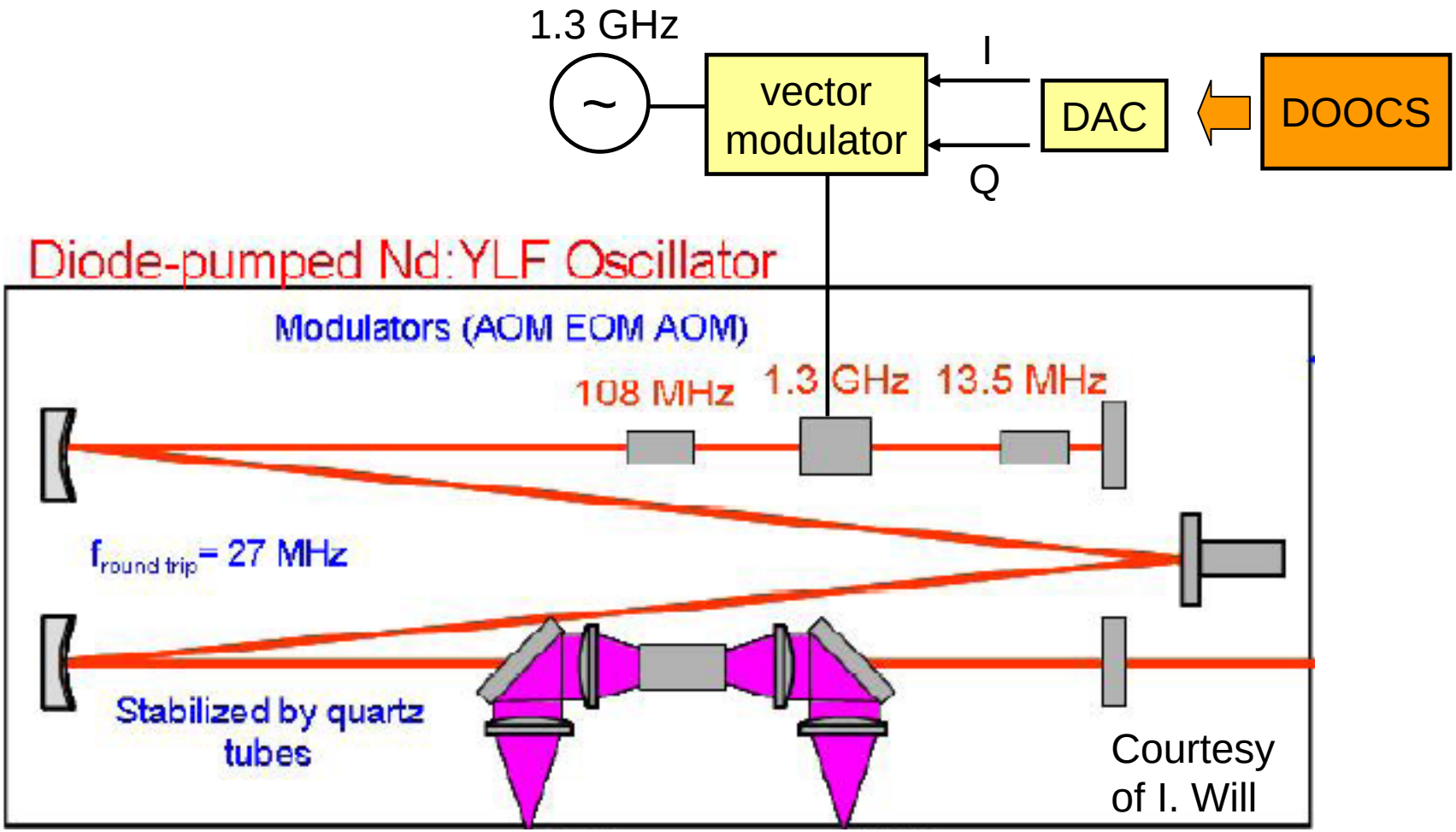
Motivation



Compression signal shows strong slope over the bunch train!

