Collaboration Meeting

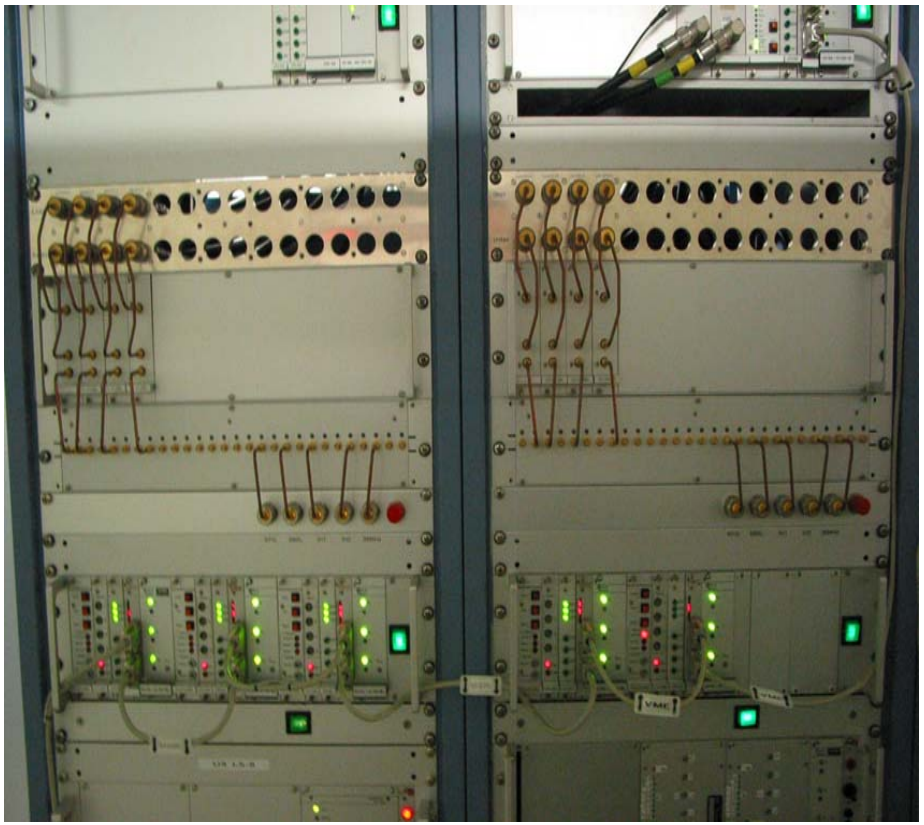
CAE/Saclay – GSI

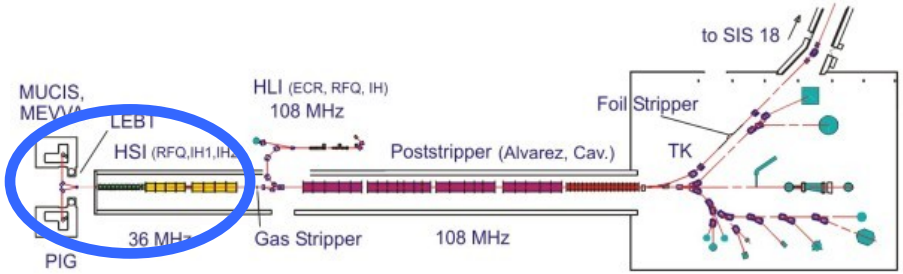
October, 29th, 2009

BPM and TOF systems for linacs at GSI

- Installations
- Blockdiagram of BPM setup
- Operating
- TOF measurement
- Characteristics of pickups & amplifiers
- Connectors & Cables

Installation for injector HSI





capabilities:

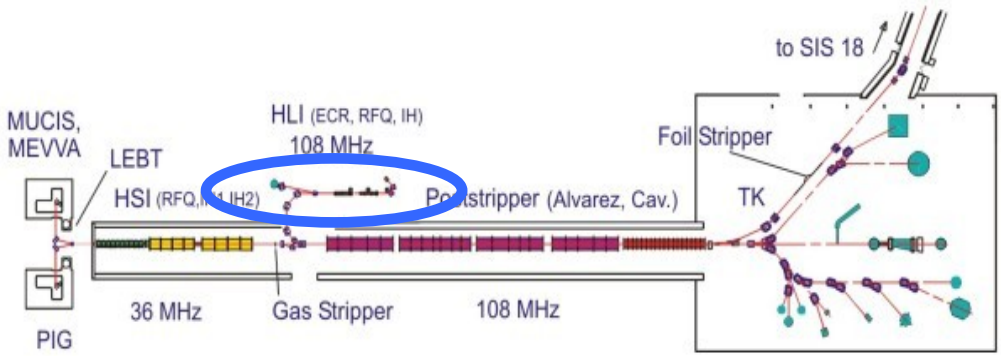
time of flight

beam position

beam intensity

rf-phase relation

Installation for injector HLI



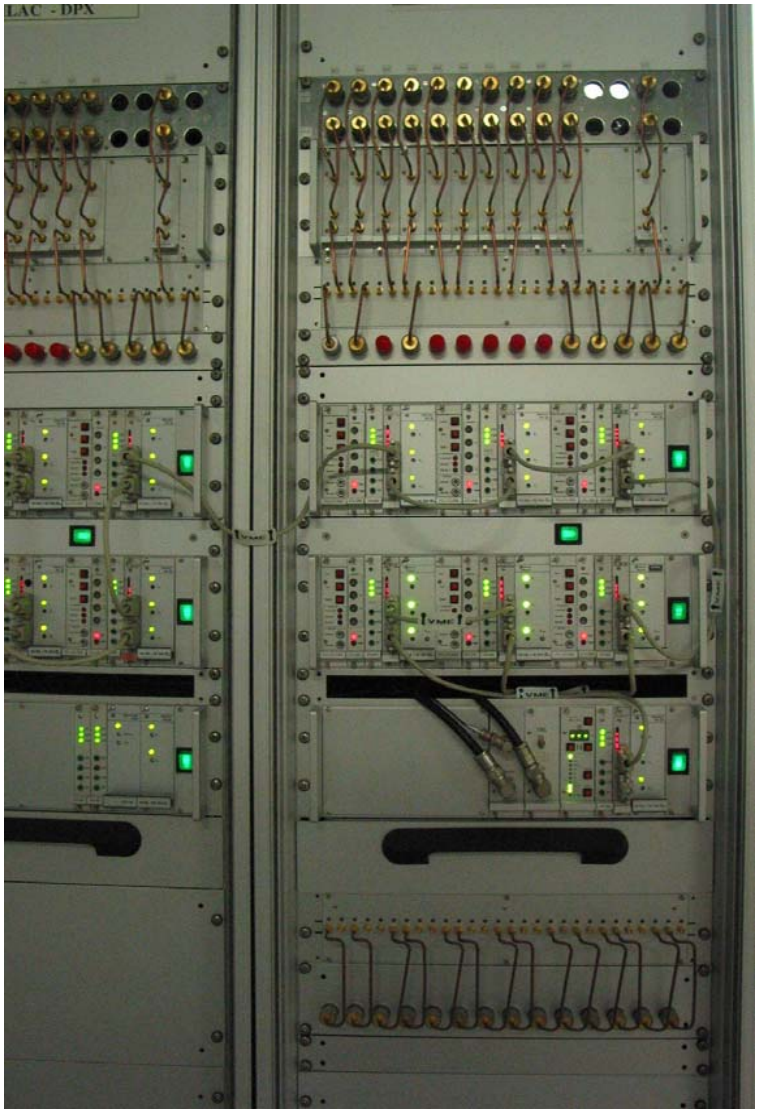
capabilities:

