

LS LFD compensation algorithm
S1Global test
at KEK

Proposal

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Outline

- Objectives
- Brief Introduction to LS LFD algorithm
 - application of LS LFD for CM2 cavities testing at FNAL/HTS.*
- Proposed System (hardware) for LFD S1G test at KEK

Objectives

- To use most sensitive (from our point of view) LFD algorithm to compare performance of 4 different types of tuner (Blade tuner, Saclay/DESY; KEK (2 versions)).

Brief Introduction to FNAL LFD Algorithm

STEP 1: Correcting the IF Signals

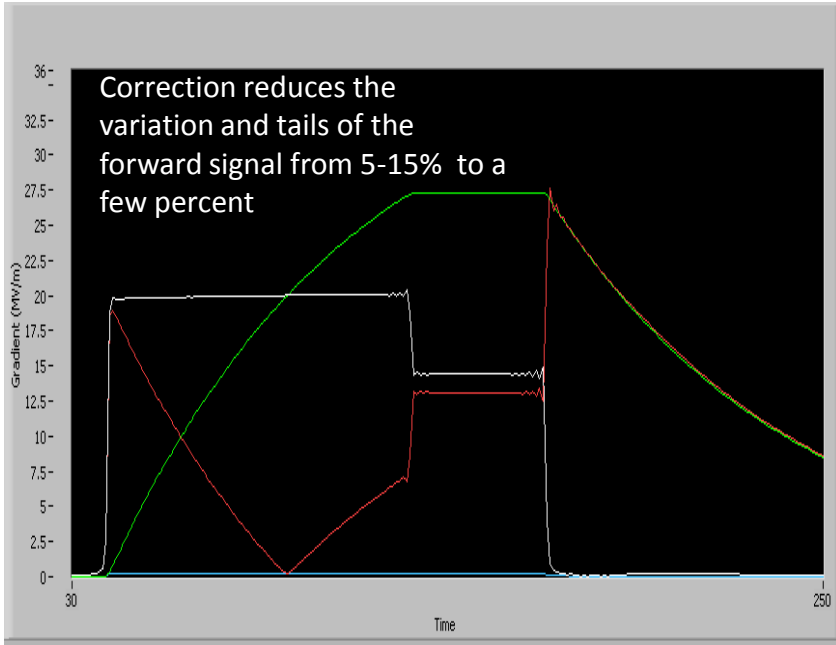
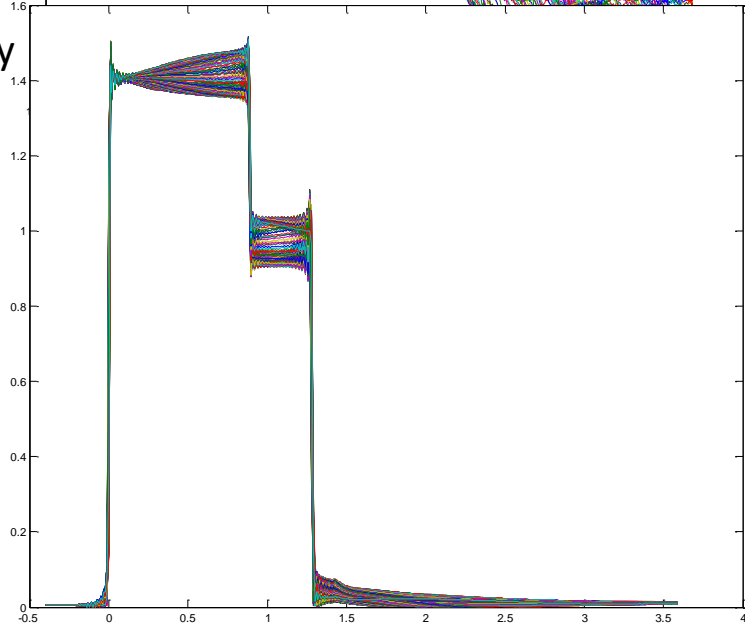
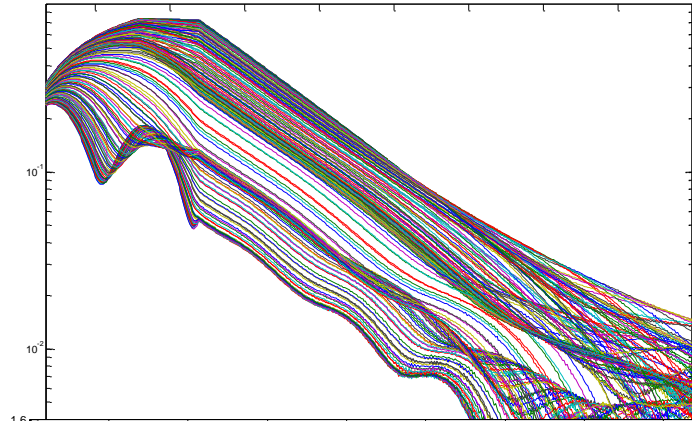
Examine IF signals for saturation