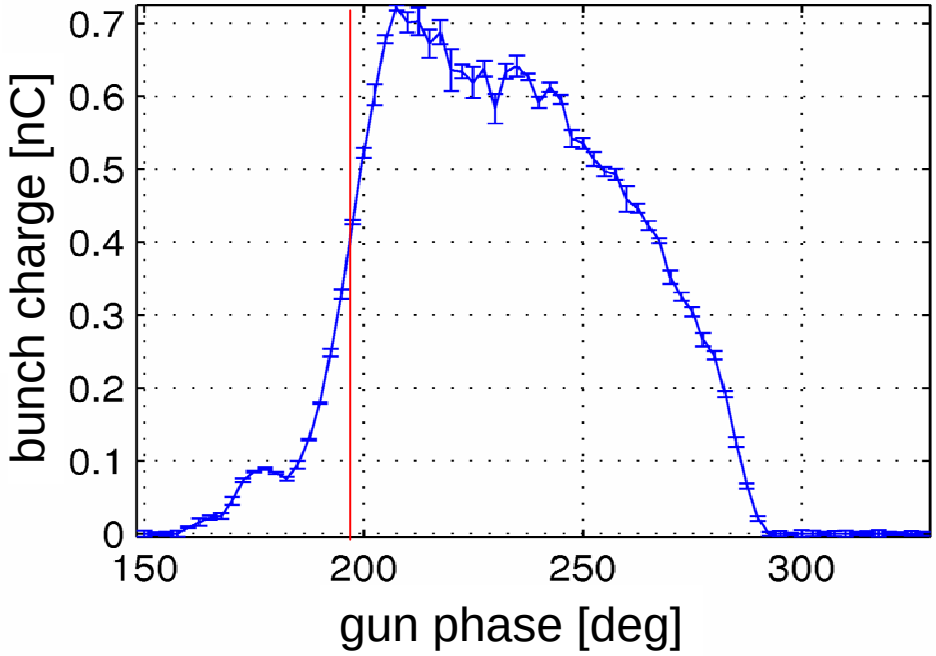
Possible reasons:
1.) Slope on the gun phase
2.) Arrival time change of photo injector laser pulses

