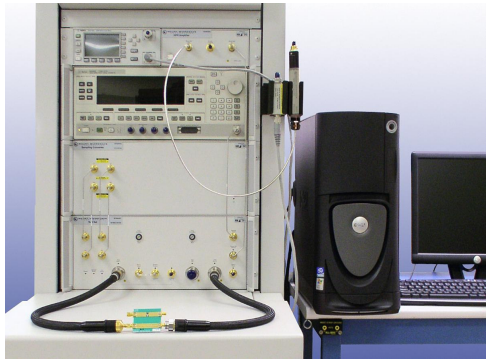
Metrology @ NMDG.

A 10-minute intermezzo

LSNA phase calibration traceability

LSNA phase calibration

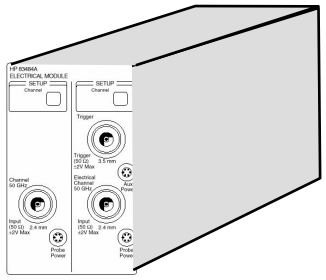


requires

a calibrated HPR

requires

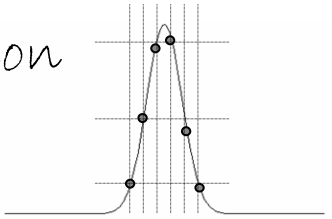
a calibrated oscilloscope



sampling oscilloscopes "reality"

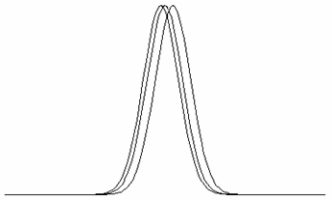
timebase errors

distortion
$t_k \neq k.\Delta t$



measure, estimate, compensate

drift



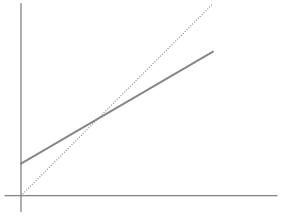
measure, estimate, compensate

jitter

measure, estimate, compensate

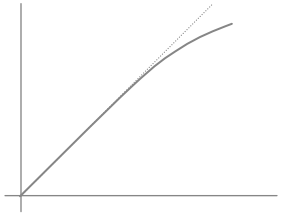
vertical errors

offset



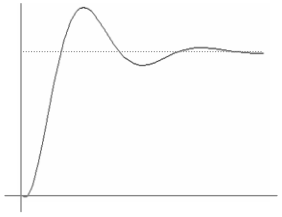
vertical cal plug-in

nonlinearity



avoid: use small signal

dynamics

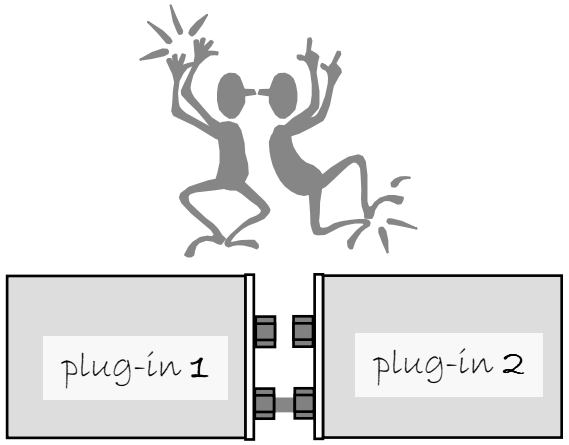


nose2nose EOS

mismatches, connector saver

measure and compensate

nose2nose



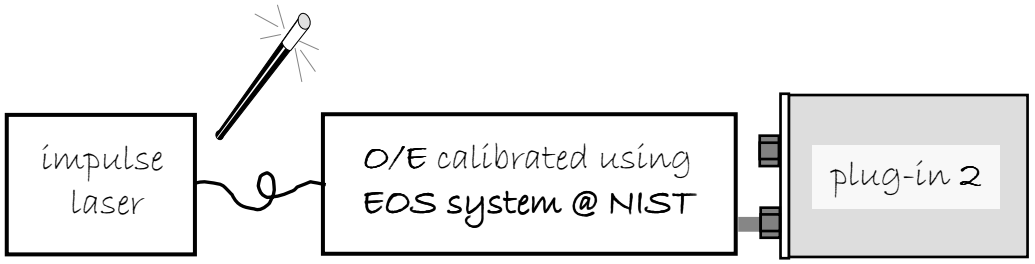
assumption:
kickout pulse ÷ impulse response

