

Measurement of environmental magnetic field

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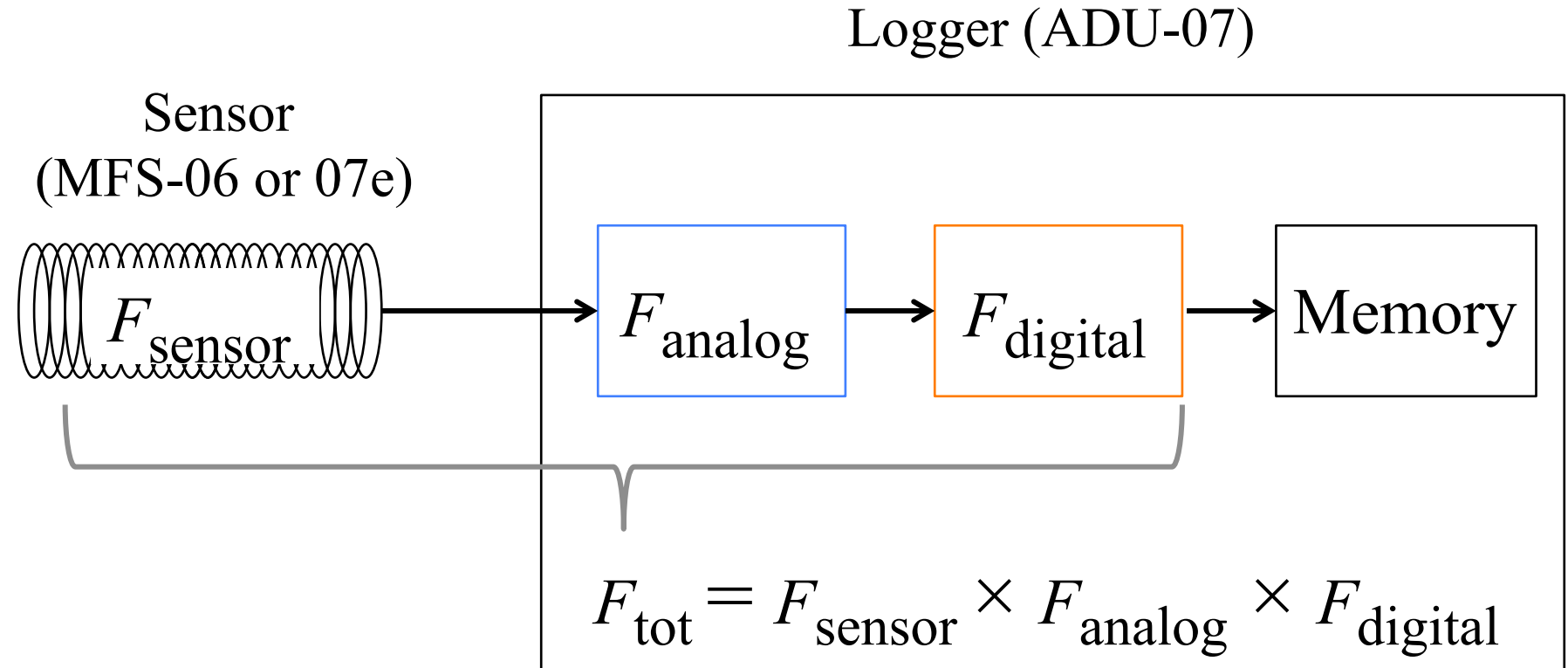
Contents