Decay of probe and reflected should be exponential

Cross-contamination of forward and reflected signals

Amplitude and phase variations of the forward power during the fill and flatop

Tails on forward power during the decay

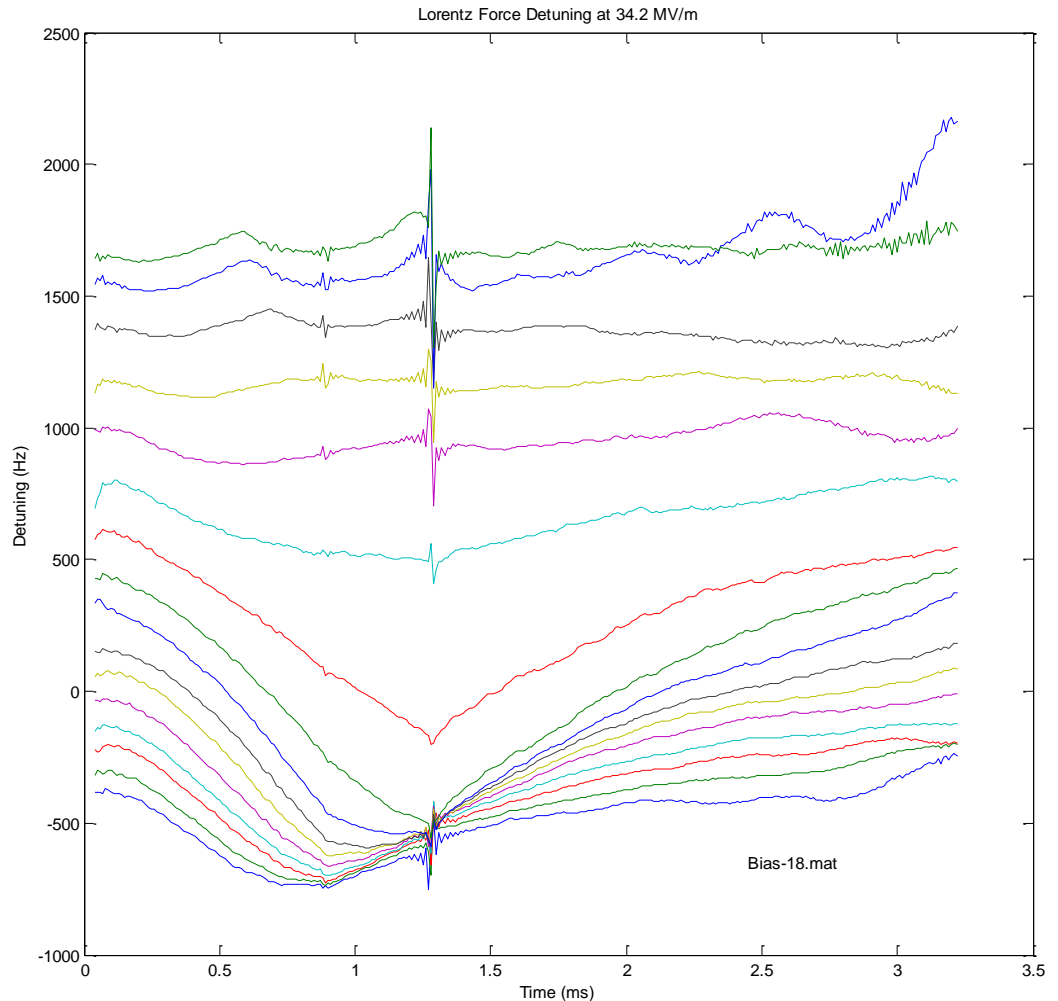