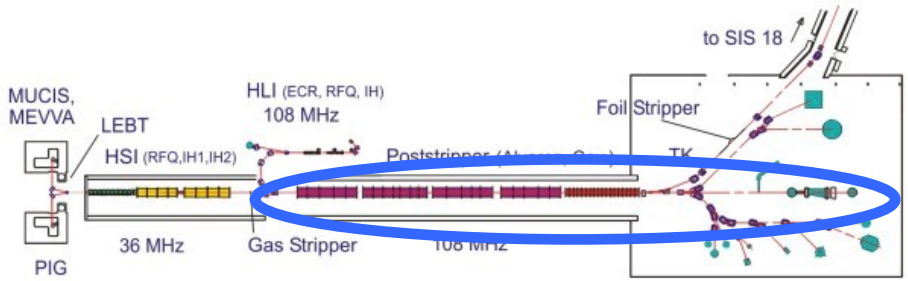
time of flight

rf-phase relation

rf-macropuls demodulation

Installation for poststripper and experiment





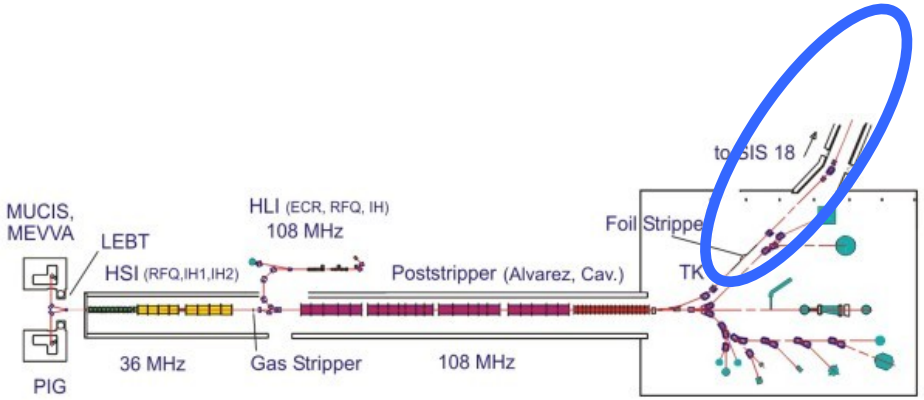
capabilities:

time of flight

beam position

rf-phase relation

Installation for transfer line

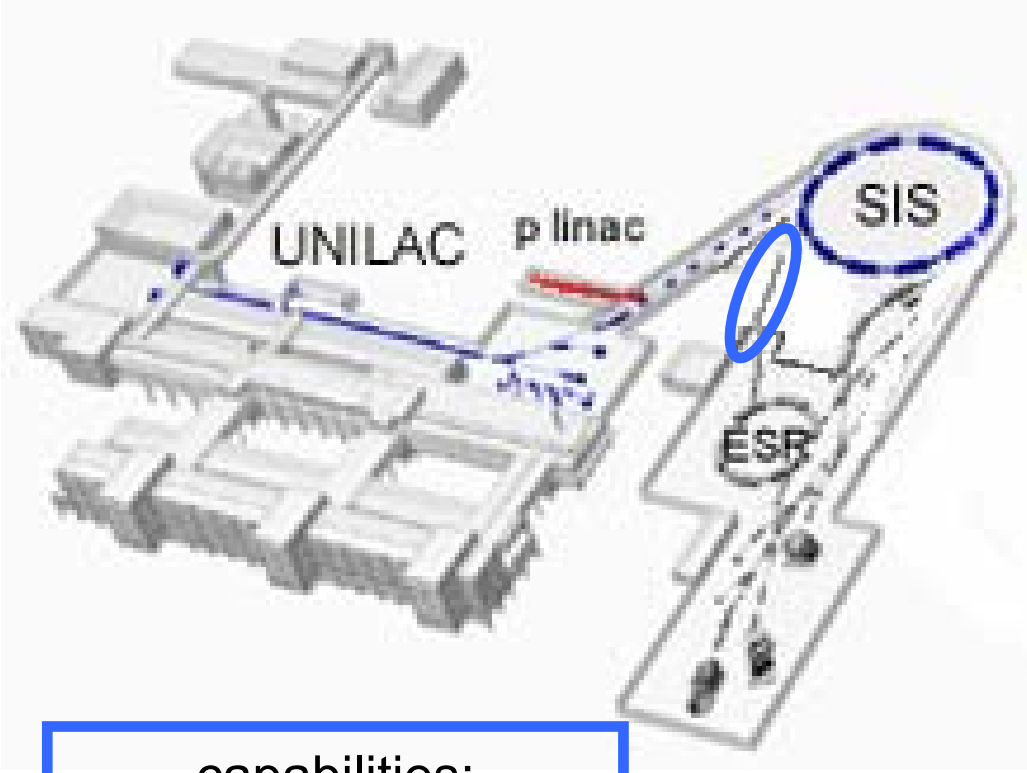


capabilities:

time of flight

beam position

Installation for Hitrap

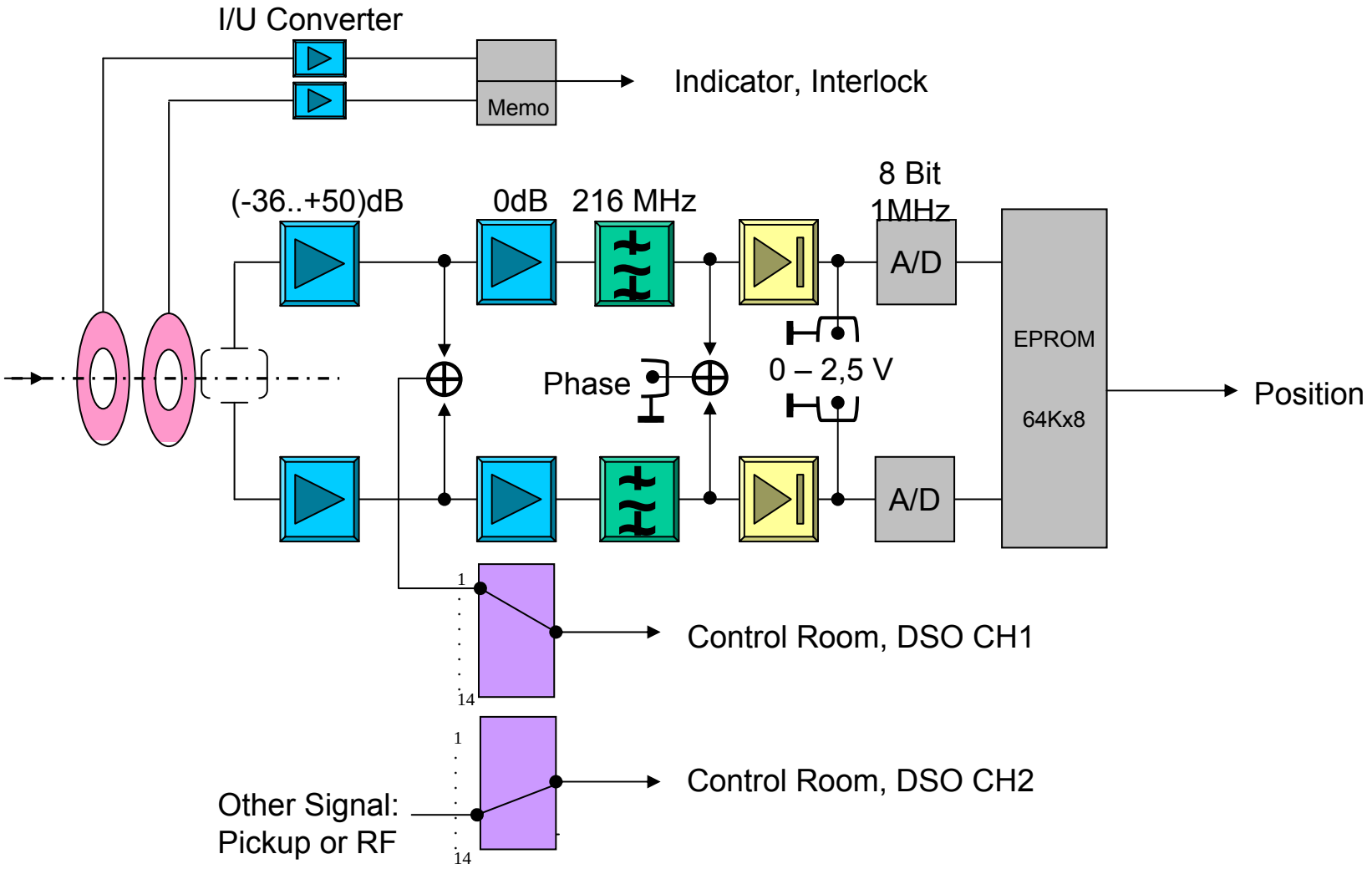


capabilities:

time of flight

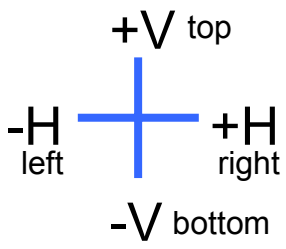
rf-phase relation

Blockdiagram of BPM setup



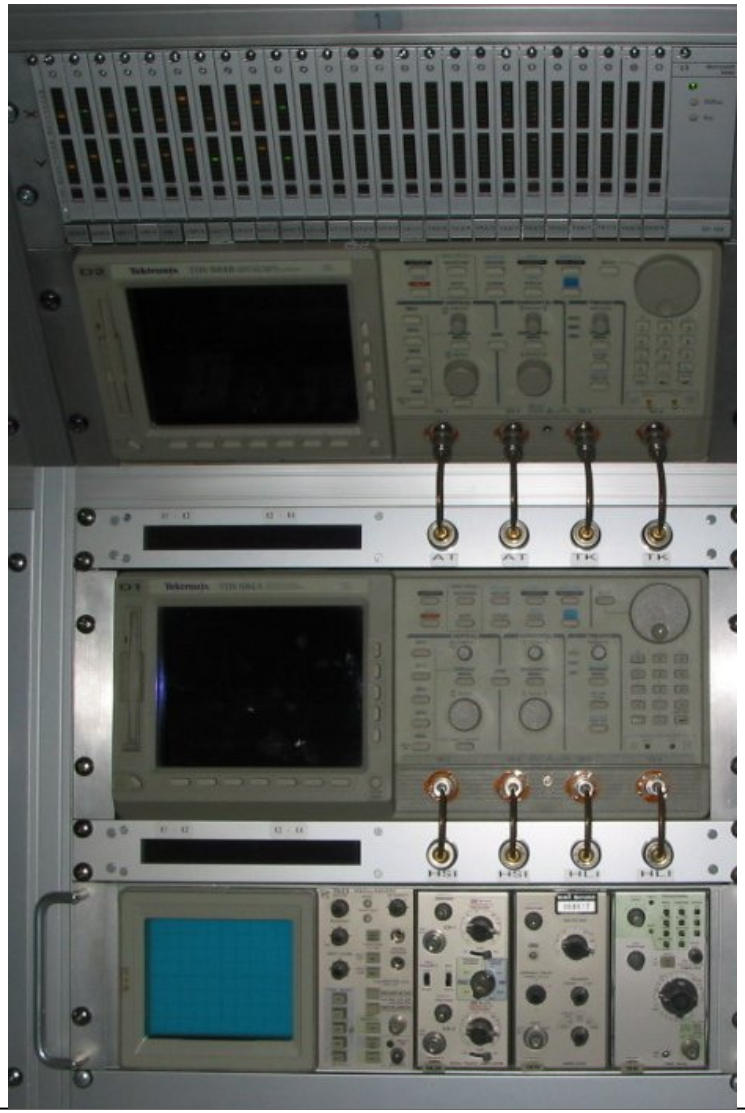
Operating workplace (Unilac)

convention:



LC display

LC display



online positionmonitor

bunch observation

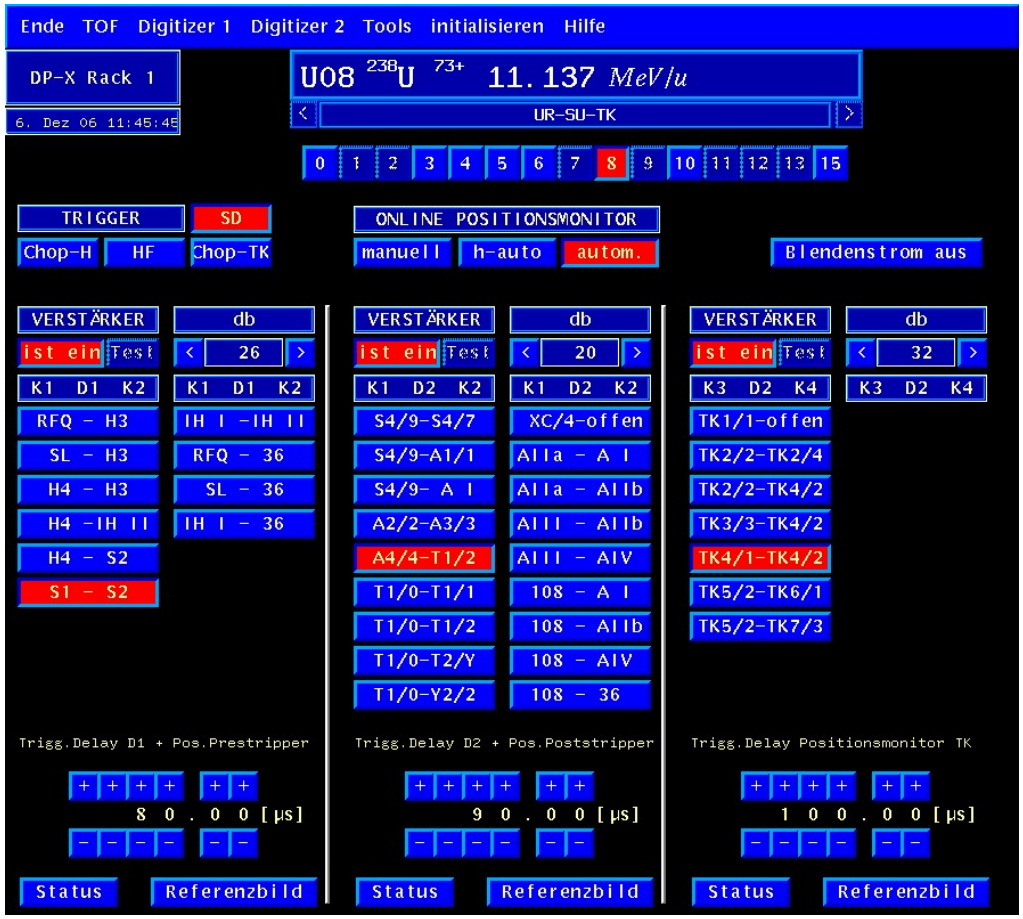
(Poststripper & Transfer Line)

bunch observation

(Injectors HSI & HLI)

auxiliary

Operating program (Unilac)



controlpanel for pickup selection,

controlled sections:

injector, poststripper, transfere line

pulldown menue for TOF calculation,

pulldown menues for DSO control,

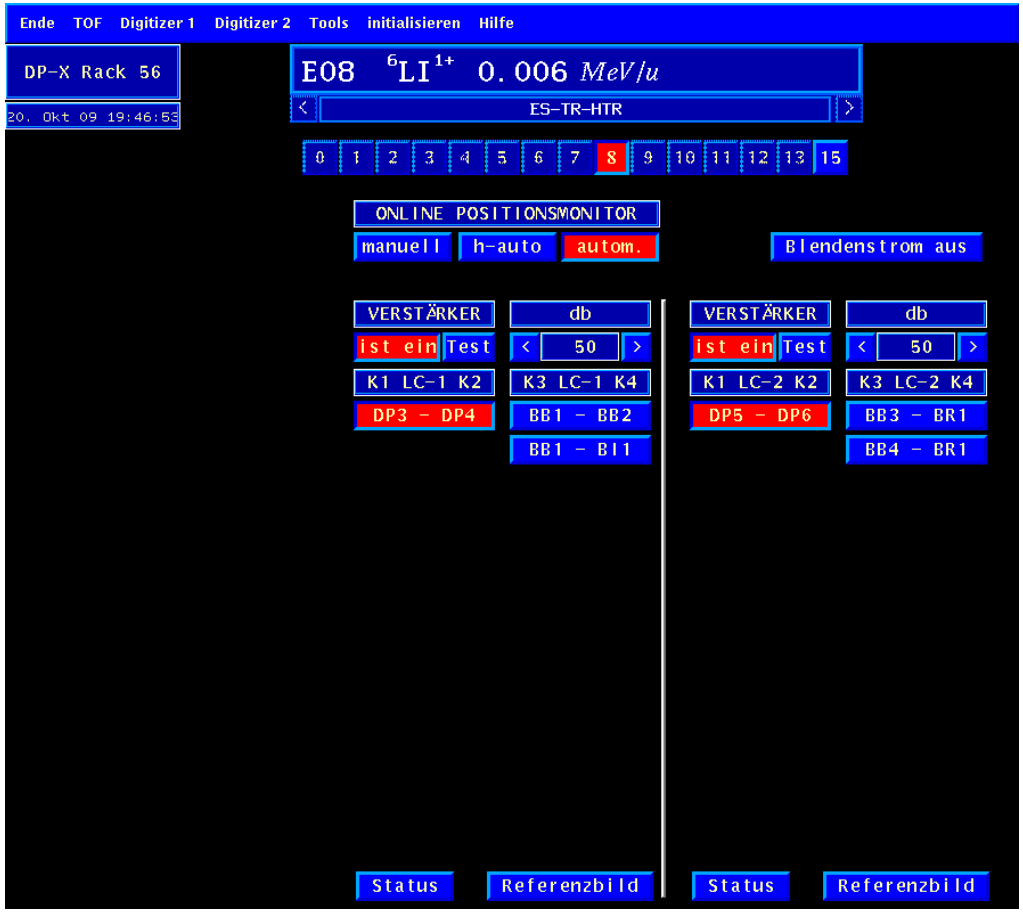
pickup menue depending on beamline,

automatic gain control for BPM,

manual gain control for selected pickups

variable propagation delay for trigger

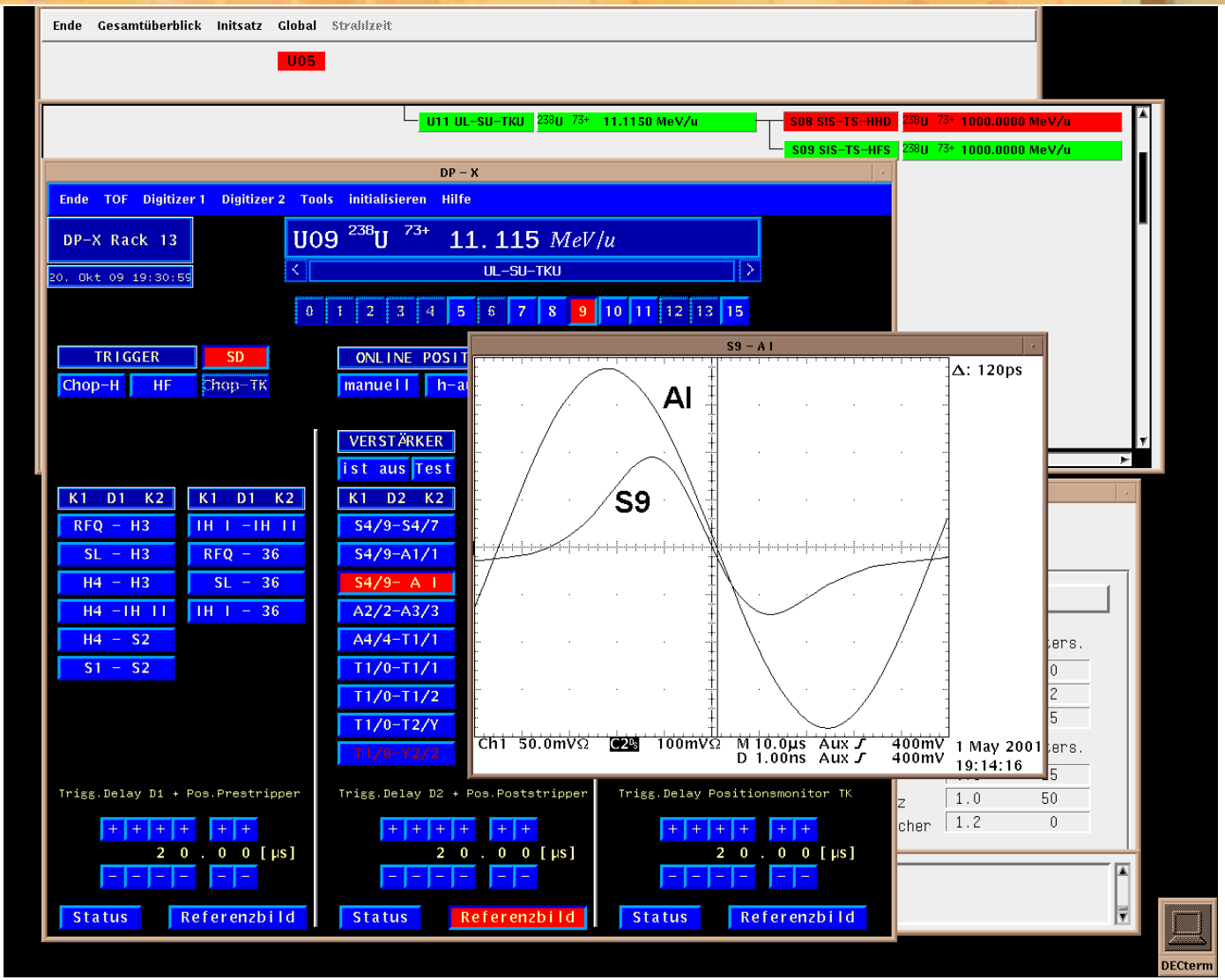
Operating program (Hitrap)