- Calibration
- Result of Measurement
- Data quality
- Conclusion & Future Works

Contents

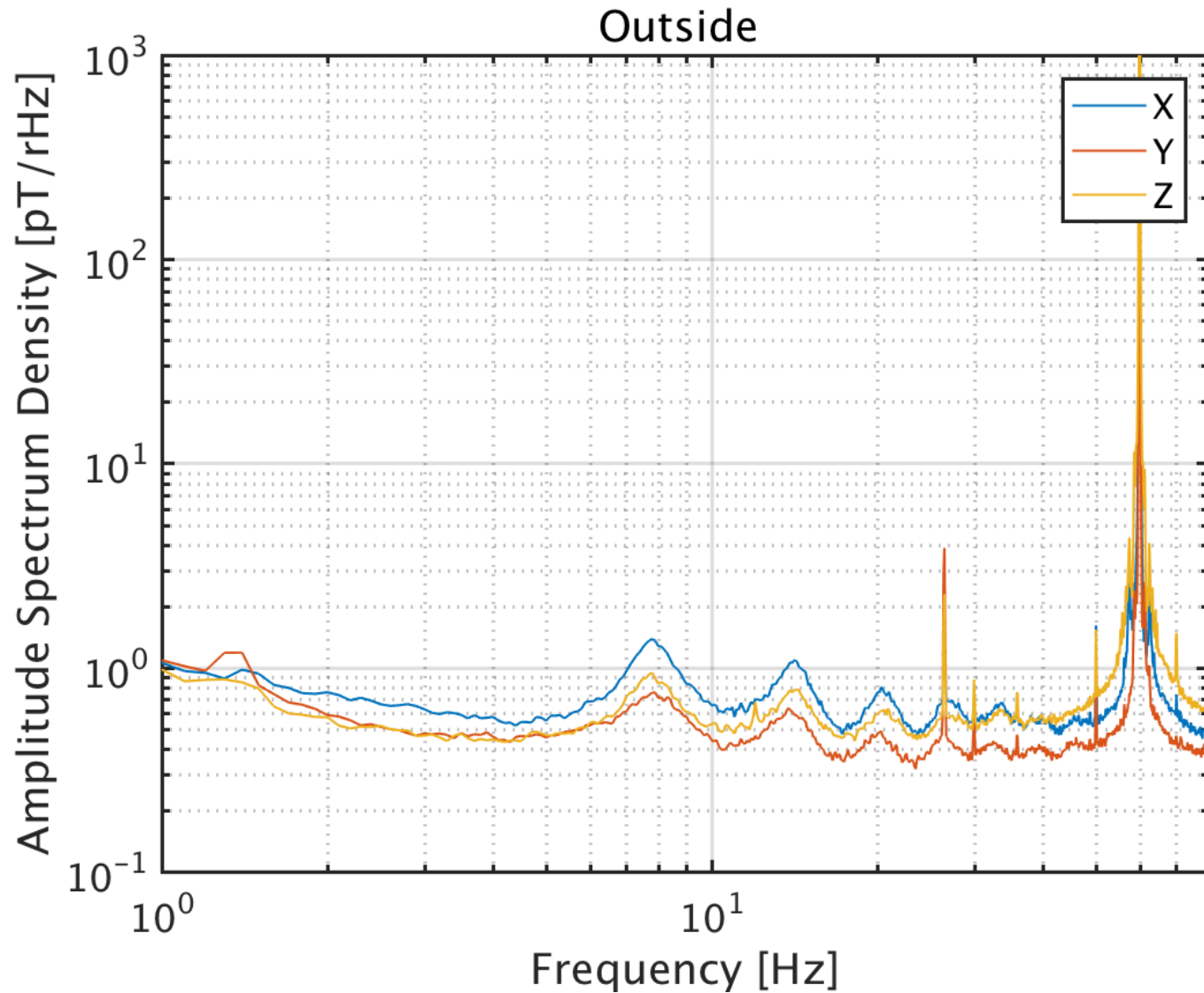
- **Calibration**
- Summary of Measurement
- Data quality
- Conclusion & Future Works

