New pre−amplifiers for the transverse feedback PU

Old electronics

Limited intensity range (30dB)
Can’t see ions
BW 7kHz−2.5MHz

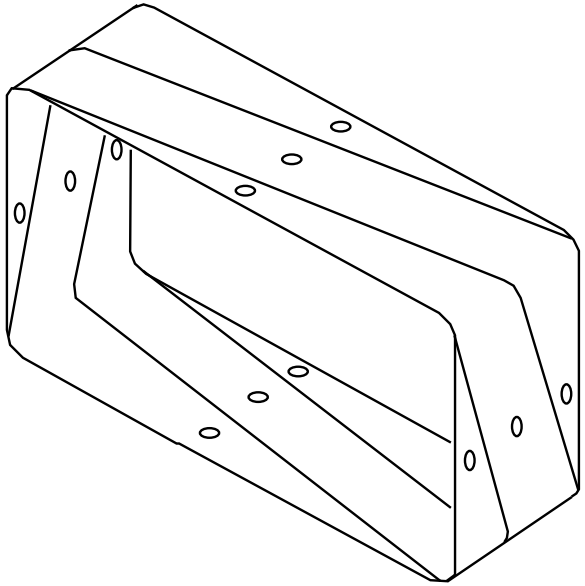
New electronics

Intensity range 80dB
More sensitive (Can see ions)
BW 20kHz−40MHz

Jeroen Belleman

New pre−amplifiers for the transverse feedback PU

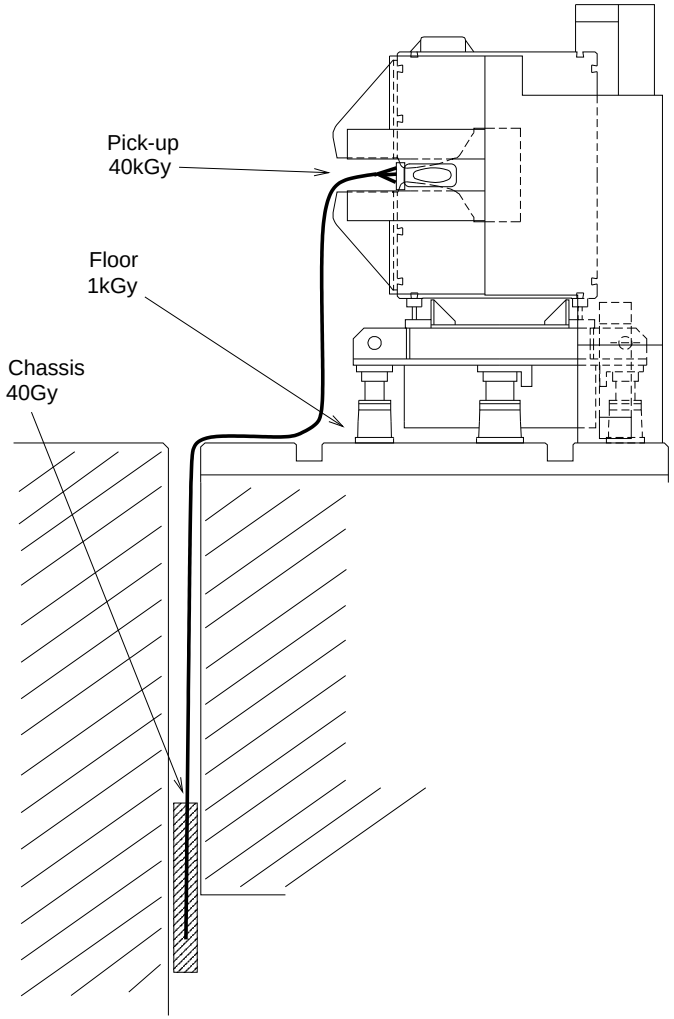
Electrodes



Aperture	166 x 80mm
Length in beam direction	62mm
Electrode capacitance	70pF
Additional capacitance	30pF
Transfer resistance (o.c.)	0.52 Ω
Horizontal sensitivity	170mm
Vertical sensitivity	80mm

