



University of  
Zurich<sup>UZH</sup>

UZH Group Meeting

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## DAMIC readout system status and noise studies

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# DAMIC-M System – Electronics Rack

## Vacuum - Temperature




Pfeiffer Vacuum TPG 361, Single Gauge + PKR 251 Gauge Sensor




Lakeshore 335 cryogenic temperature controller

## Low and High Voltage



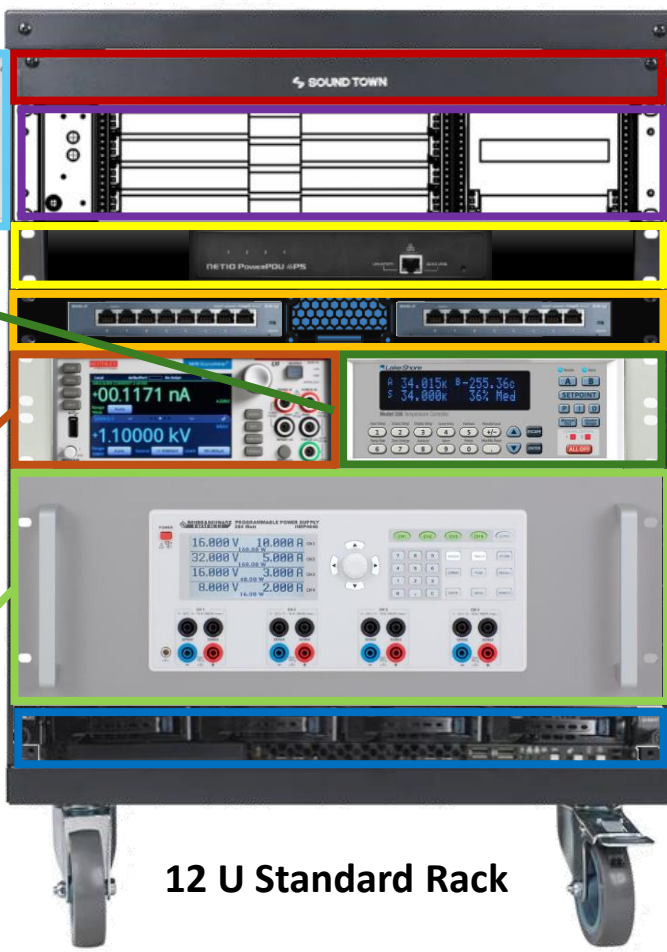
Keithley 2470 High Voltage Source Meter, 10 fA resolution, 2  $\mu$ V Noise RMS



R&S HMP4040 four channel low voltage power supply (10 A, 32 V)


- Compact transportable system
- Lan only control/data connections
- Fully protected internal network (NAT/router)

Instrumentation




12 U Standard Rack

## Power Management




Safety rack-mounted (19") power distribution block




NETIO PowerPDU 4PS (4 input LAN programmable mains)