Calibration



$$X_{\text{cal}} = 1/F_{\text{tot}} \times X_{\text{row}}$$

Result of this measurement



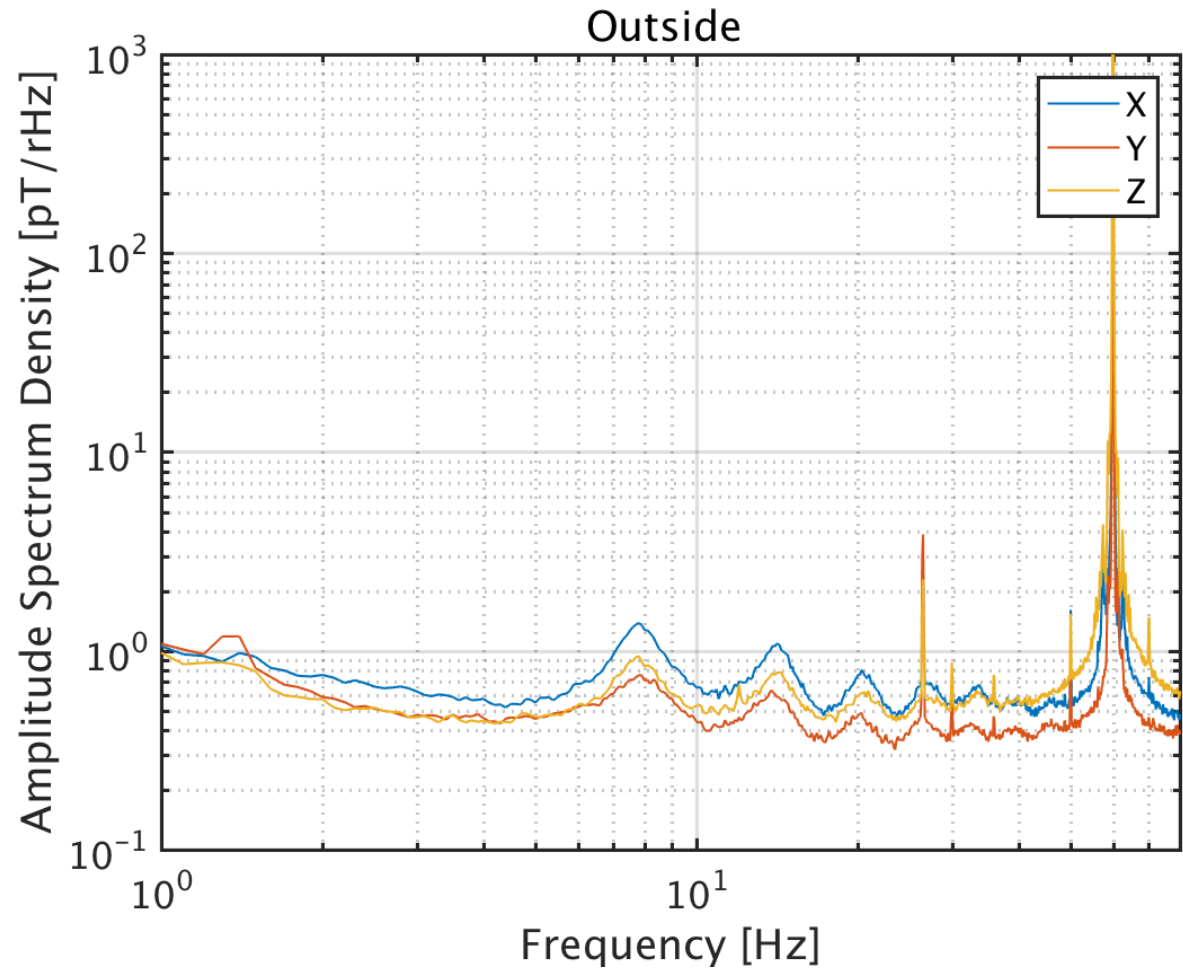
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Result of this measurement