New pre−amplifiers for the transverse feedback PU

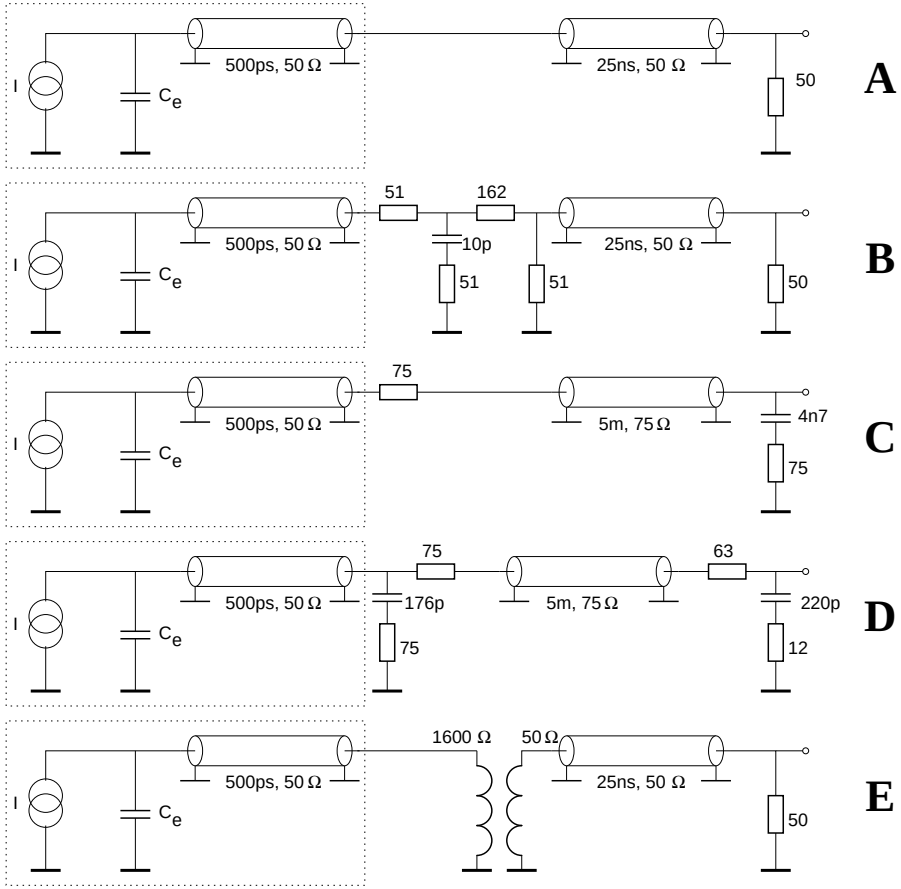
Installation in SS99

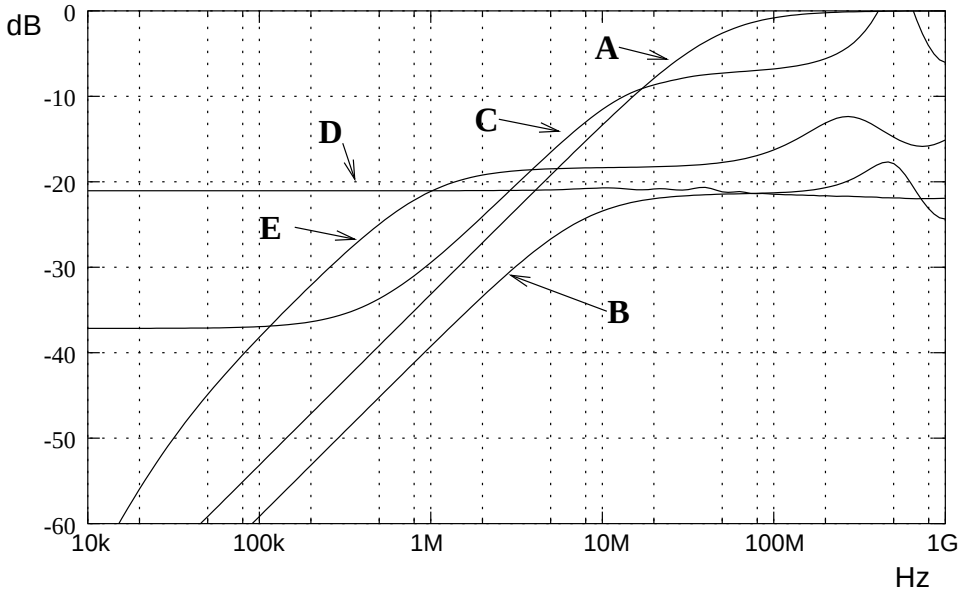


- Radiation kills electronics
- Cable capacitance kills the signal!