## DAQ System / Control



CAEN VME8004X 2U 4 Slot VME64X Mini Crate

1x



Asus RS300-E7/PS4 1U Server with Quad LAN 4 x 4TB HotSwap Drives on RAID 10

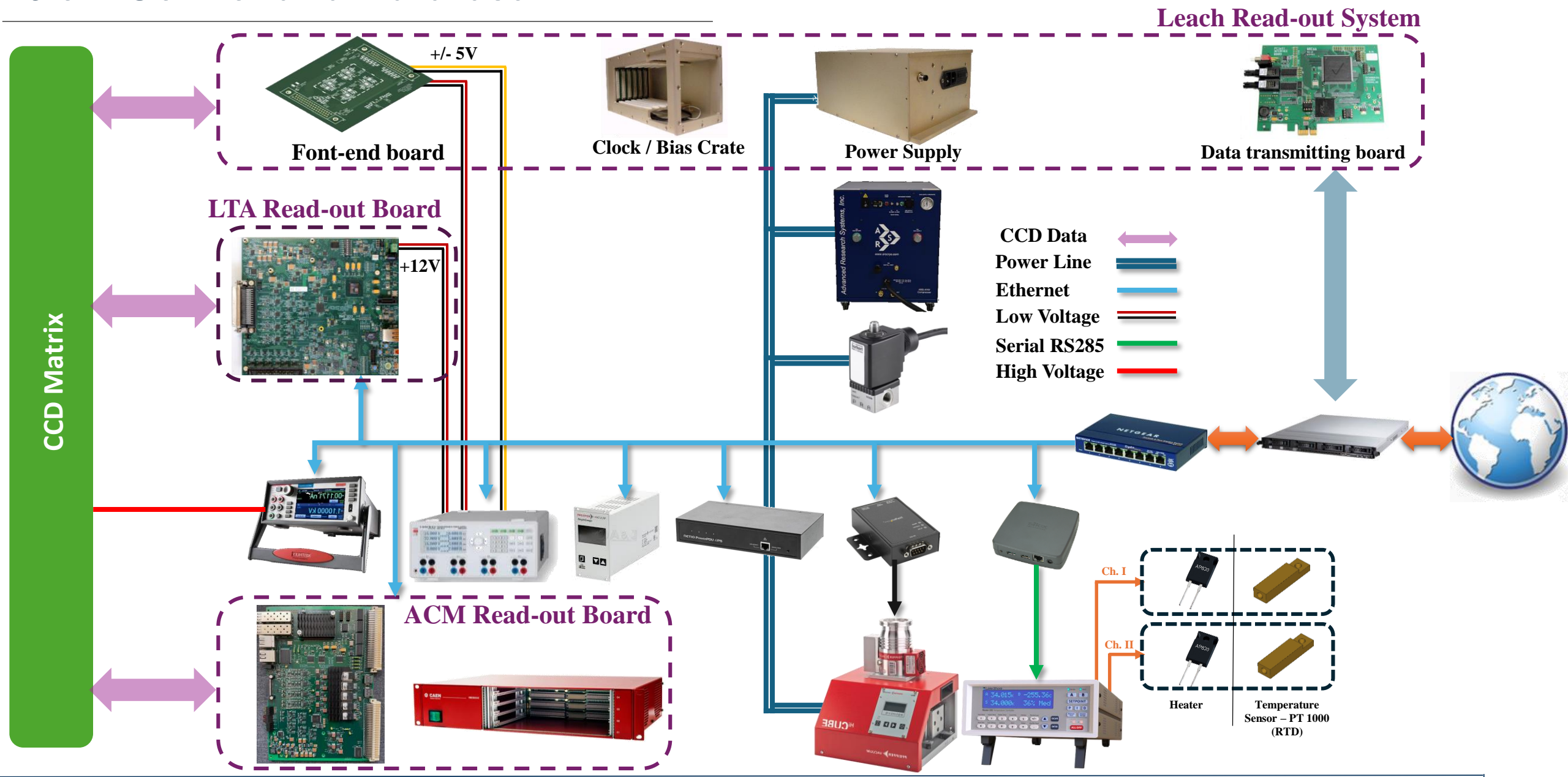