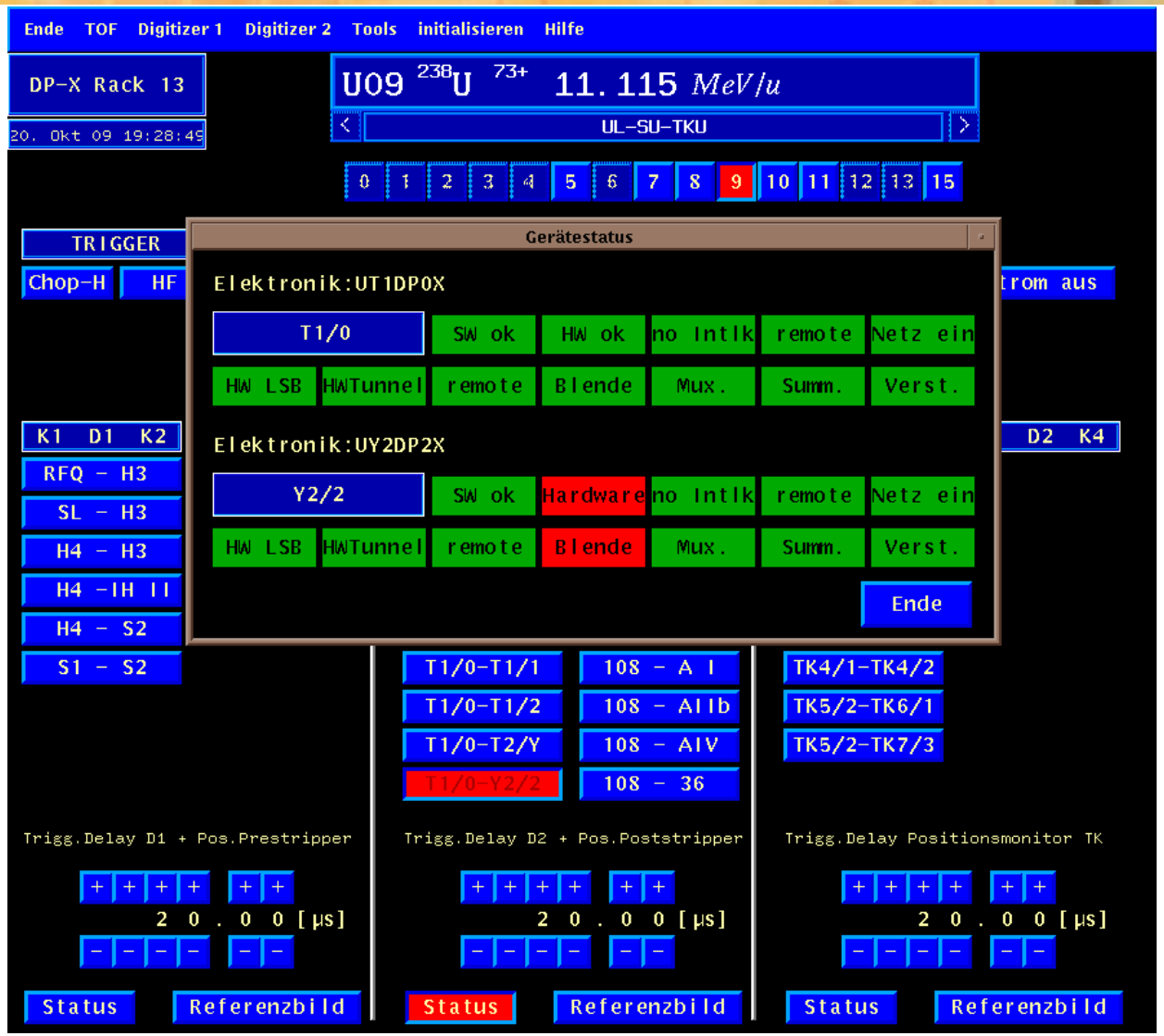
program modified and adapted to operate Hitrap-pickups

DSO control and measurements via „remote desktop“

Operating program (reference picture)

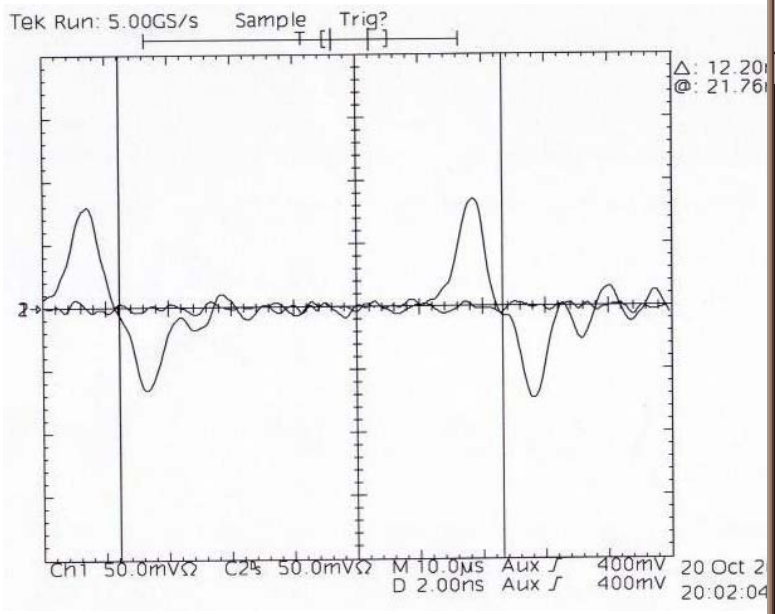


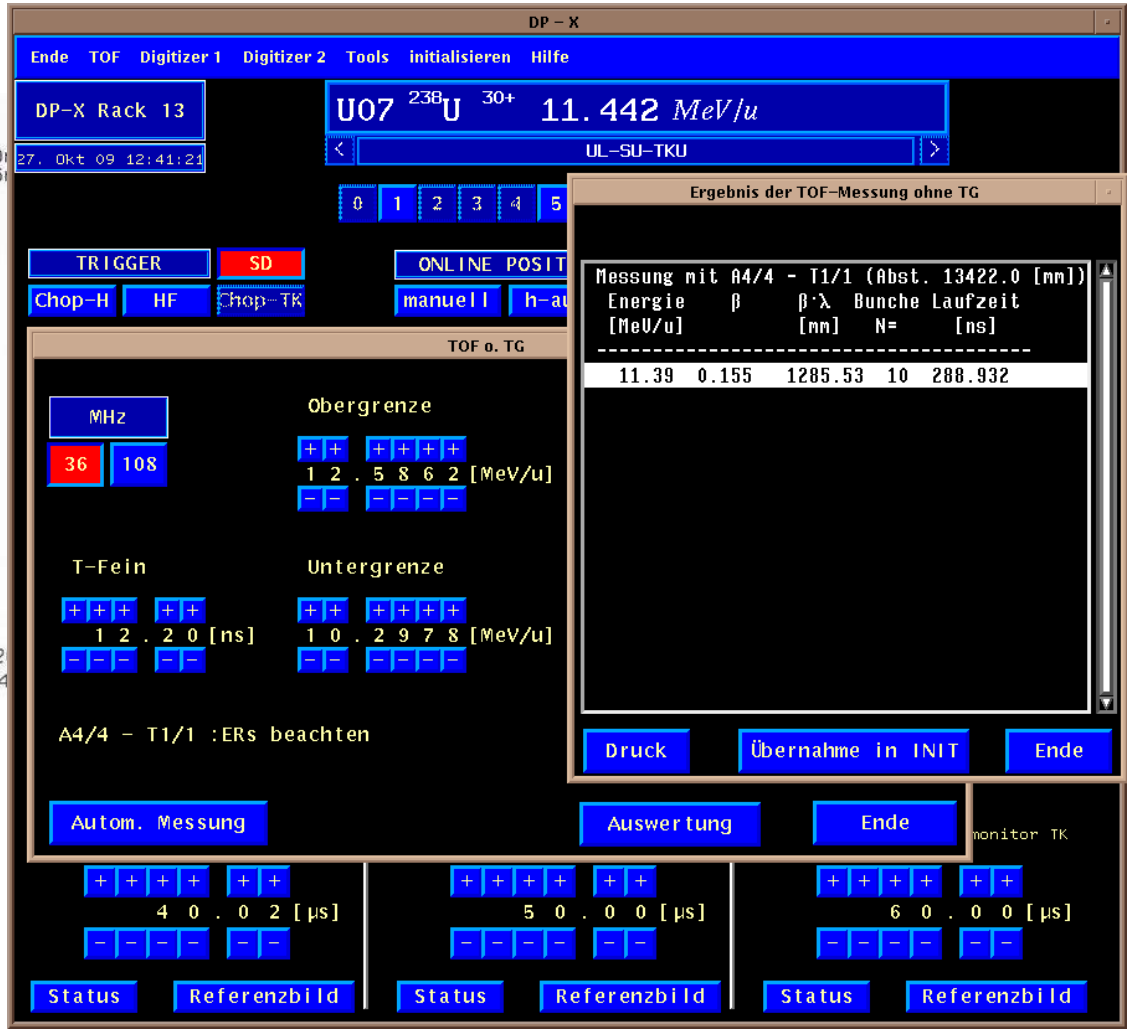
Operating program (pickup status)