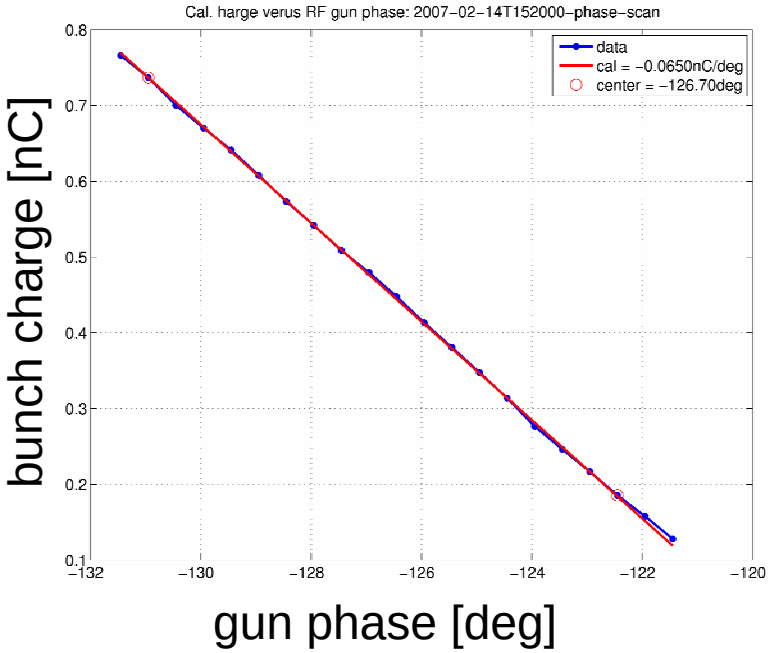
photo injector laser



measurement principle

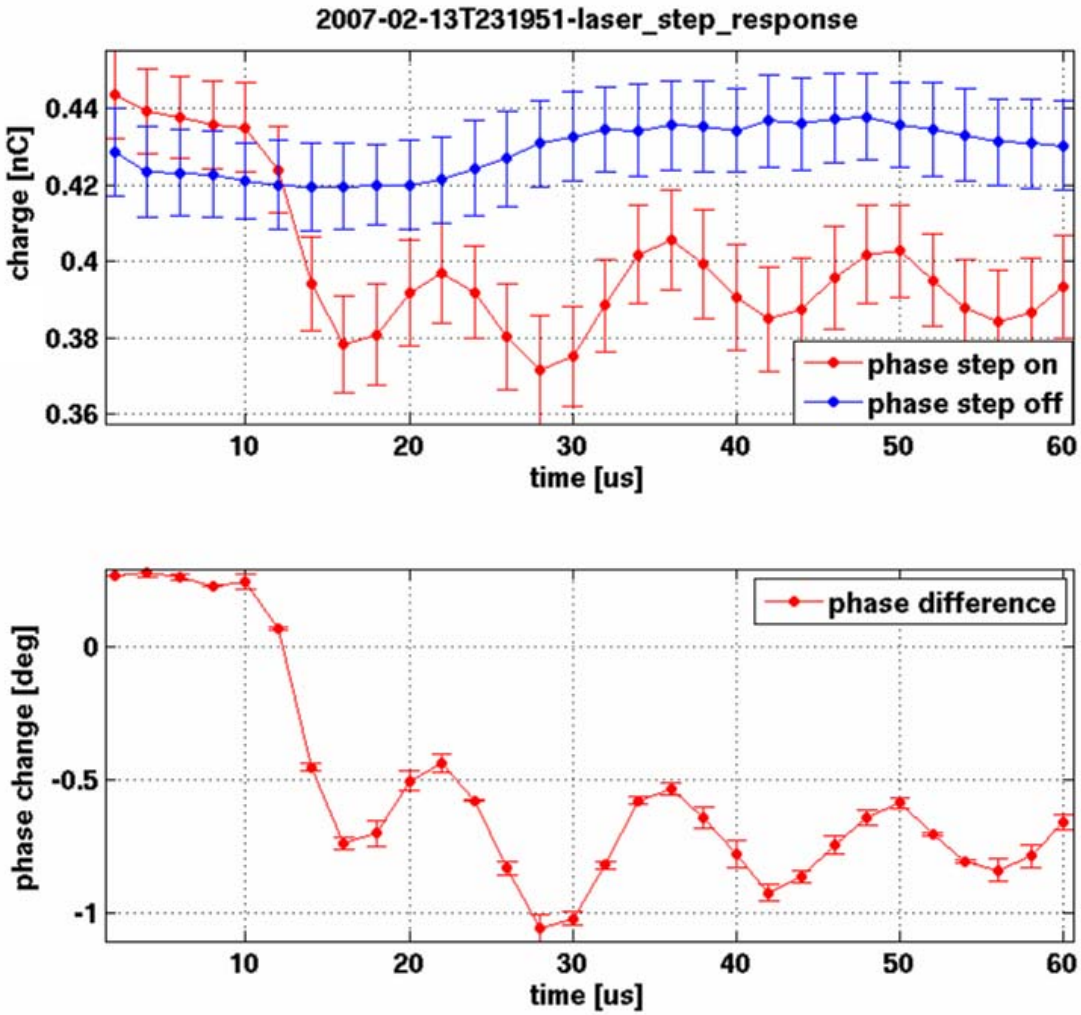
The gun phase is adjusted such that the bunch charge has a large dependence on the gun phase