New pre−amplifiers for the transverse feedback PU

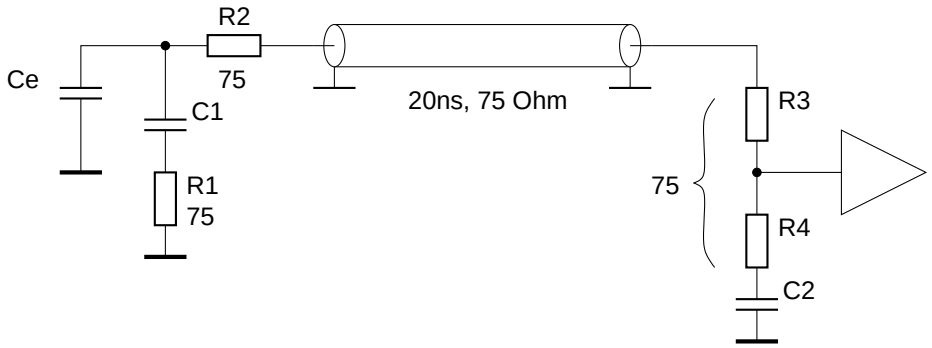
Signal extraction

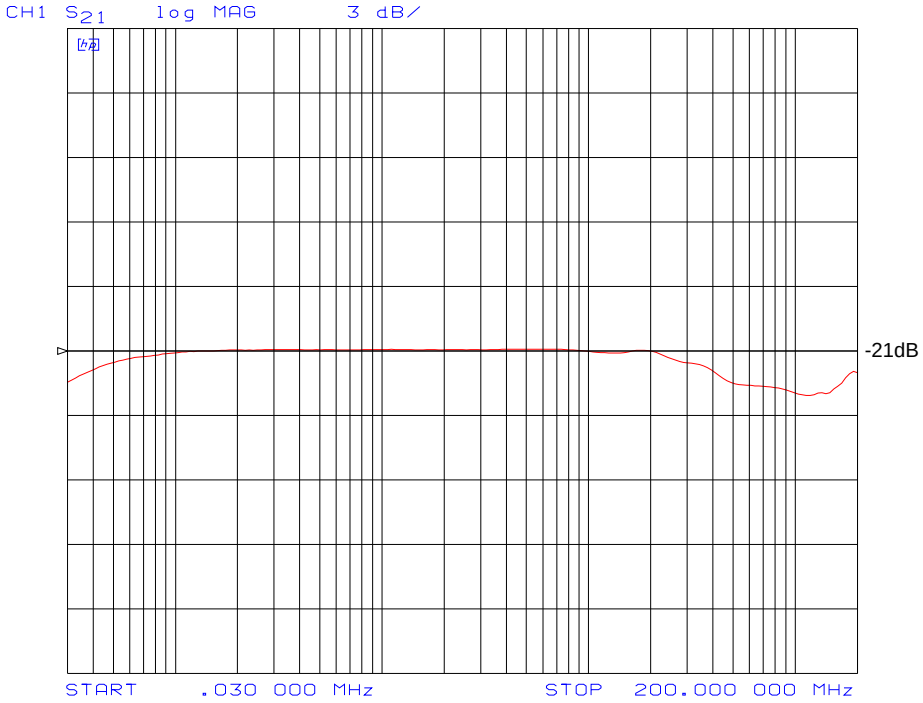




New pre−amplifiers for the transverse feedback PU