$$H_{meas}(f) \div H_1(f) . H_2(f)$$

after
compensation of timebase errors
and mismatches

50/50 GHz

EOS-based

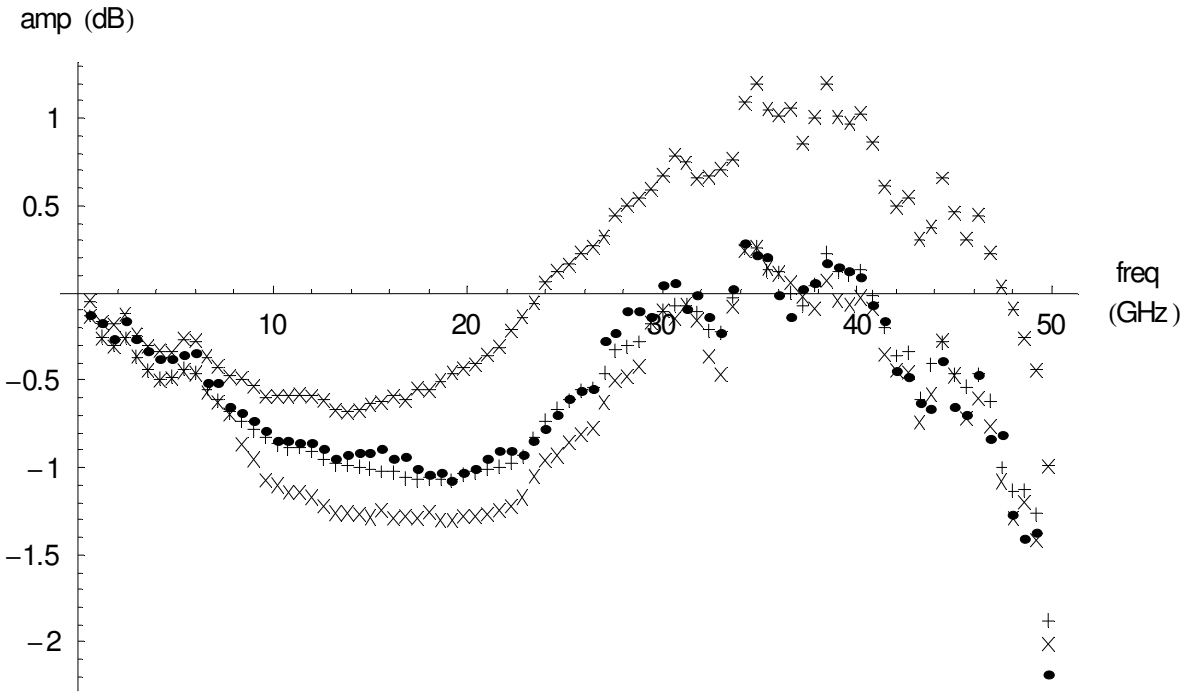


$$H_{meas}(f) = H_{O/E}(f) . H_2(f)$$

after
compensation of timebase errors
and mismatches

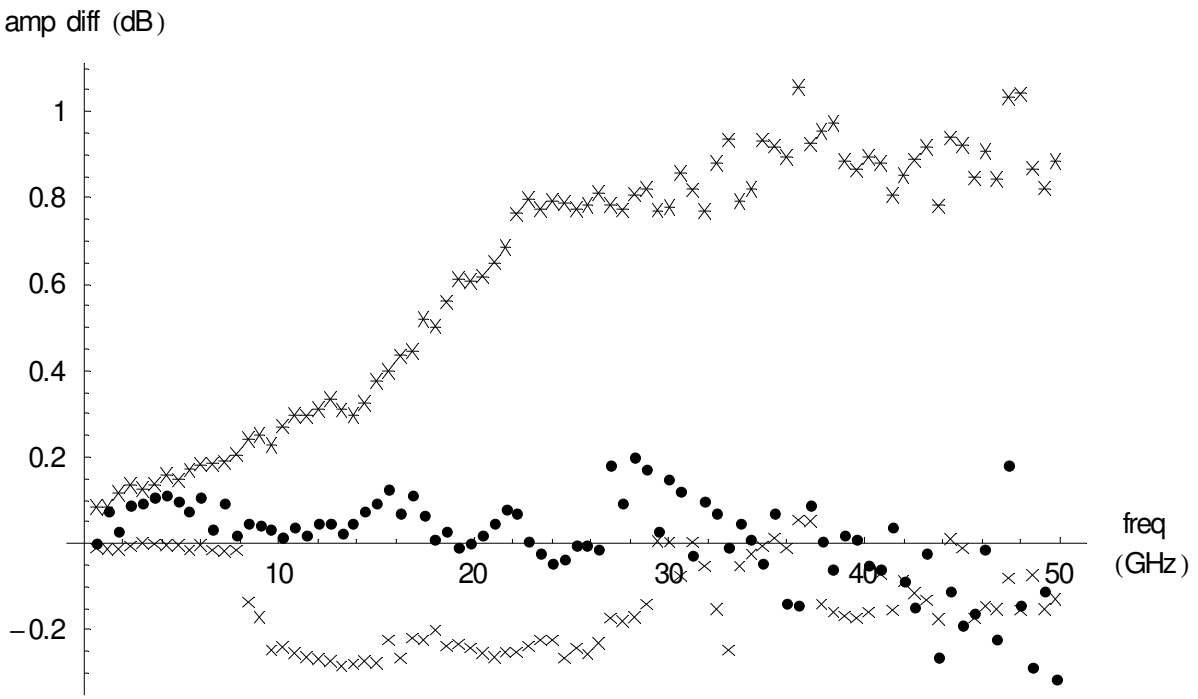
50/110 GHz

ampl. characteristic verification (1)