Brief Introduction to FNAL LFD Algorithm

Step 2: Dynamic detuning

Extract the width and the dynamic detuning from the probe and forward IF signals

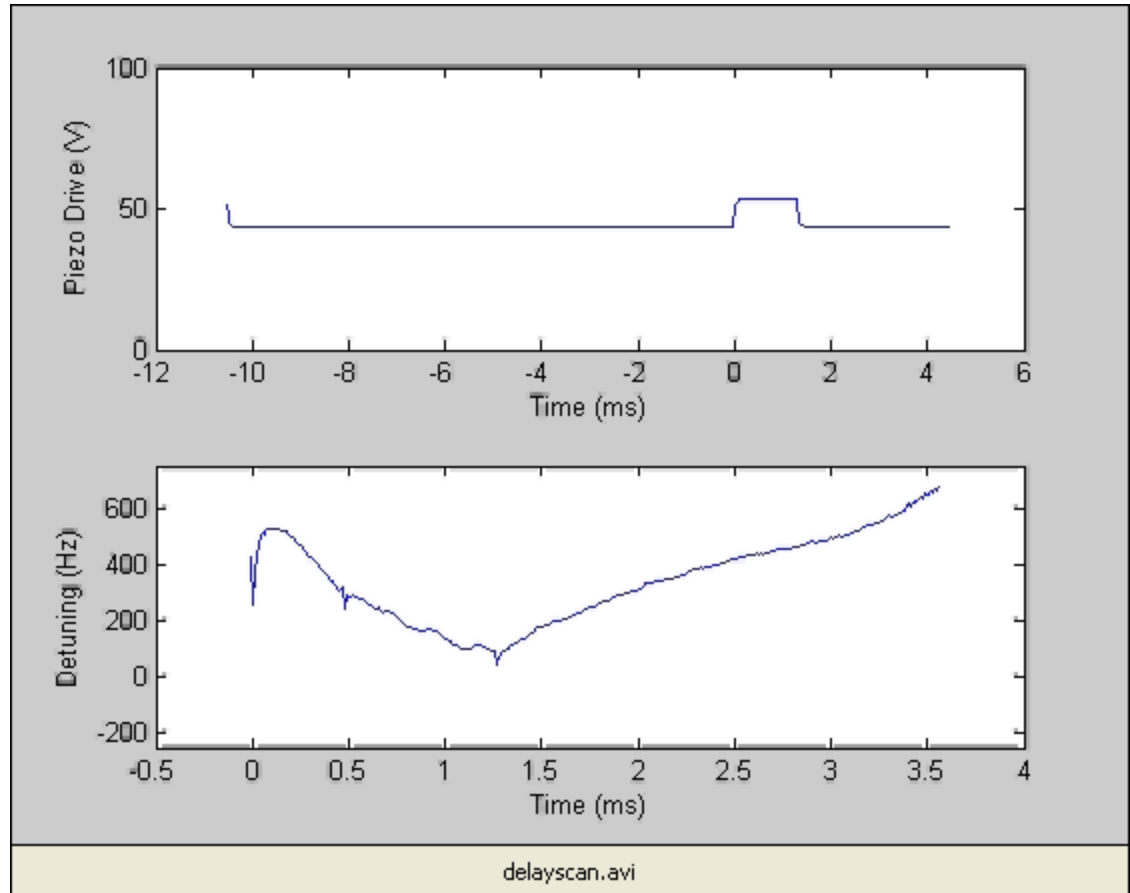
Scan Piezo bias (increment 1V) +/-100V from resonance.