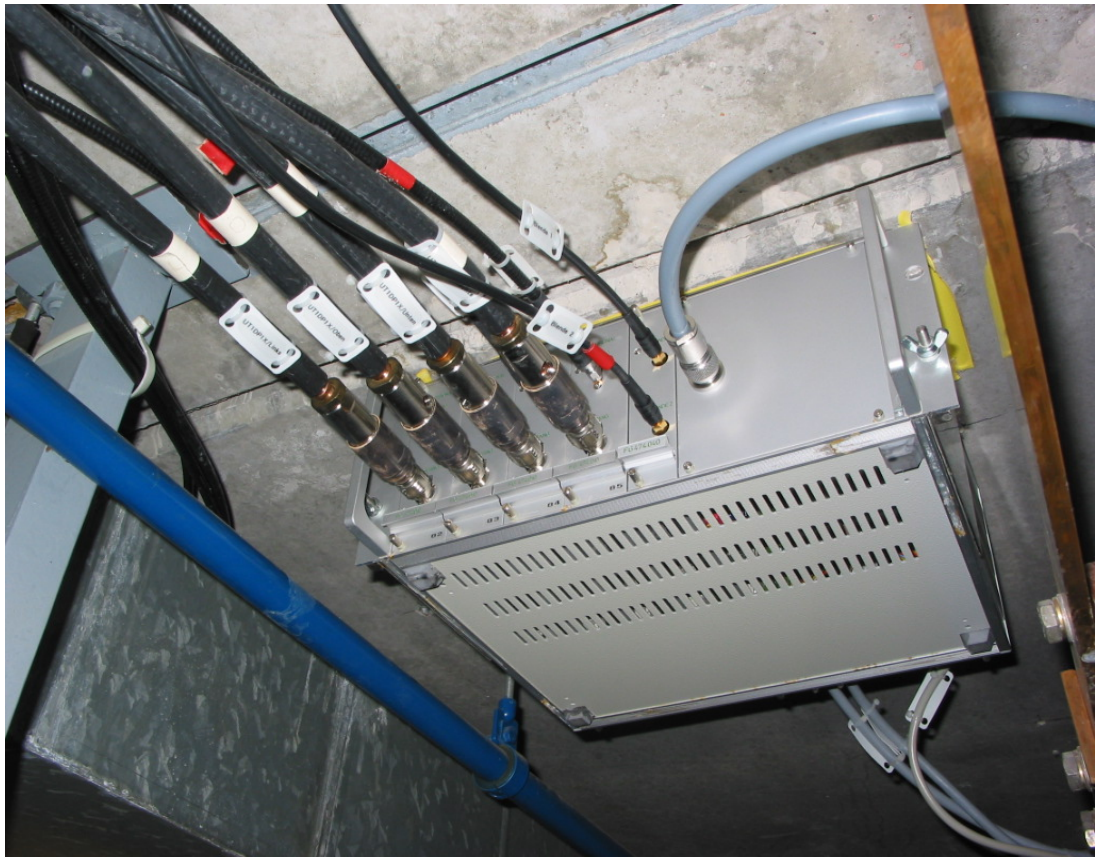
Operating program (DSO control)