## Network Management

2x

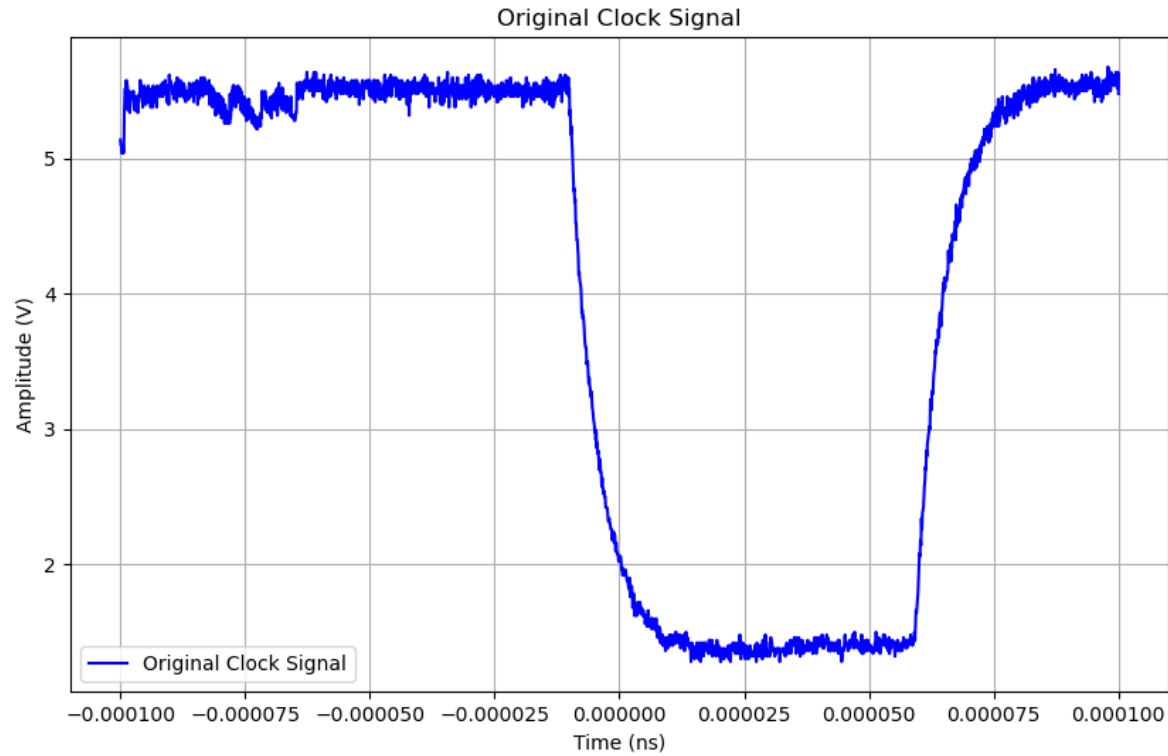


NETGEAR ProSAFE GS108 8 port Gigabit Switch

# •Slow Control and Data bus



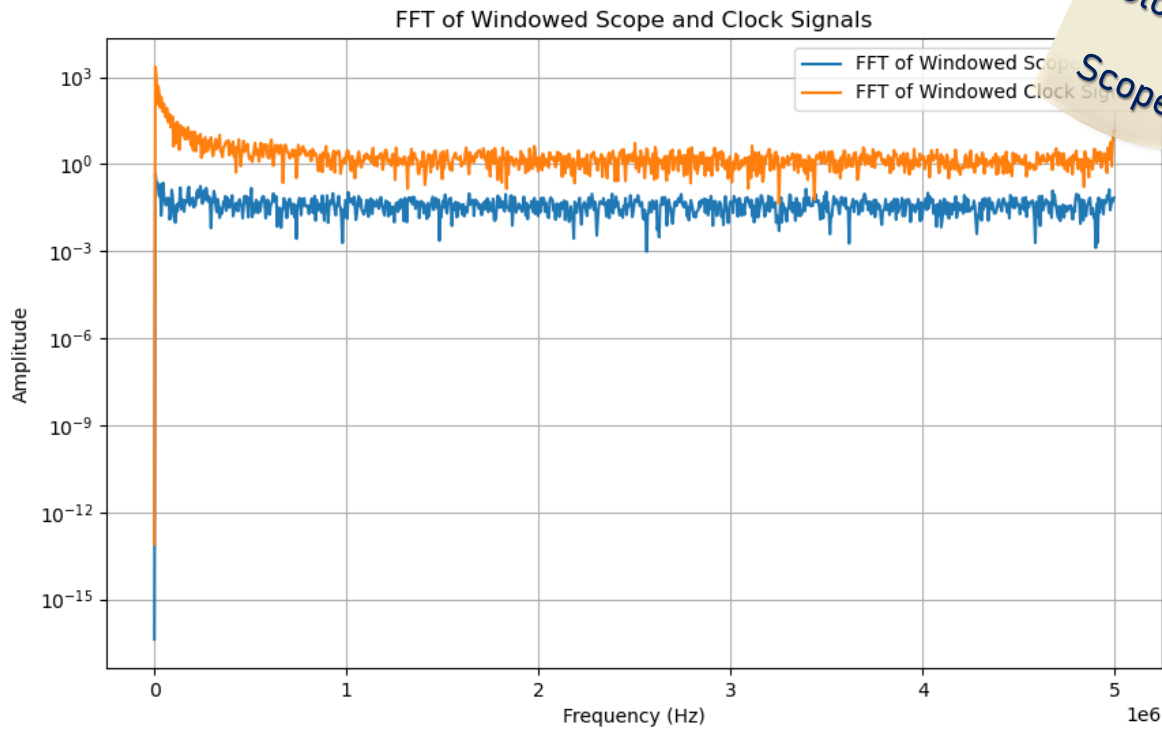