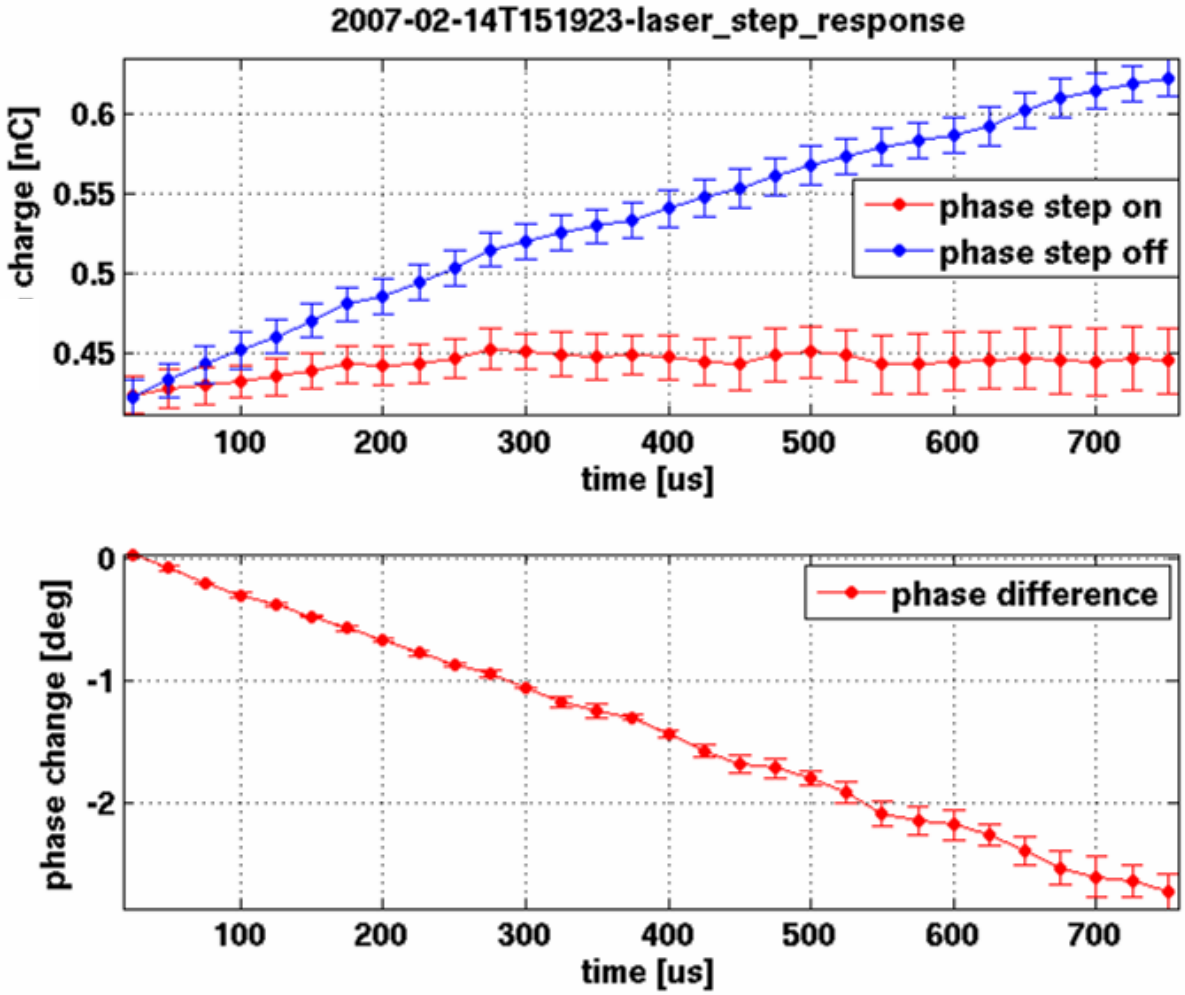
A calibration is performed to get the conversion factor from bunch charge change to gun phase change.