-X-	nose2nose
●	EOS
X	power meas – freerun trigger – histogram meas
+	power meas – triggered mode - normal meas

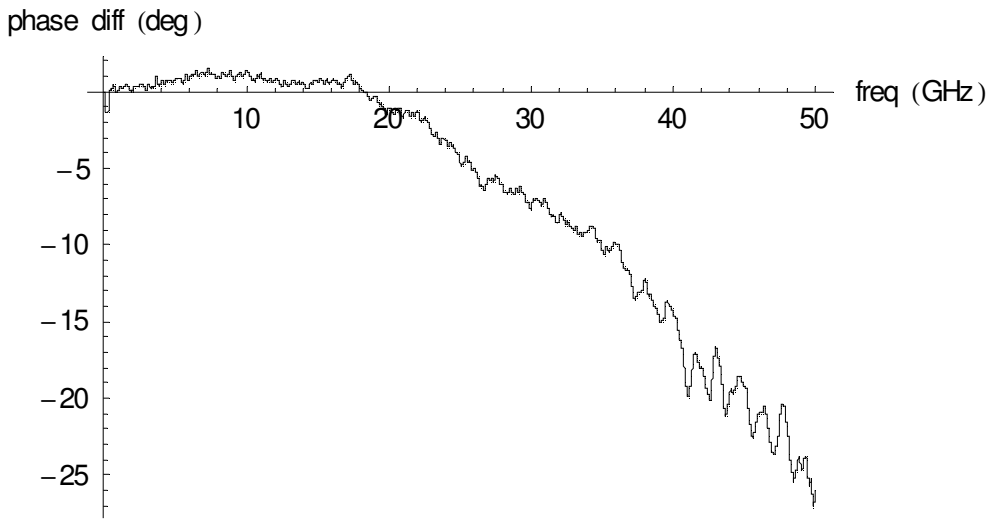
ampl. characteristic verification (2)



-X-	nose2nose
●	EOS
X	power meas – freerun trigger – histogram meas
ref	power meas – triggered mode - normal meas