# Leach clock 0 measurement



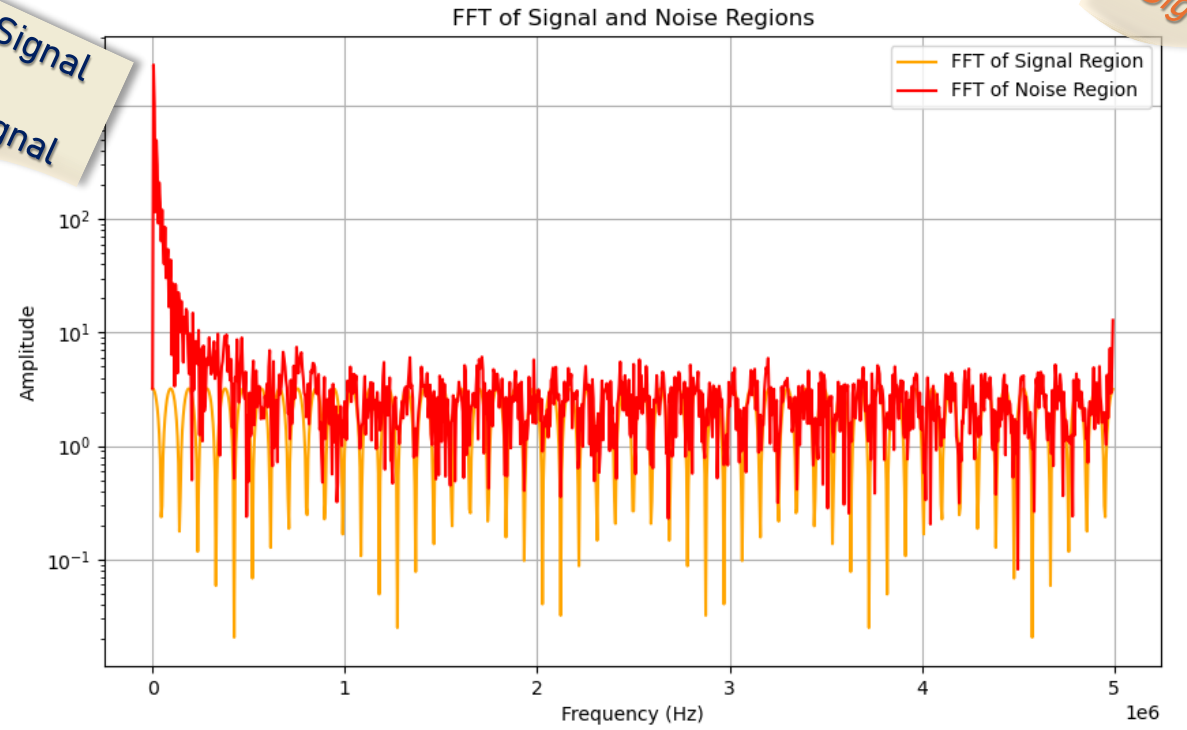
Amplitude	=	4,355 V
Duty	=	9,686 %
Fall Time (90 % - 10 % )	=	130,5 $\mu$ s
Frequency	=	44,39991 Hz