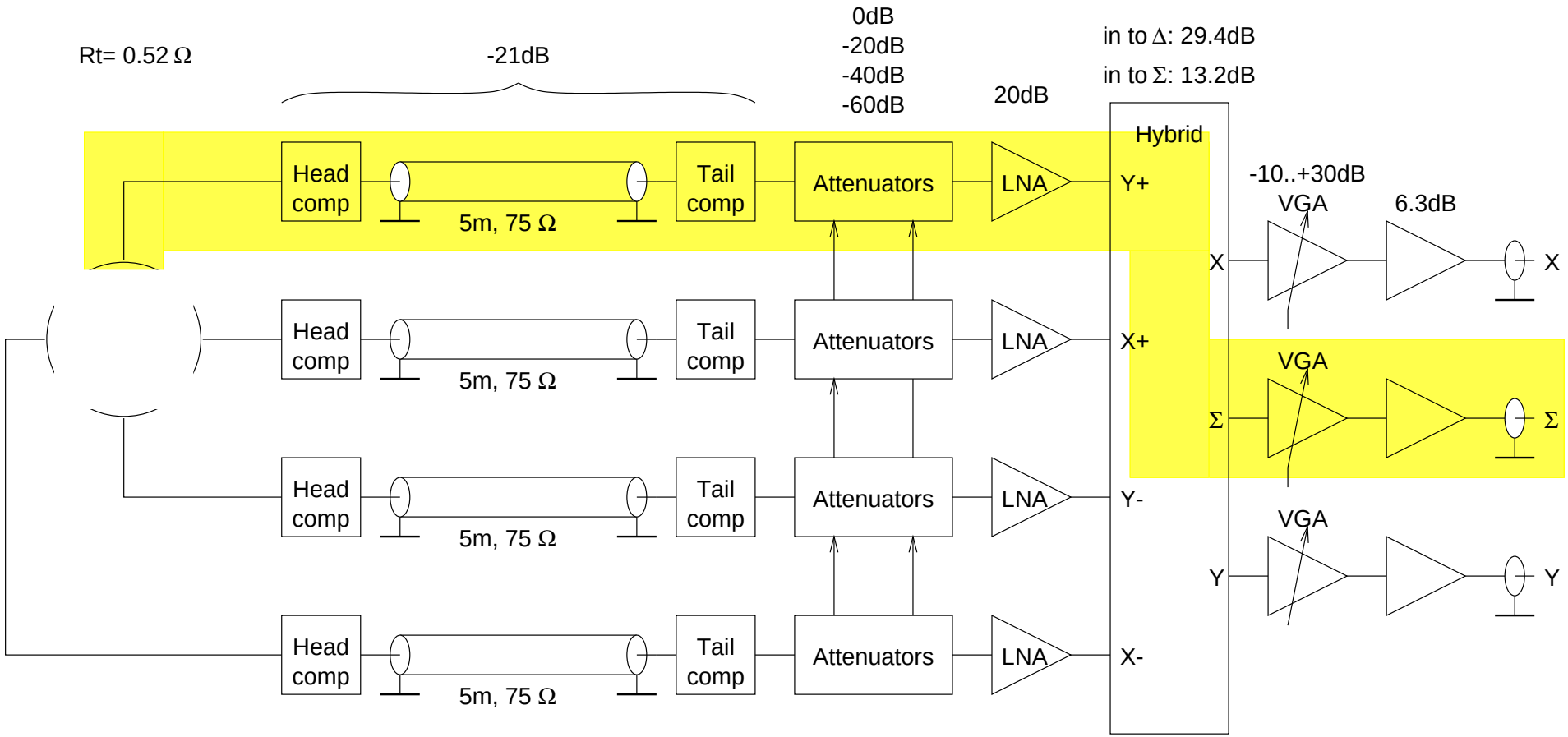
Cable compensation





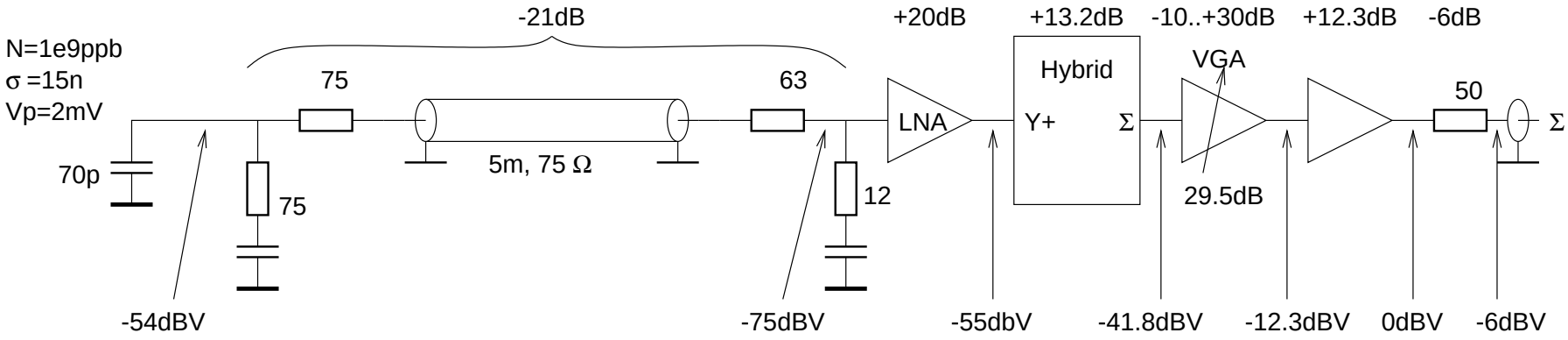
New pre−amplifiers for the transverse feedback PU