Brief Introduction to FNAL LFD Algorithm

STEP 3: Delay Scan

Excite piezo with a series of short pulses at various delays and measure the detuning



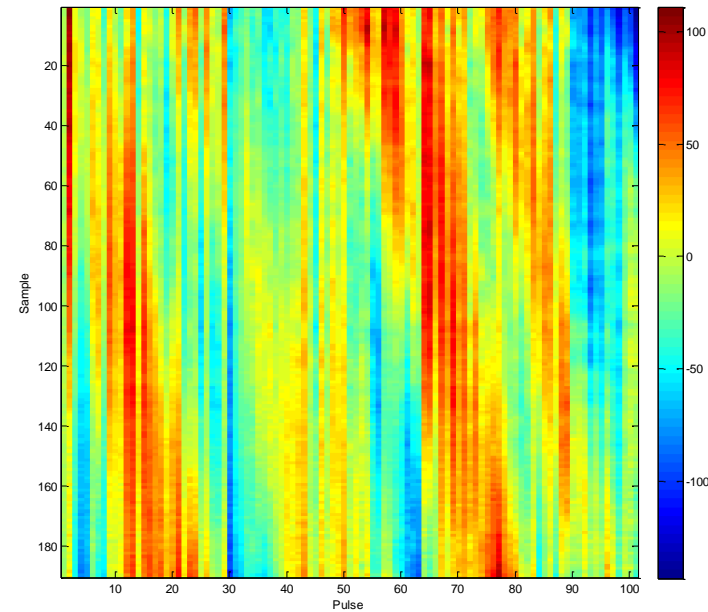
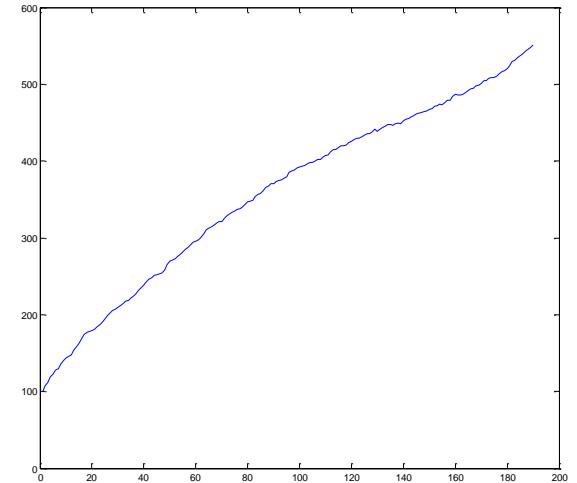
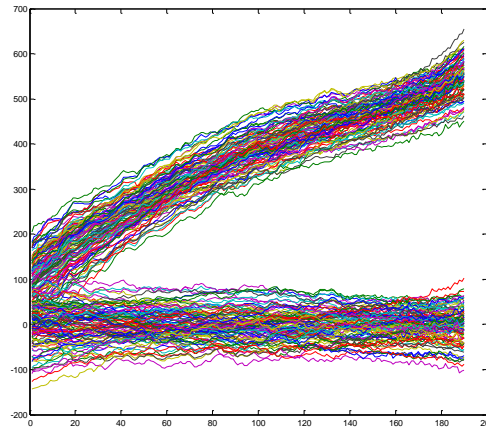
Brief Introduction to FNAL LFD Algorithm