# • FFT (Fast Fourier Transform)

Threshold value of 0.0 V was used to filter the noise signal



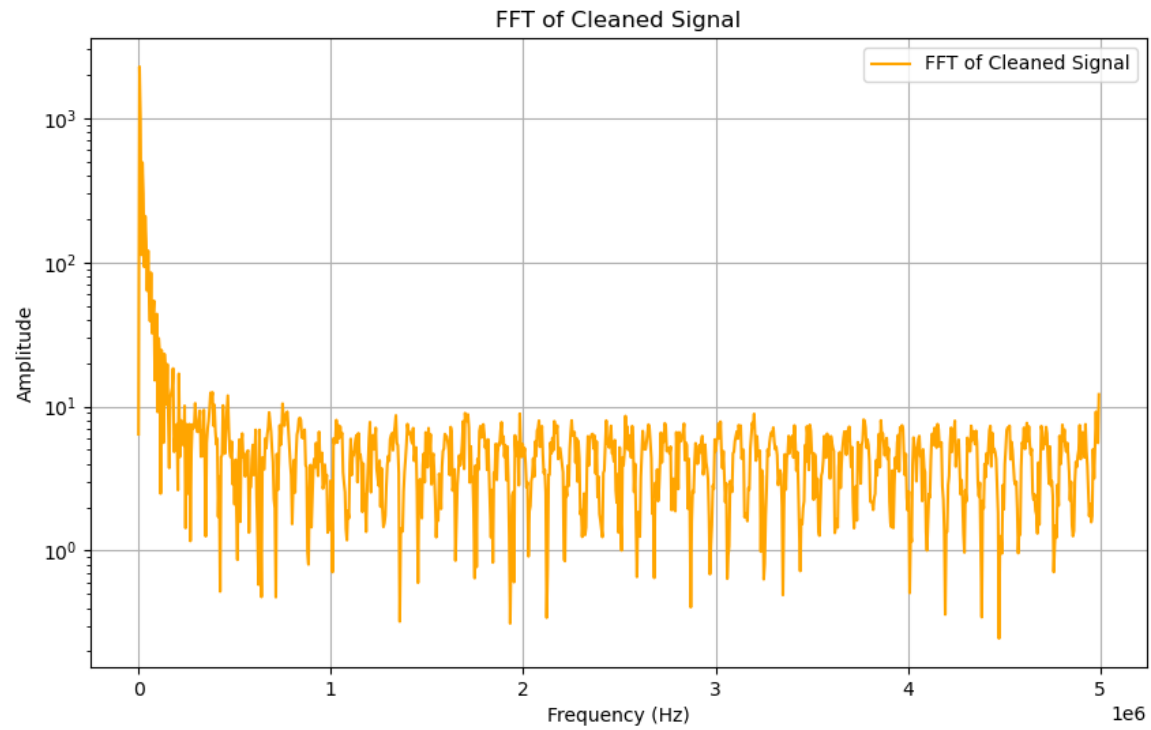
Clock Signal vs. Scope Signal



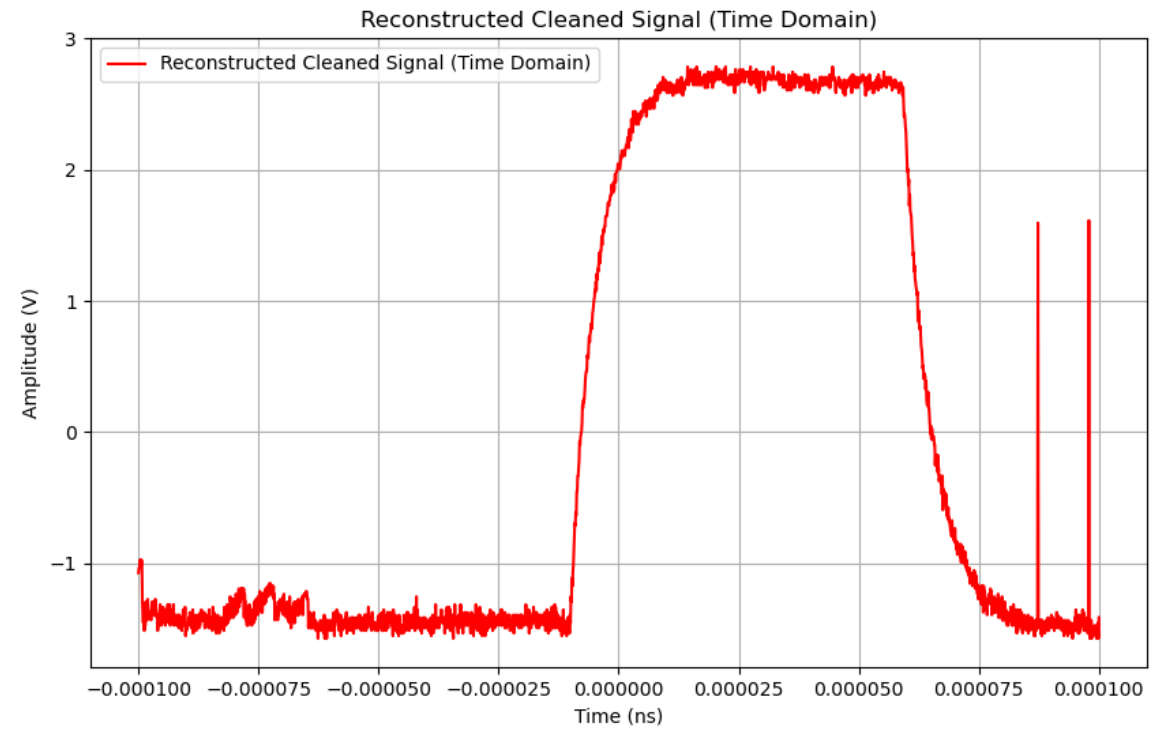
Noise vs. Signal

# • Noise subtraction and Inverse FFT

## Noise subtraction

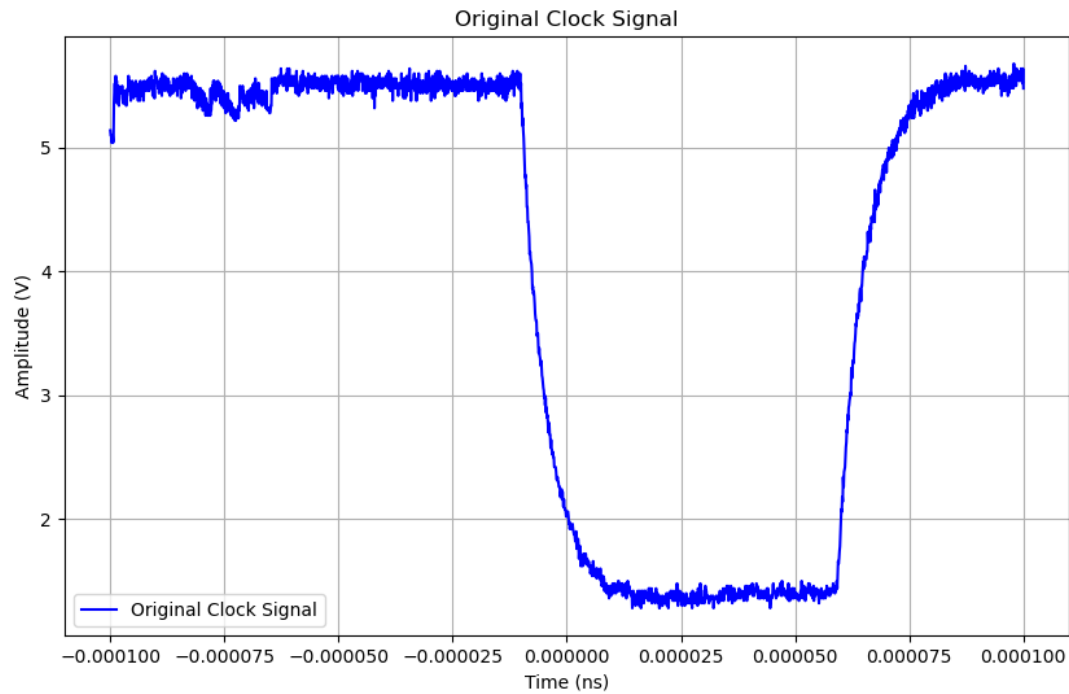


## Signal reconstruction

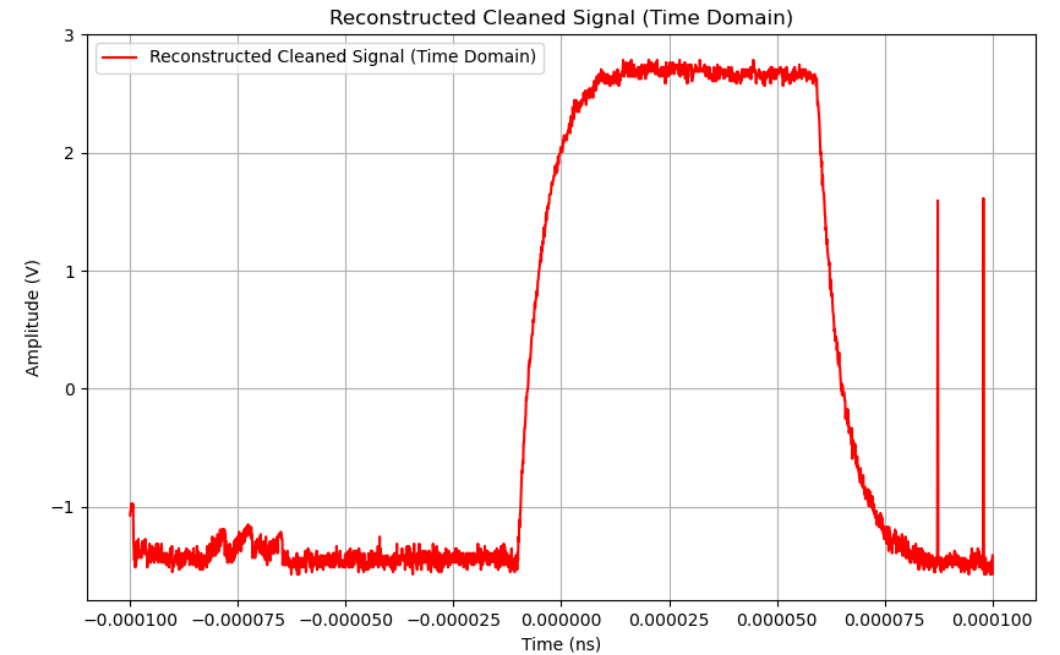