Electronics Block Diagram

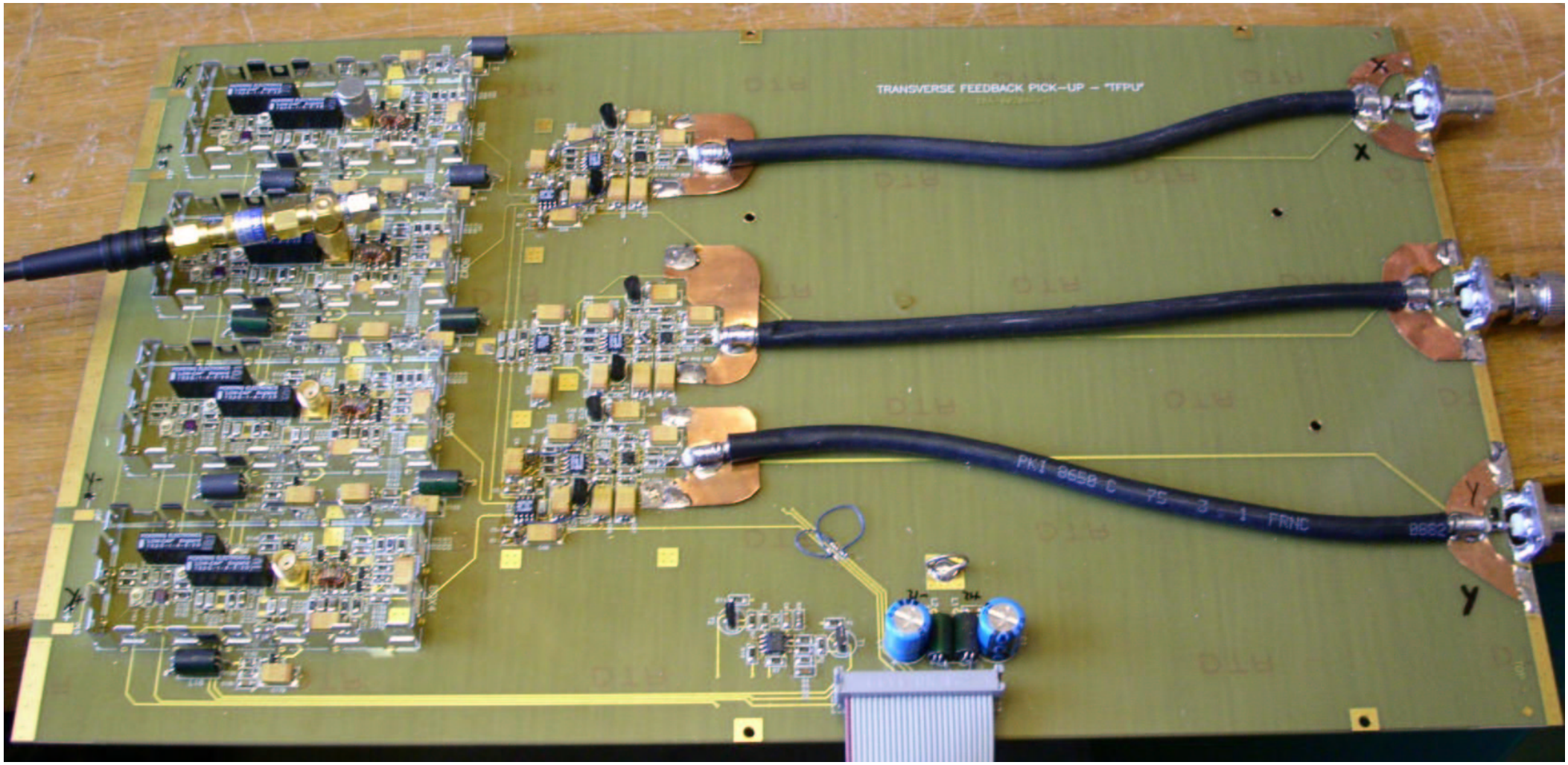


New pre−amplifiers for the transverse feedback PU

Gain partitioning



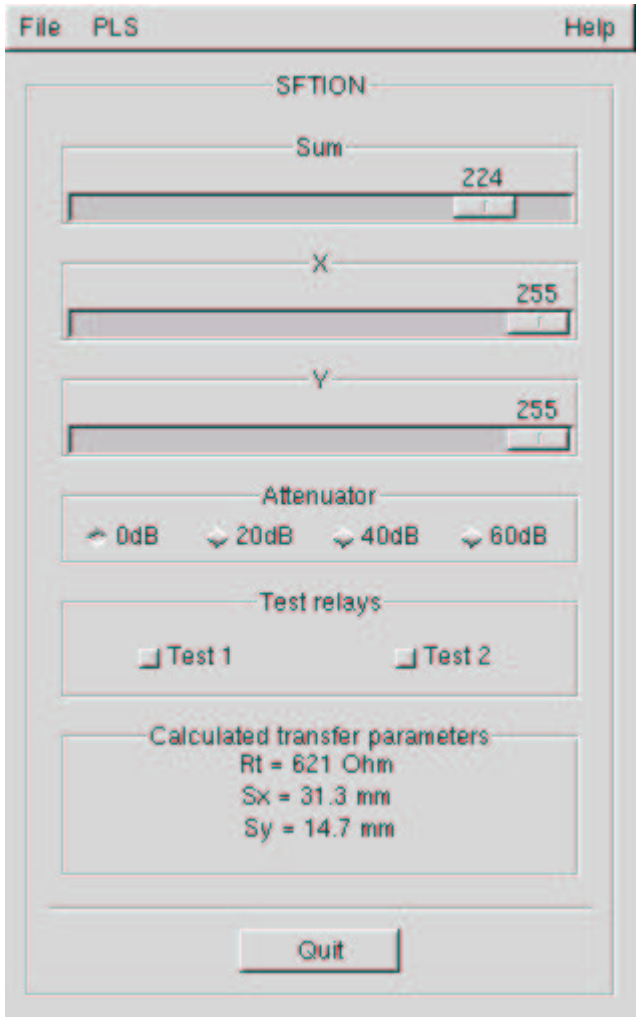
New pre−amplifiers for the transverse feedback PU