■ Check Point

1. Amplitude
2. Frequency

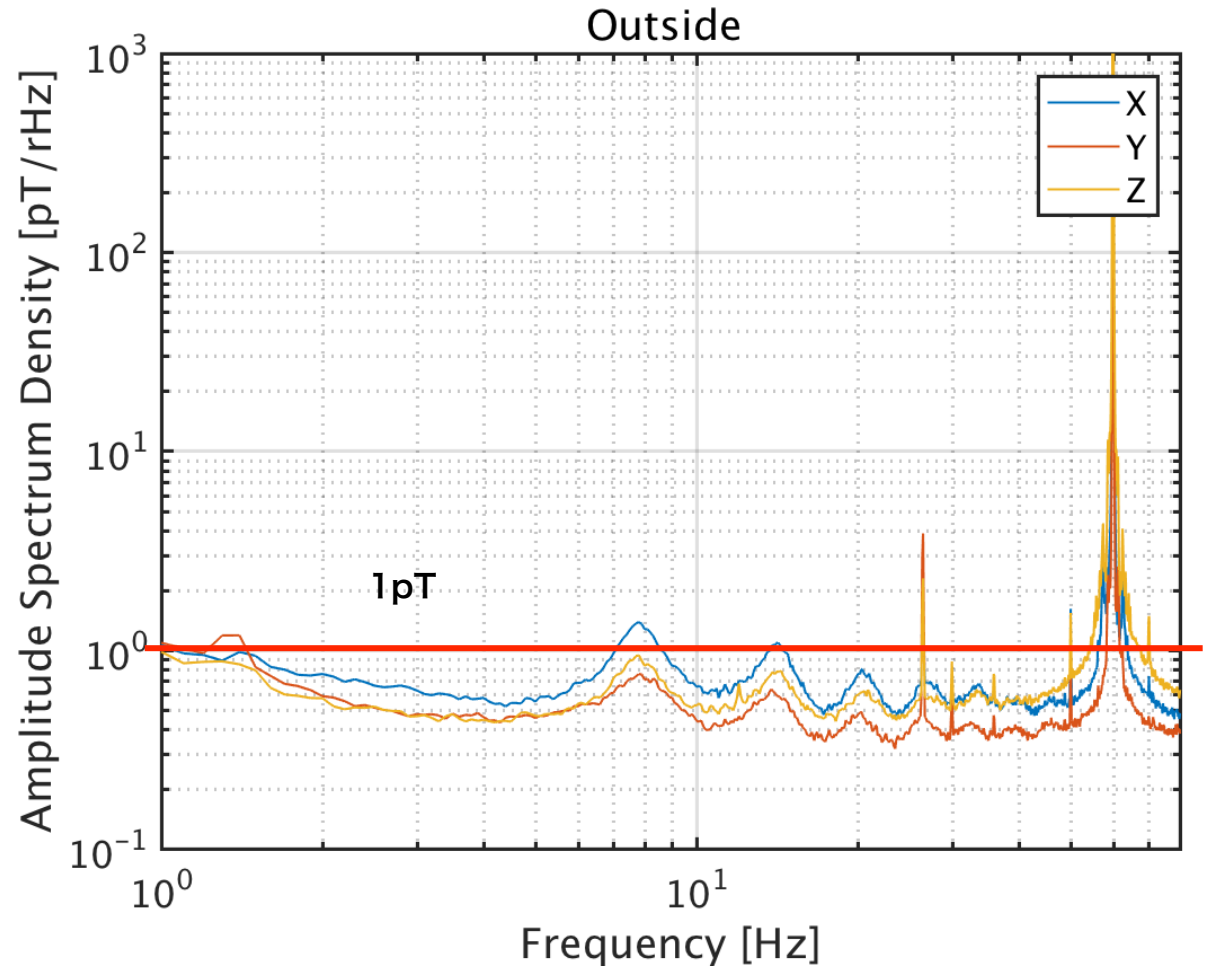


Result of this measurement

■ Check Point

1. Amplitude