# • Comparison Original – Filtered Signal

## Original Signal



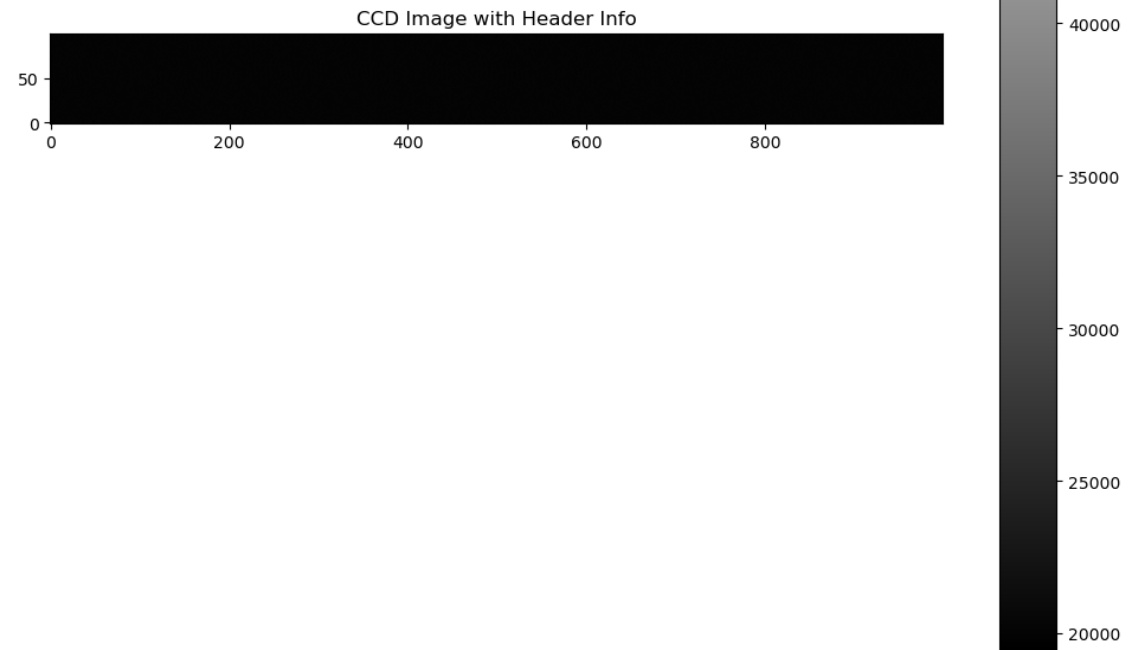
## Cleaned Signal



# • CCD Test Image - Leach

Empty CCD  
Image -  
Leach

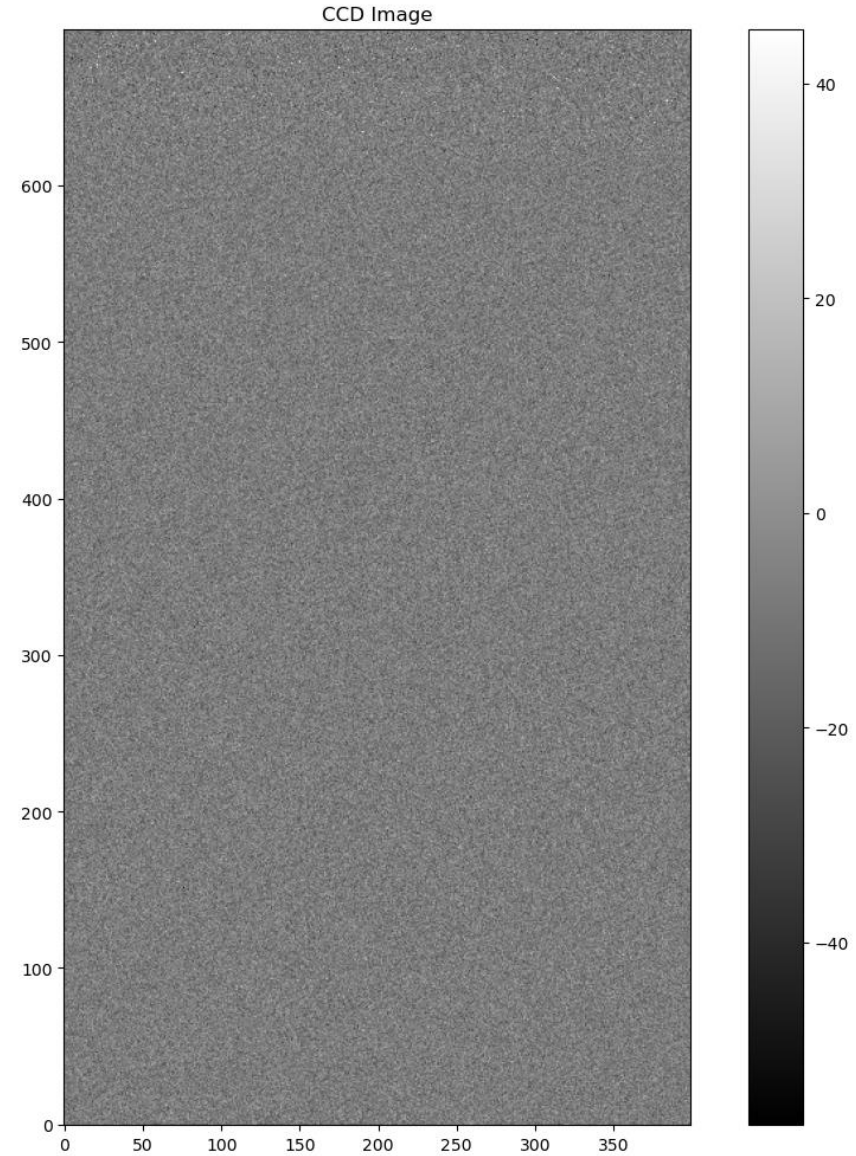
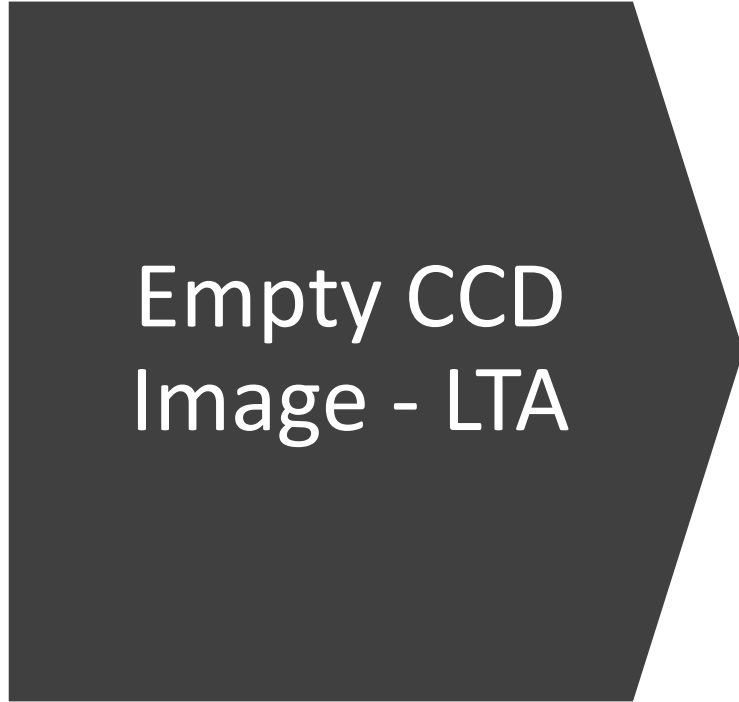
```
SIMPLE: True  
BITPIX: 16  
NAXIS: 2  
NAXIS1: 1000  
NAXIS2: 100  
EXTEND: True  
COMMENT: FITS (Flexible Image Transport System) format is defined in 'Astronomy  
COMMENT: and Astrophysics', volume 376, page 359; bibcode: 2001A&A...376..359H  
BZERO: 32768  
BSCALE: 1  
EXPTIME: 0.01  
DATE: 2024-10-21T08:06:56
```





# • CCD Test Image - LTA

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# • Future Plans



## Lock-In Amplifier



# •Conclusions and next Steps

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- Leach and LTA tested and work as expected
- Noise under control and affected frequencies identified
- Next step test ACM v1 to verify operation and noise
- Re-designing cryostat for full CCD assembly
- Integrate Zurich Instruments Lock-in Amplifier
- Design LTA injection board for clock and signal sniffing