New pre−amplifiers for the transverse feedback PU

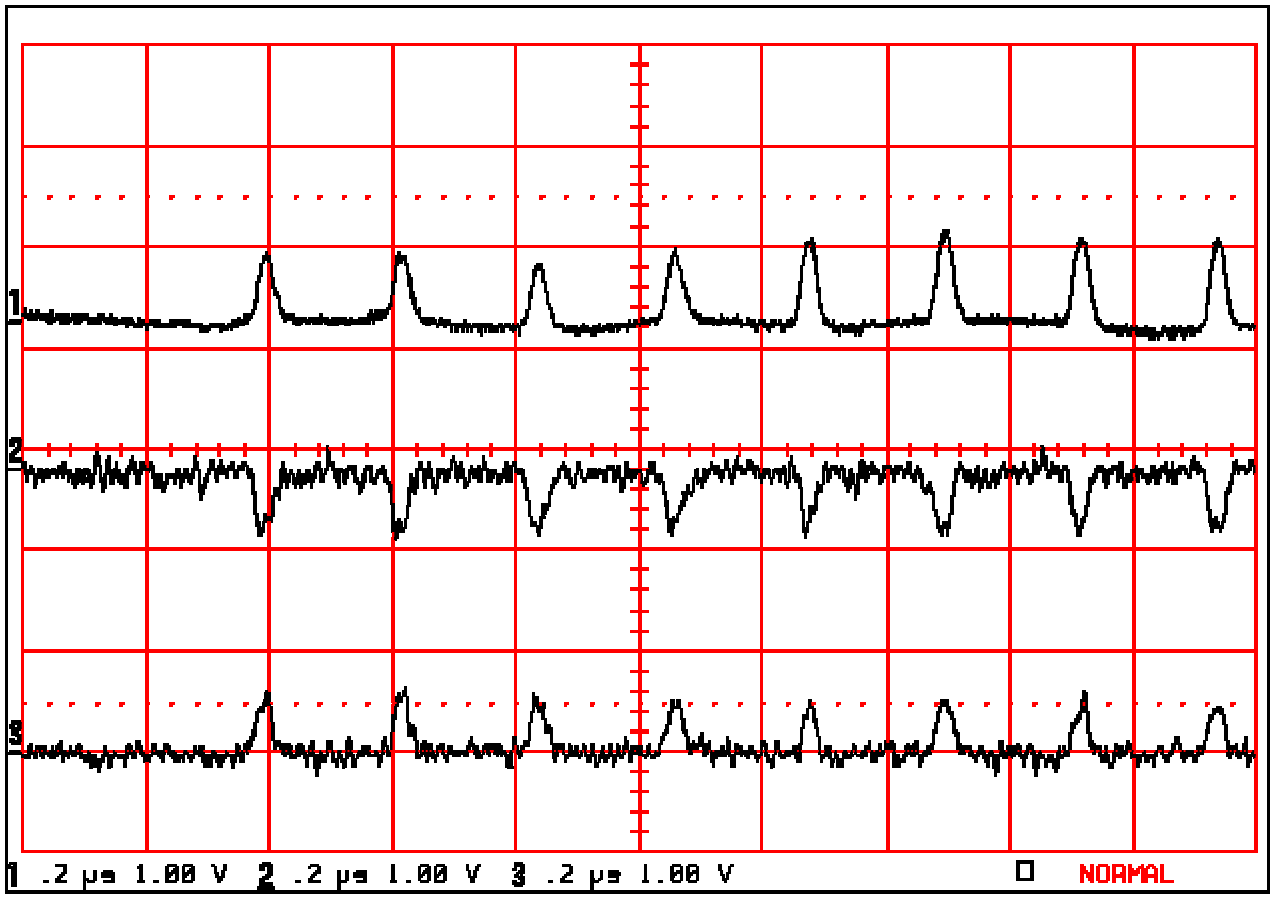
Specialist gain control interface

Gain control from
any Linux workstation...



New pre−amplifiers for the transverse feedback PU

- STFION at injection, 16 bunches
- Beam intensity ~1.3e9 ppb
- X and Y channels at full gain, Σ channel 6dB lower