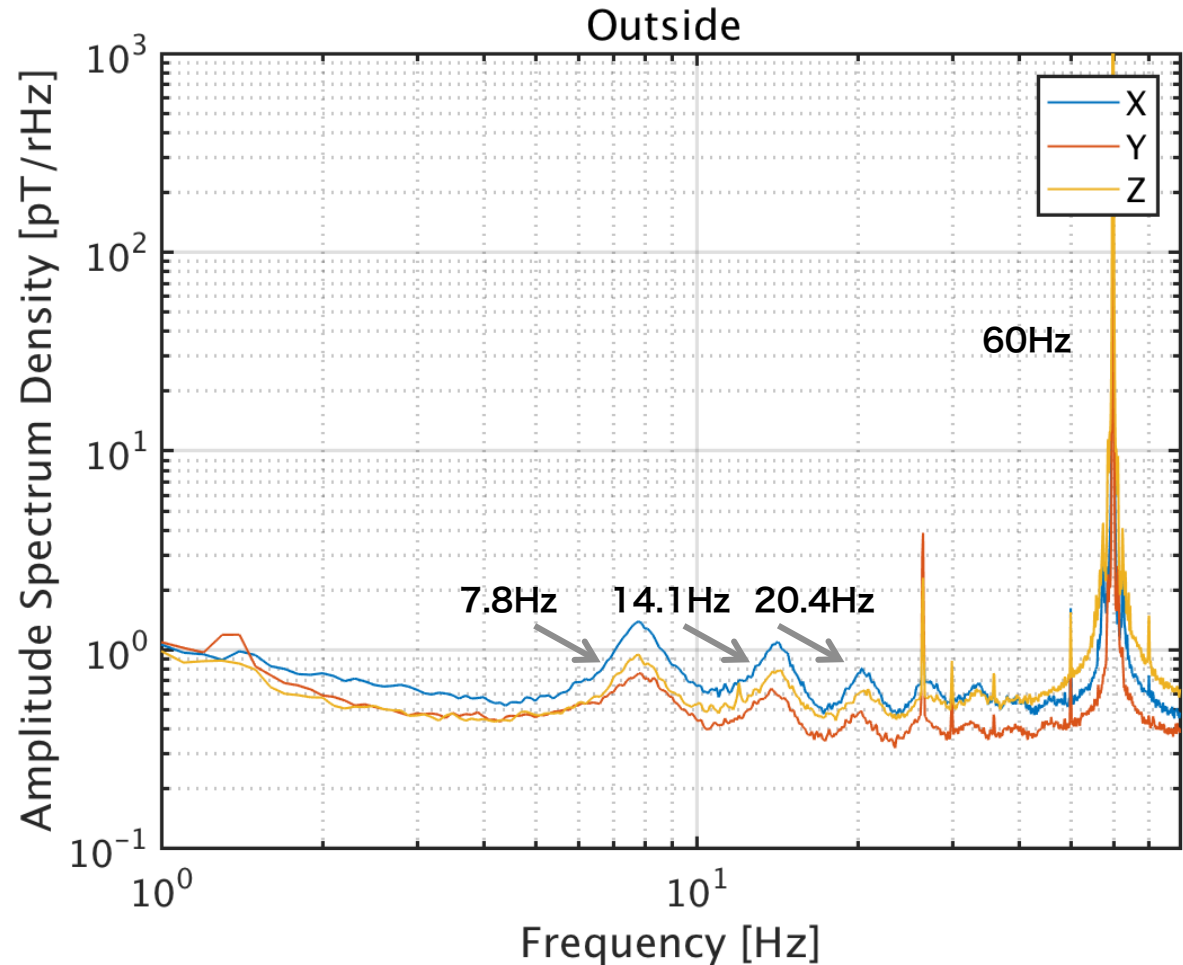
2. Frequency



Result of this measurement

■ Check Point

1. Amplitude
2. Frequency



Measurement is consistent with the theory !!