Response Matrix

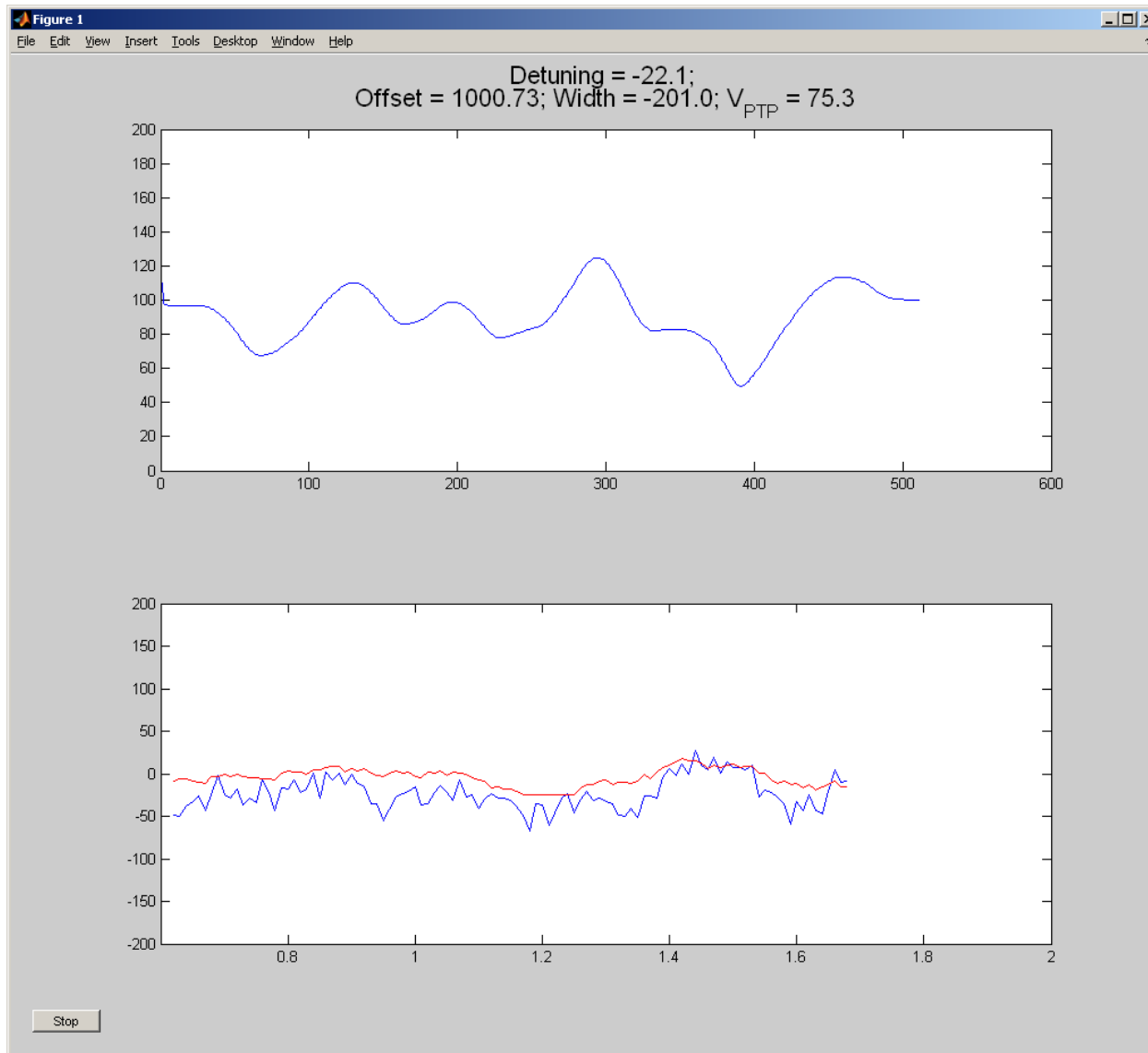
STEP 4: Response Matrix/
Calculation of
Compensation Pulse