1 deg phase step at t = 12 μs applied to the laser



reponse time: ~ 6 μs
frequency of ringing: ~ 70 kHz

compensation of phase slope



1.)
The slope on the charge was corrected giving a 3 deg slope on the gun phase

2.)
The slope on the gun phase was removed. The same phase slope was applied to the photo injector laser

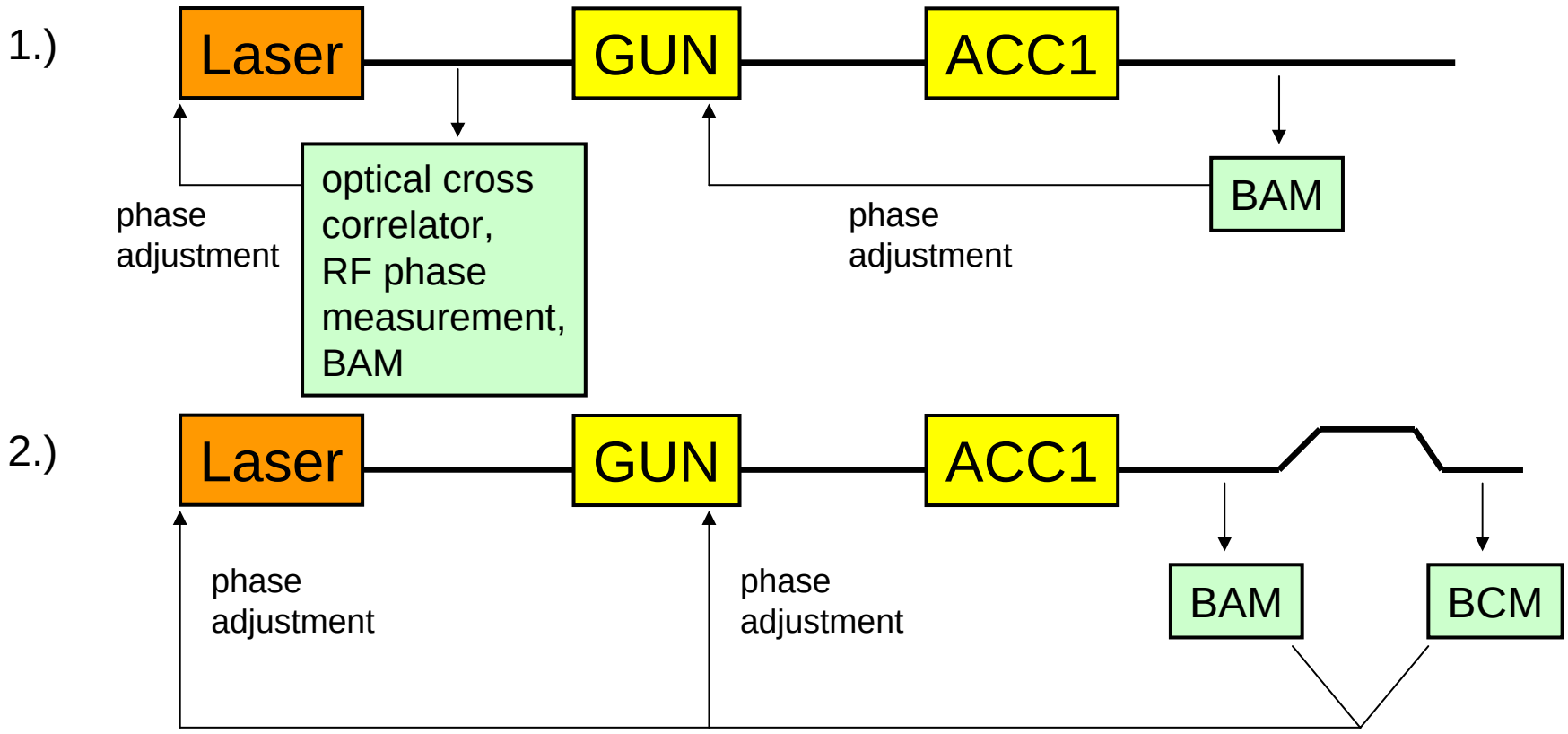
→ Both slopes have the same effect.

comments

- Measurements of the pyro-signal showed, that the slope on it is caused by a superposition of a gun phase slope and a photo injector laser timing change.

- The vector modulator should be installed permanently in the laser reference line together with a fast feedback system for an intra-buchtrain regulation (e.g. SIMCON).

intra-bunchtrain feedback options



BAM : bunch arrival time monitor

BCM : bunch compression monitor