Σ

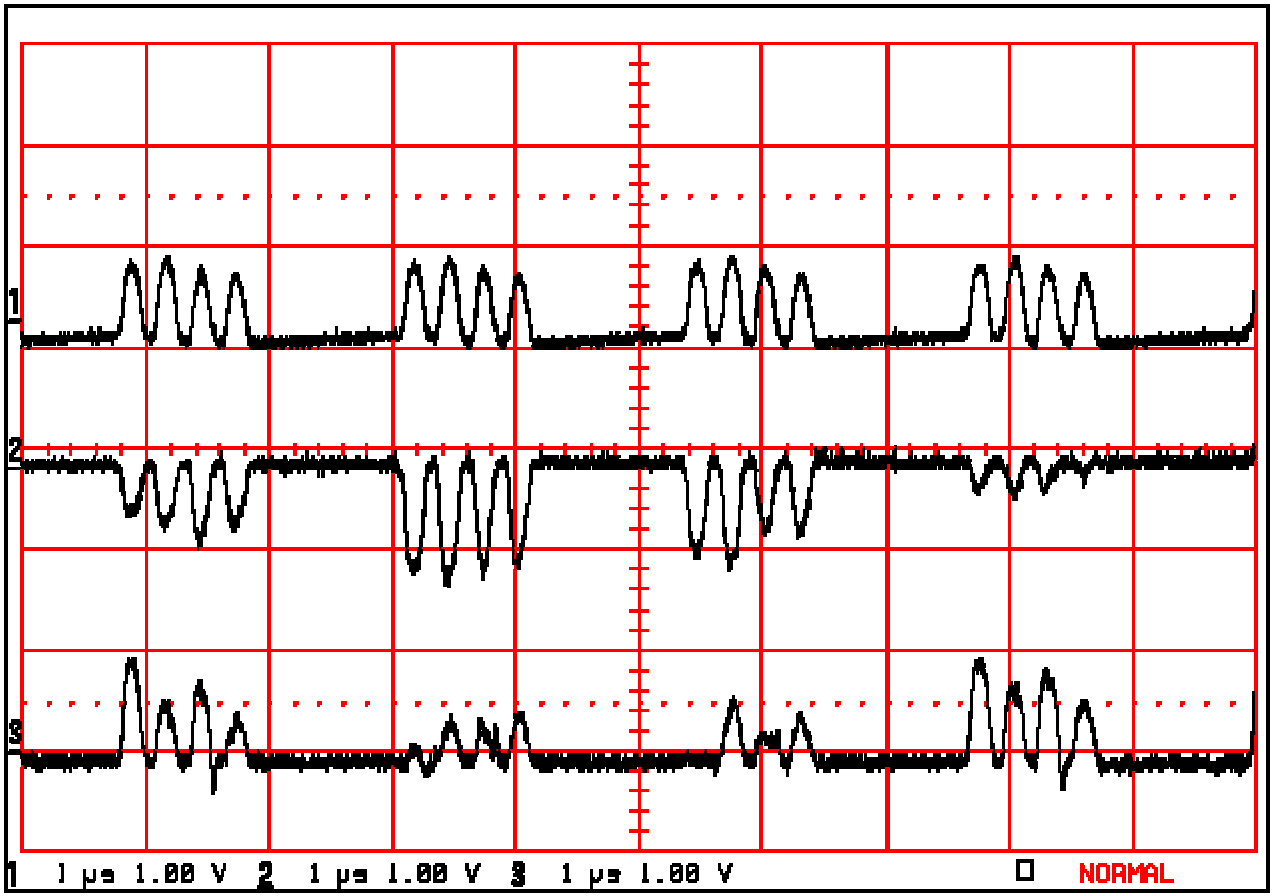
X

Y

200ns/div, 1V/div

New pre−amplifiers for the transverse feedback PU

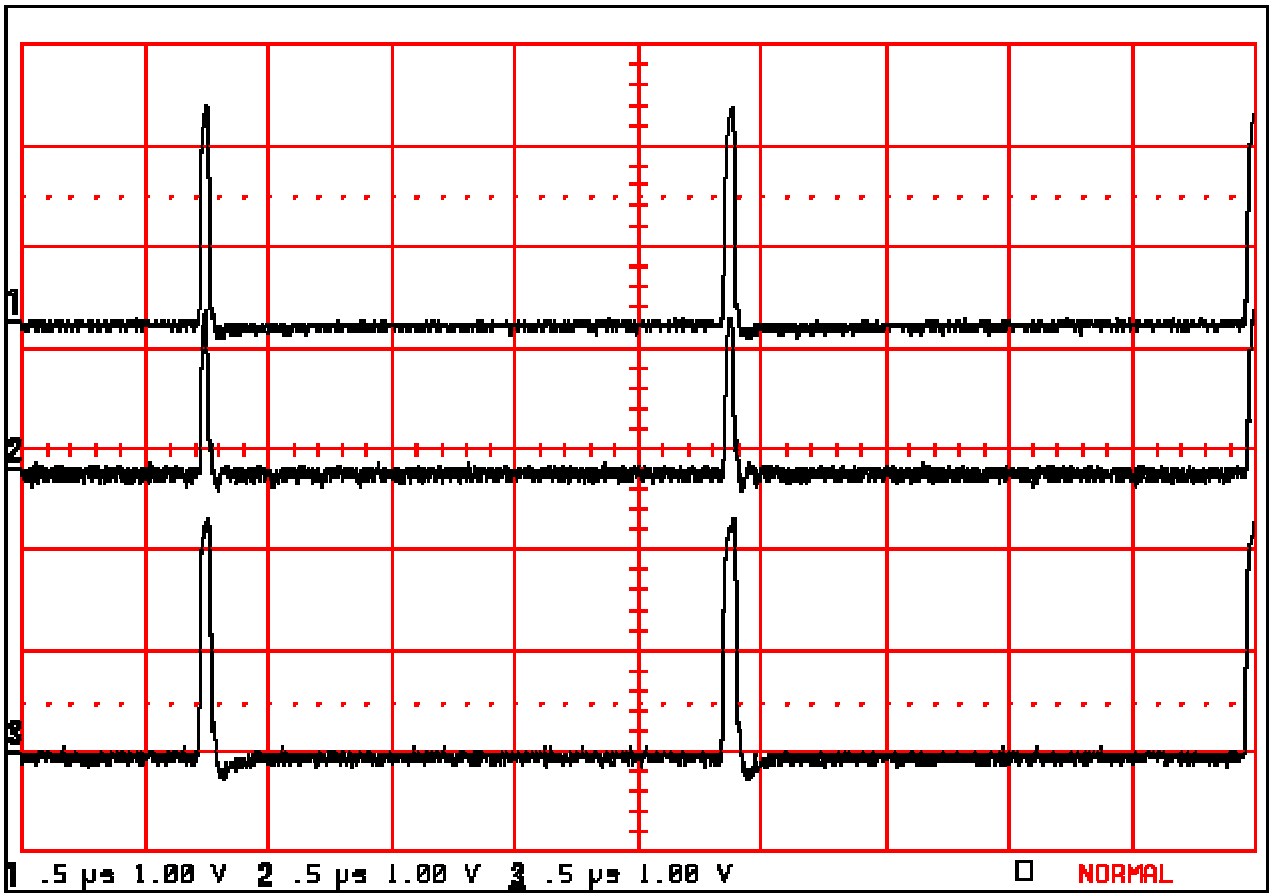
- AD near injection, 4 bunches
- Beam intensity ~3.3e12 ppb
- X and Y channels 12dB more gain than Σ channel