Typical time of flight measurement





Characteristics, amplifiers



50 Ω in- and output

(-36...0)dB, 6dB steps

+50dB/bypass

GaAs switches

46dB dynamic

20dBm max. input

16dBm max. output

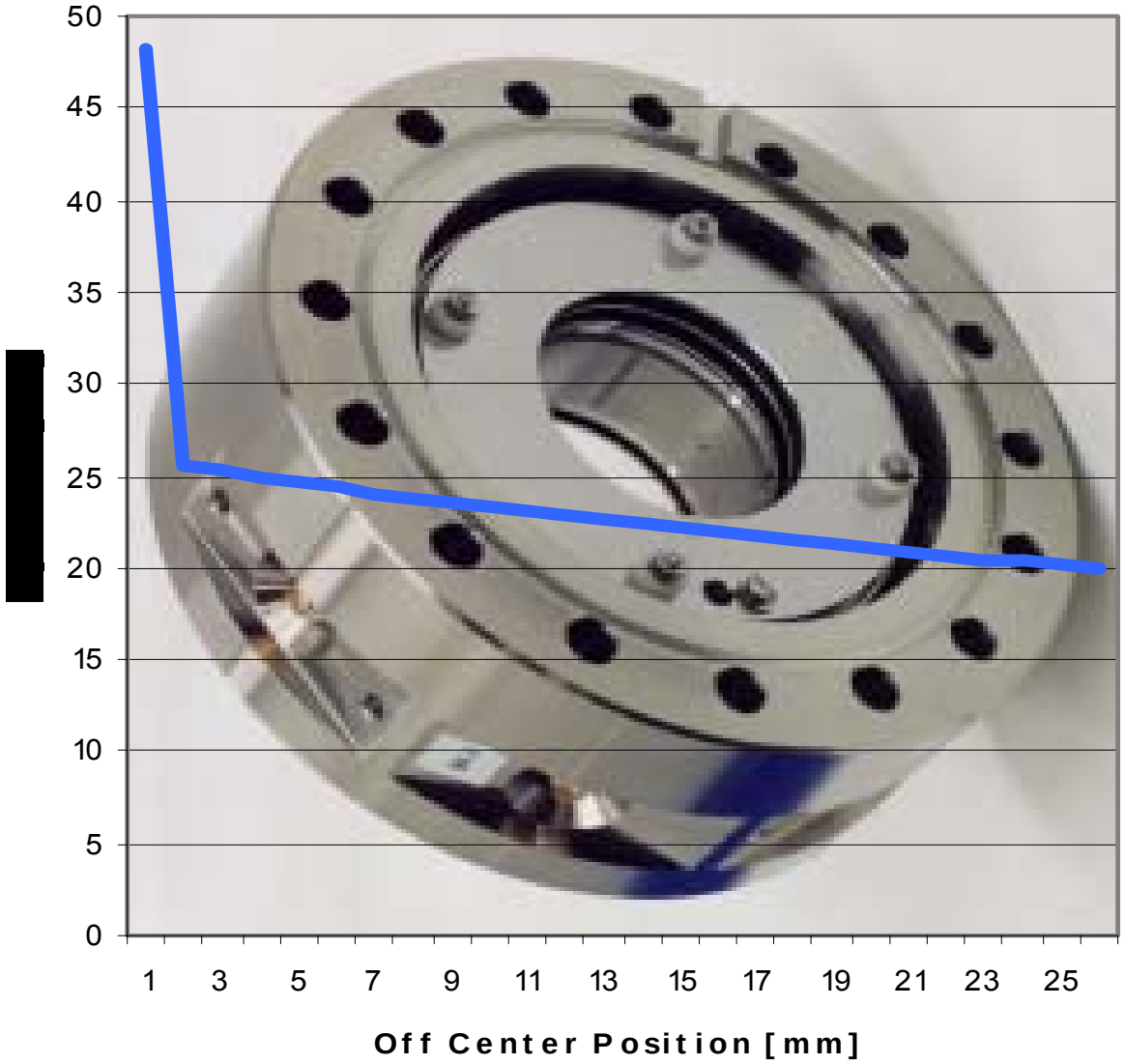
+/- 0,05dB mismatch

20....950 MHz bandwith

1nV/√Hz input noise

Characteristics,

dynamic range for 1mm resolution



8 bit system,

50mm aperture

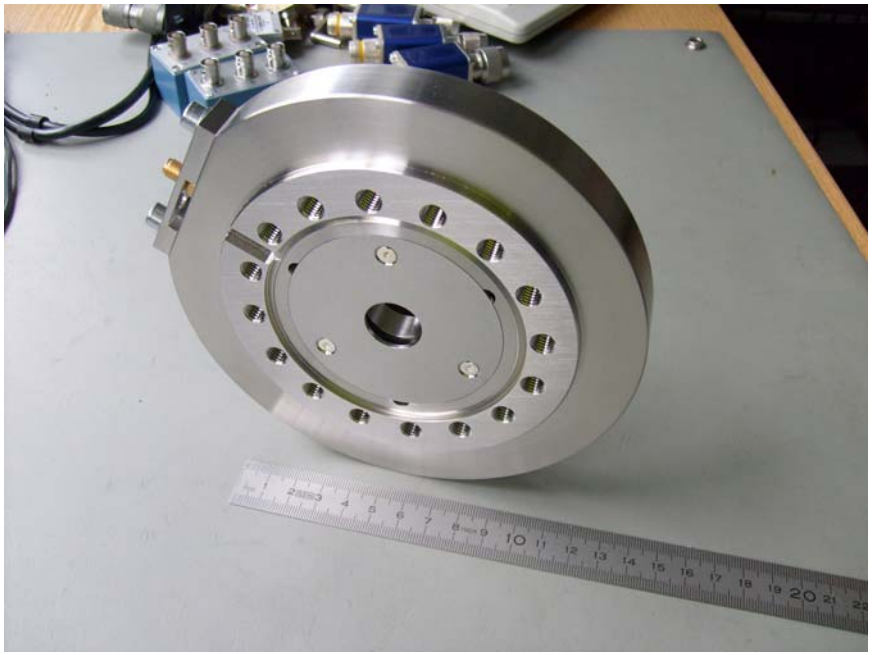
in use for:

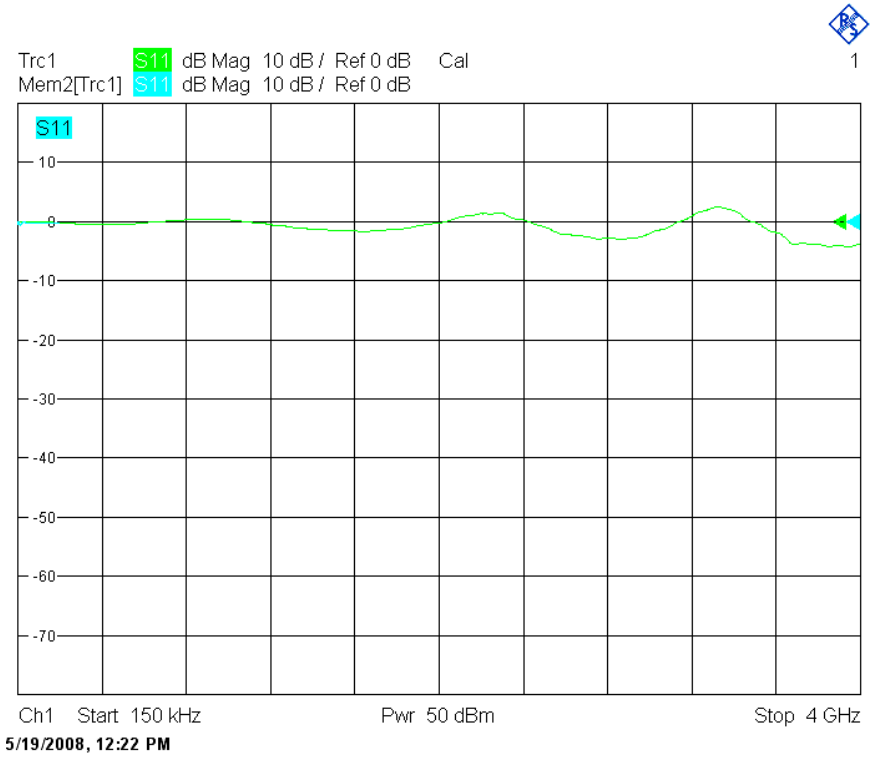
injector HSI,

poststripper,

transfere line

Characteristics, S11





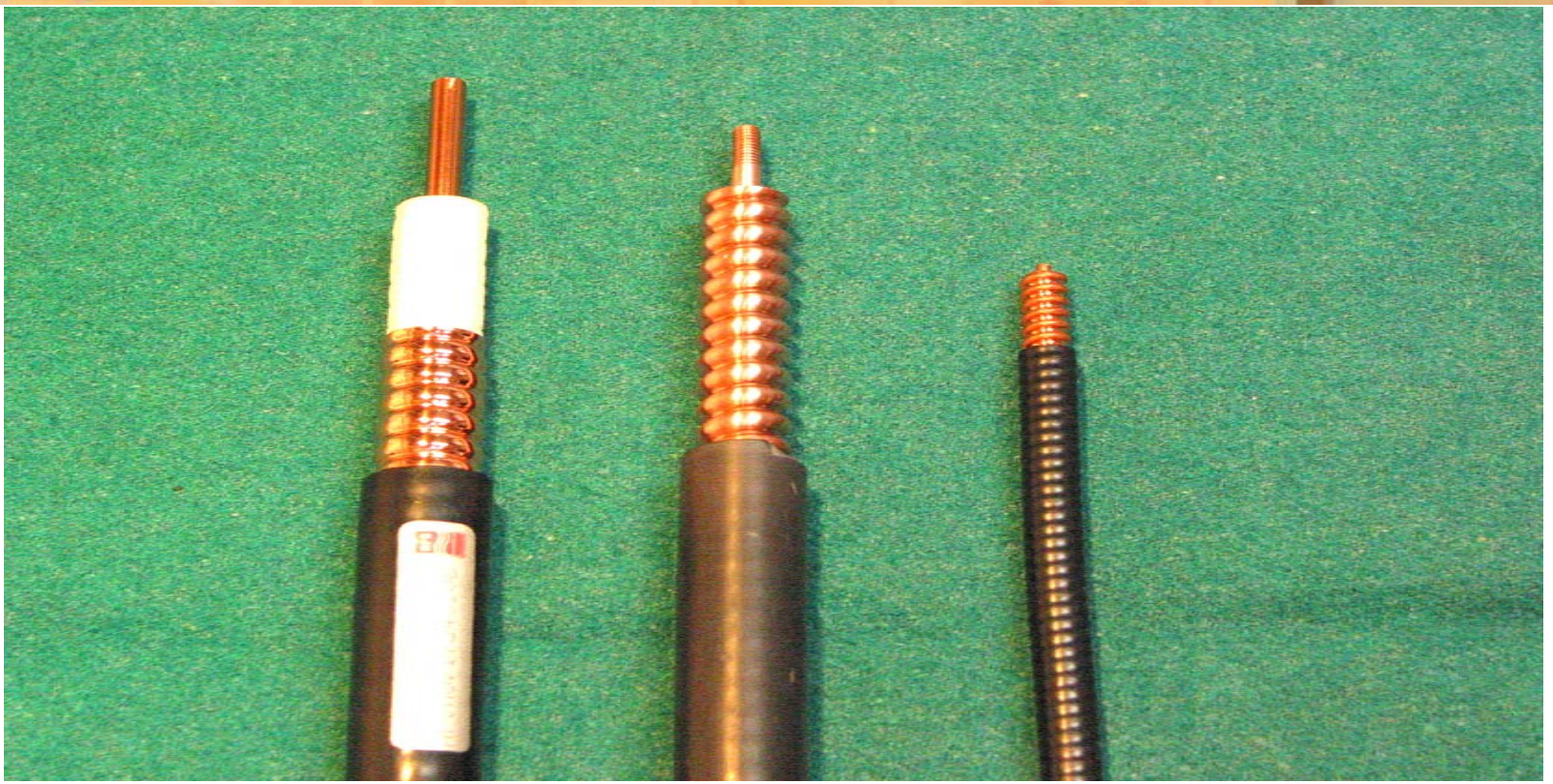
Pickup with closed ring used at Hitrap (not a BPM)