phase characteristic comparison

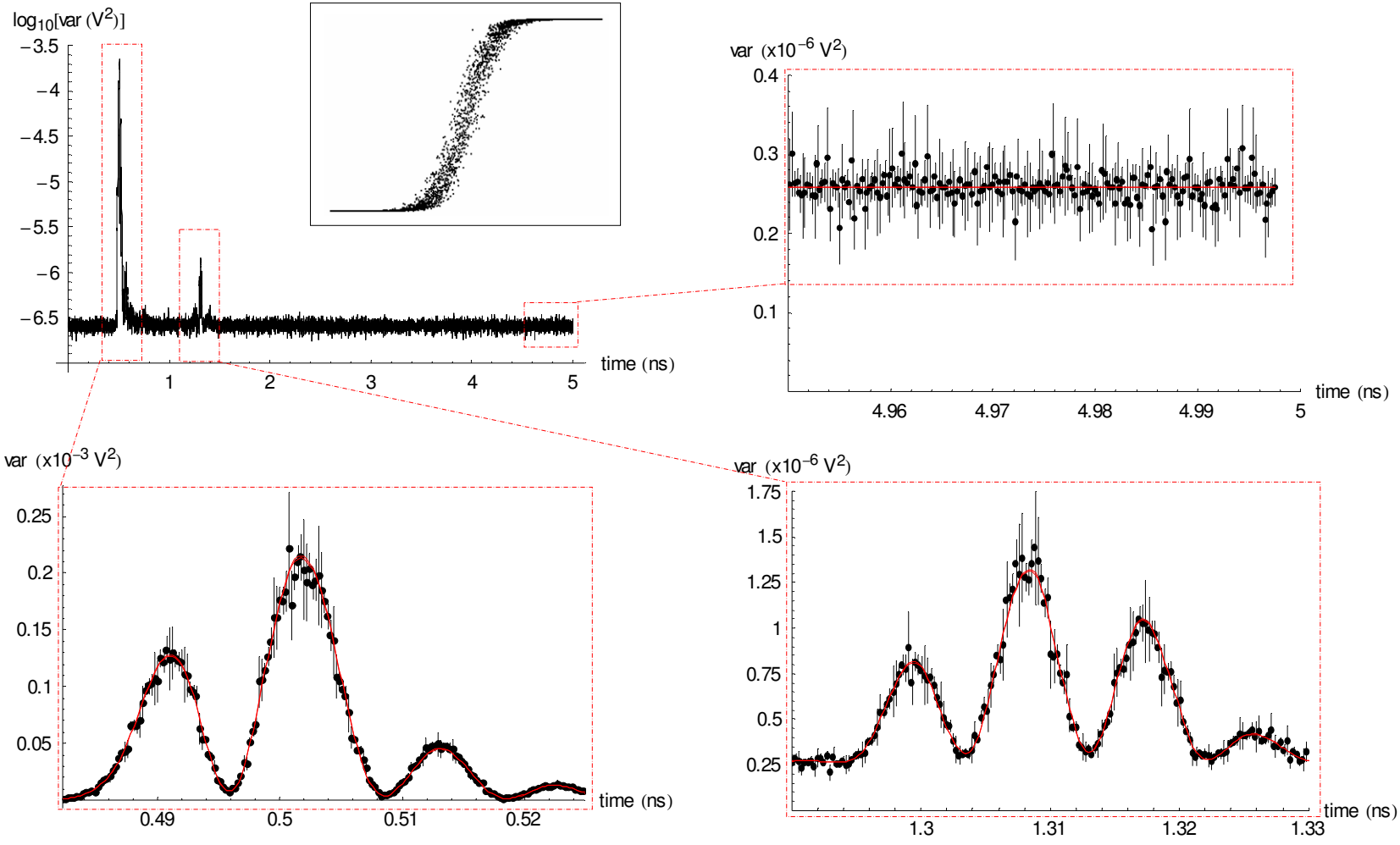
nose2nose versus EOS



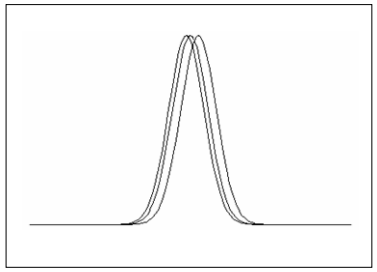
Δ within 95% conf. interval up to 20 GHz

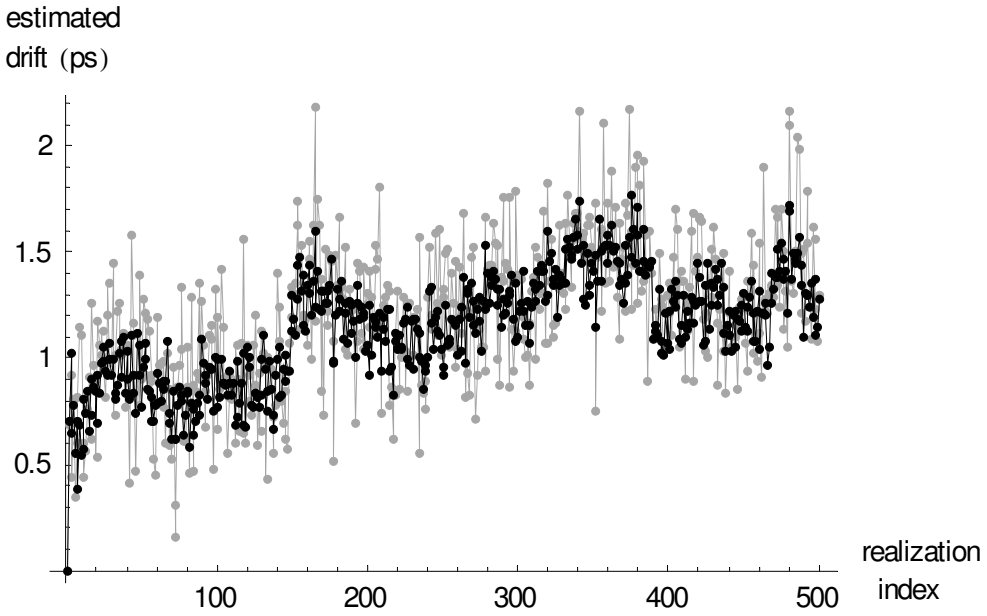
Δ ≈ 25 degrees @ 50 GHz

enhanced time base compensation: jitter (in the presence of drift and distortion)



enhanced time base compensation: drift (in the presence of jitter)





uncertainty reduced by factor of 2 !

Metrology is important @ NMDG.

Thank you !