1µs/div, 1V/div

New pre−amplifiers for the transverse feedback PU

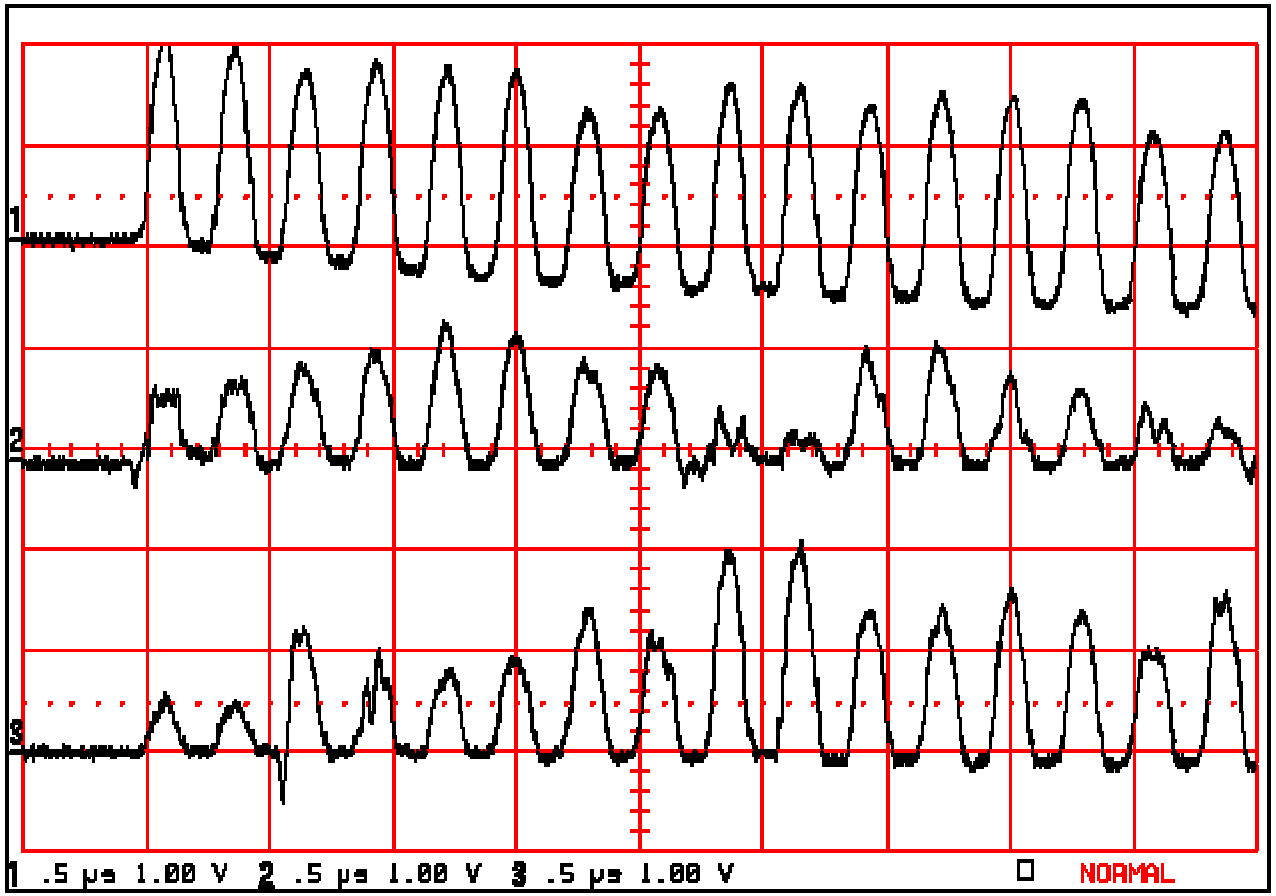
- TOF near transition
- Beam intensity ~6.2e12 ppb
- X and Y channels 18dB more gain than Σ channel



1µs/div, 1V/div

New pre−amplifiers for the transverse feedback PU

- SFTPRO at injection
- Beam intensity ~2e12 ppb
- X and Y channels 10dB more gain than Σ channel



Σ

X

Y

500ns/div, 1V/div

New pre−amplifiers for the transverse feedback PU

S/N vs. beam intensity