Result of this measurement

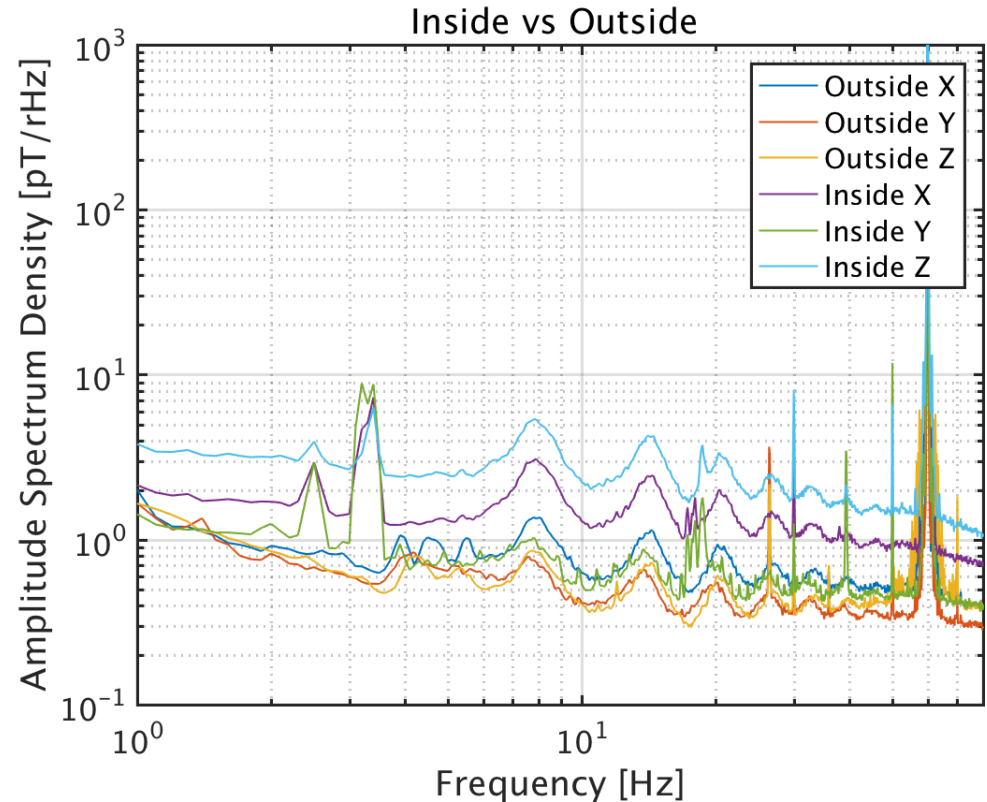
■ Compare Inside with Outside

■ Result

Magnetic field of inside the tunnel
is larger than outside

■ Reason

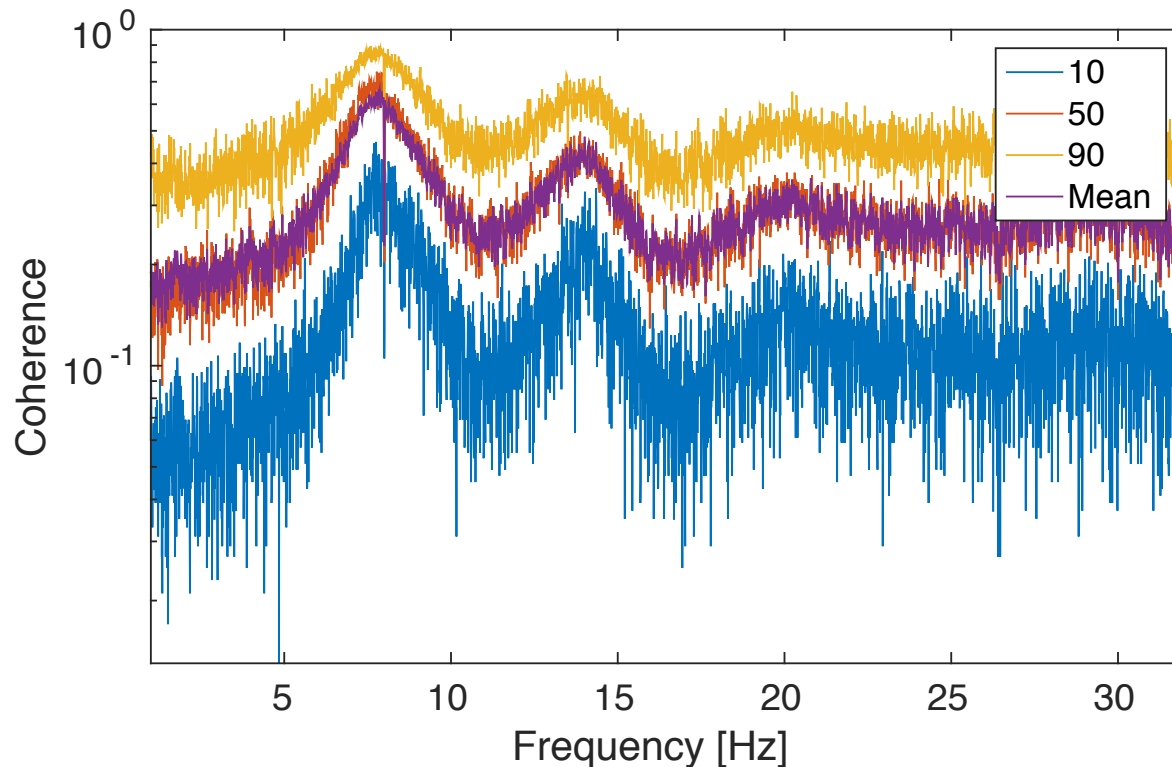
??????????