Cables, transition time matching

place for adjustment of cablelength

matching with a TDR allows
+/-10ps relative accuracy for
90m 3/8“ Heliflex

Cables



½“ Heliax	3/8“ Heliflex	¼“ Heliax
Andrew LDF series	RFS HCA 38 air coax	Andrew FSJ series
not used	long distancies, 90m	short distancies, 5m
no helical shield	Amplifier <-> DSO	Pickup <-> Amplifier

Cables, FSJ1-50 specs

Impedance: 50+/-1 Ohms

velocity: 84%c

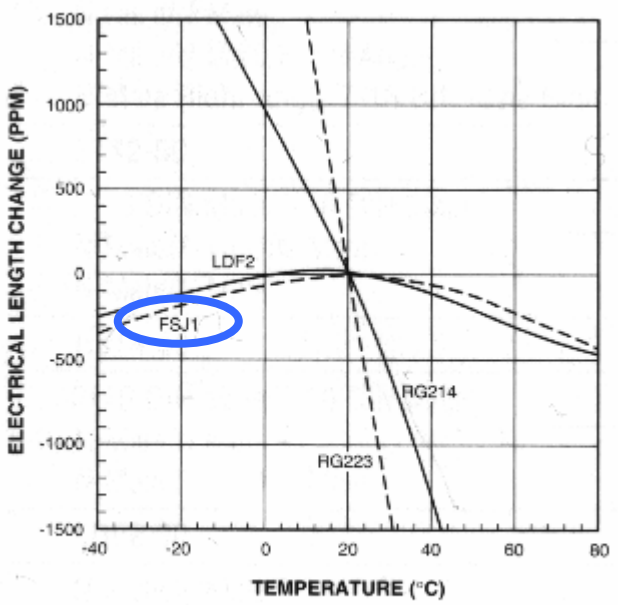
attenuation @1GHz: 19.6dB/100m

minimum bend radius: 25mm

phase stability with temperature

phase stability with bending

foam dielectric



Cables, HCS38-50 specs

Impedance: 50+/-1 Ohms

velocity: 89%c

attenuation @1GHz: 9.1dB/100m

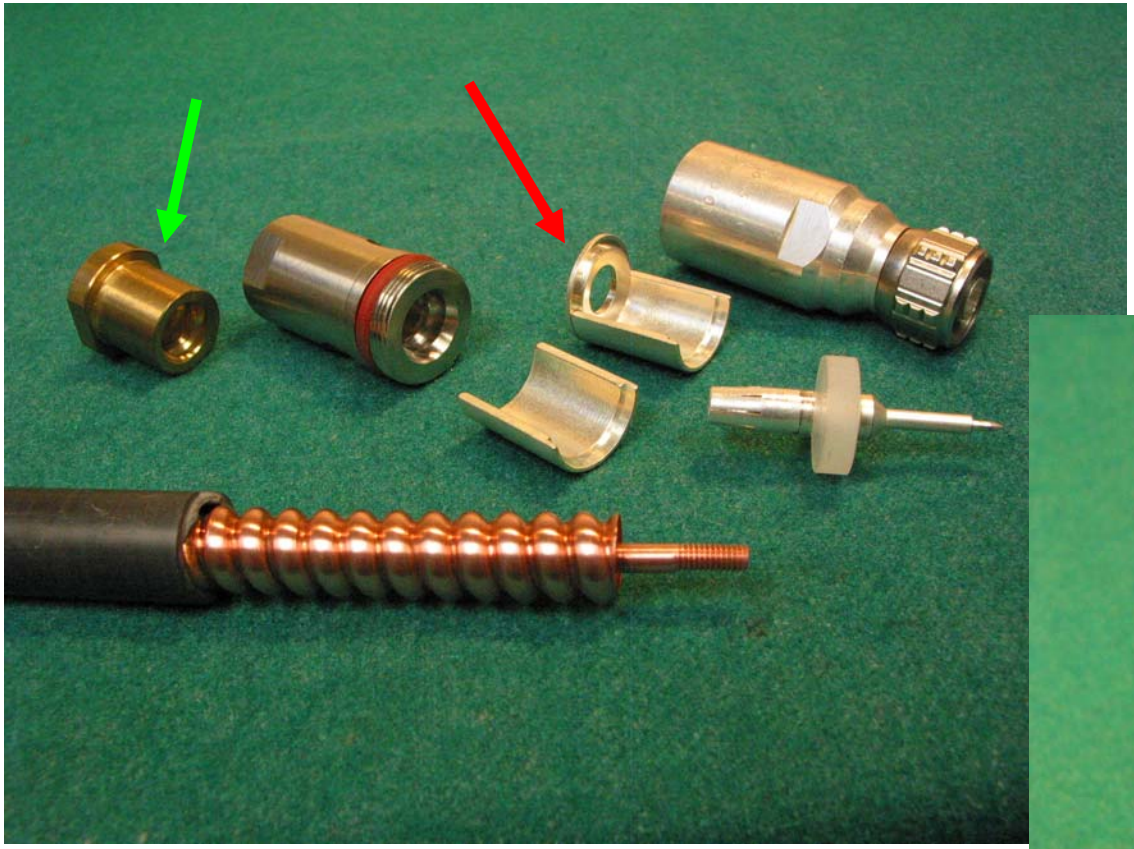
minimum bend radius: 50mm

air dielectric

RFS

HELIFLEX® Cable

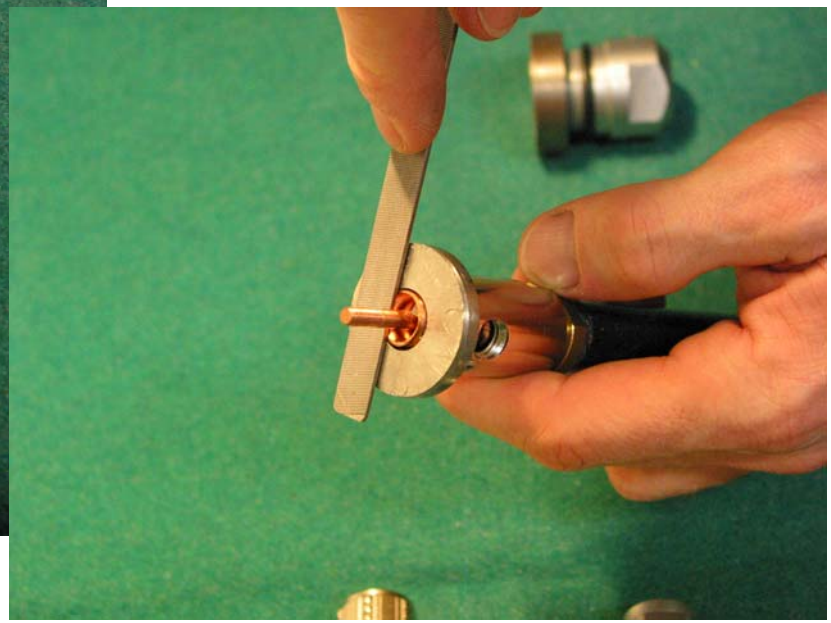
Modified connector from Spinner



Modifications:

Remove Cone

Add Custom Plug



Questions ?

Thanks for yours attention