*Subtract the mean detuning to
get response matrix*

*Invert the response matrix and
determine combination of
pulses needed to cancel
out the mean using LS*

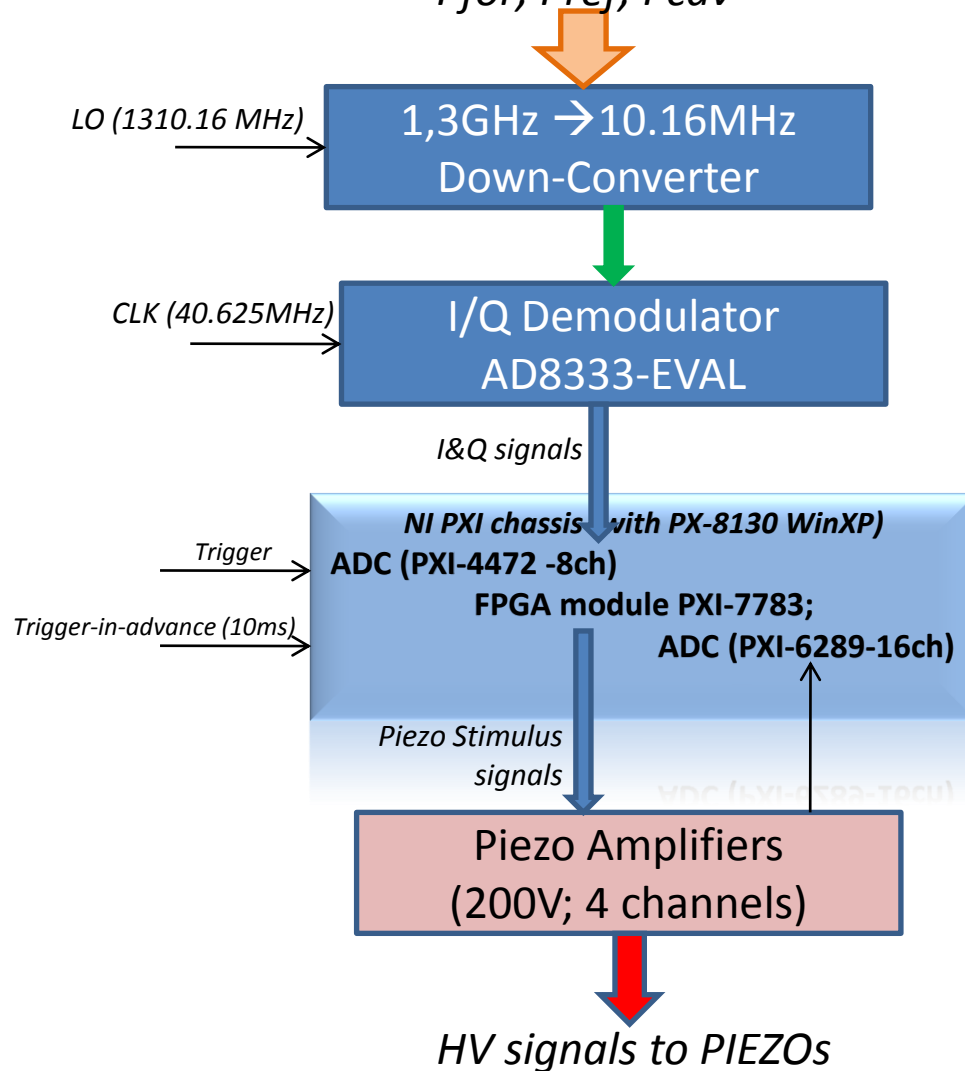


Brief Introduction to FNAL LFD Algorithm Cavity ACCELO8 Eacc=30MV/m



Hardware

Pfor; Pref; Pcav



Hardware

Pfor; Pref; Pcav