Result of this measurement

■ Compare KAGRA with Virgo

Calculate the coherence between KAGRA with Virgo (by Virgo team)



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Data Quality

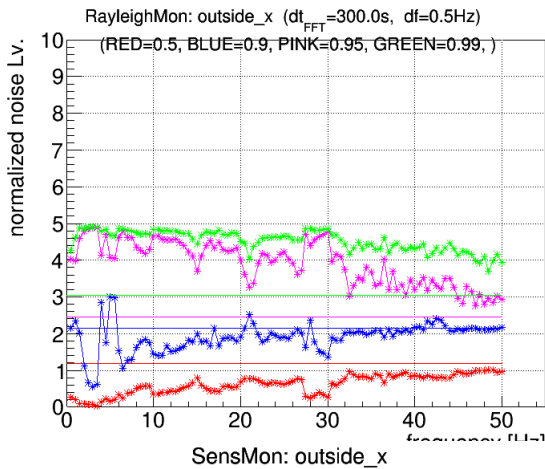
To evaluate the data quality we used 4 value :

1. Rayleigh Monitor
2. Spectrogram-histogram
3. Line-Tracking
4. Spectrogram

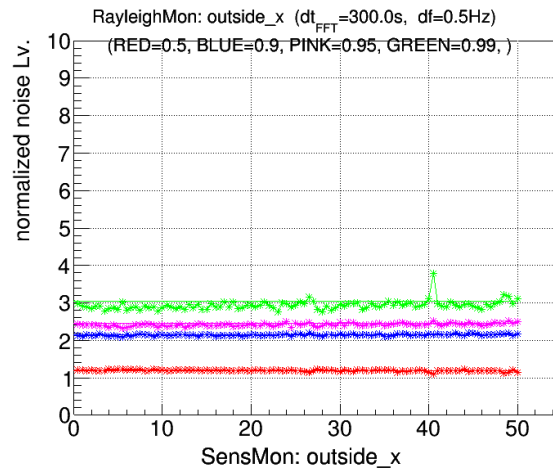
Data Quality

■ Rayleigh Monitor & Spectrogram-Histgram

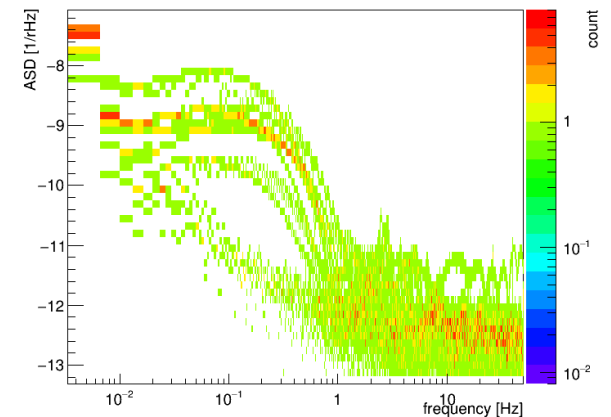
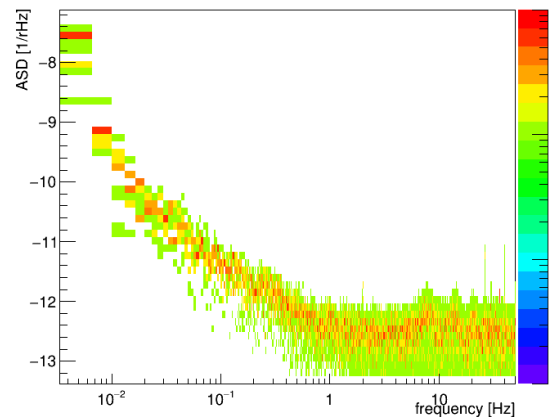
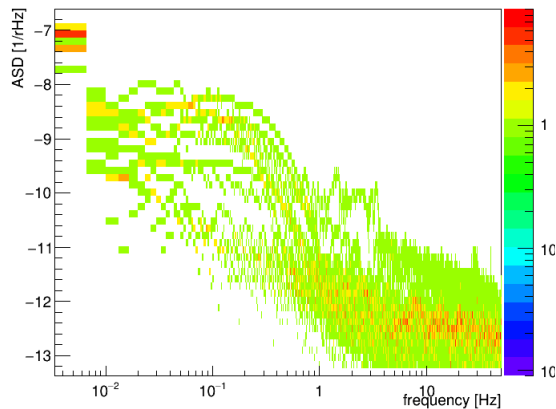
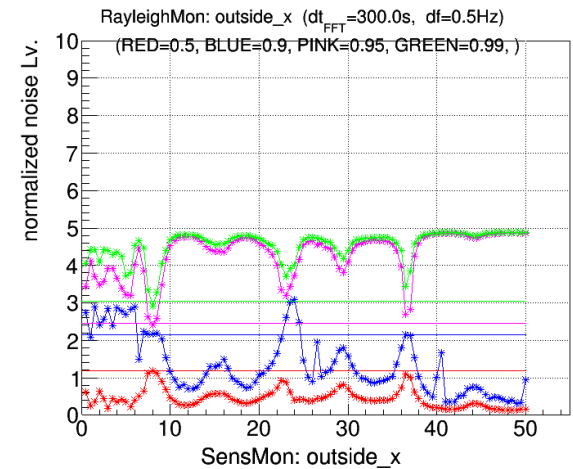
14:00-15:00(JST)



00:00-1:00(JST)



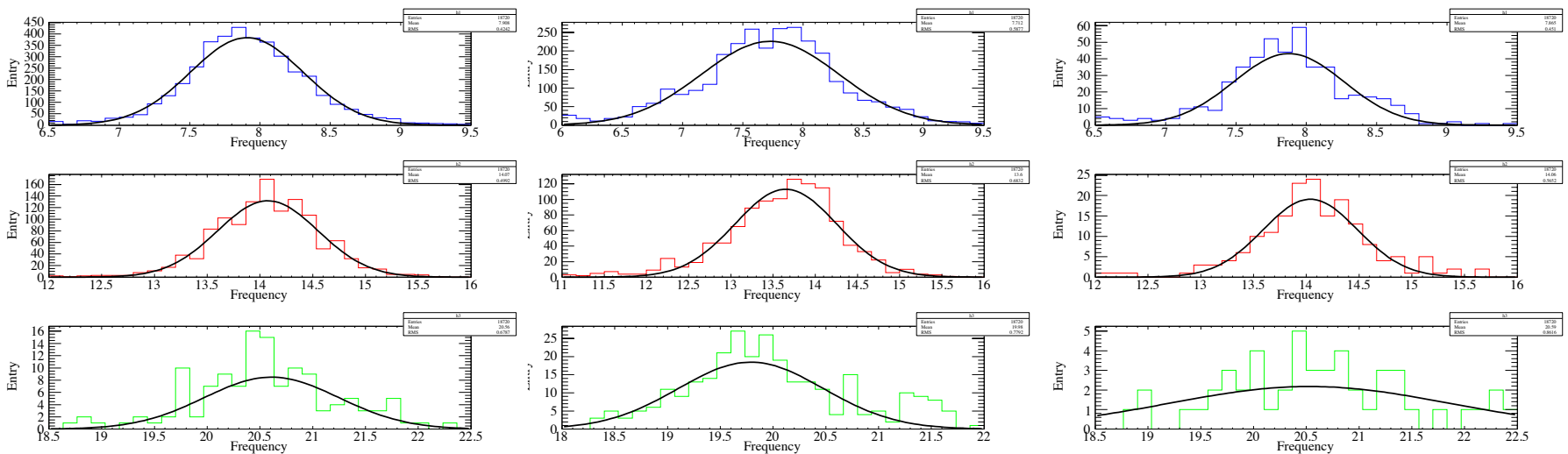
10:00-11:00(JST)



Data Quality

■ Line-Tracking (calculated by Ueno-san)

Tracking the resonant **frequency** of schumann resonance(1st 2nd 3rd)

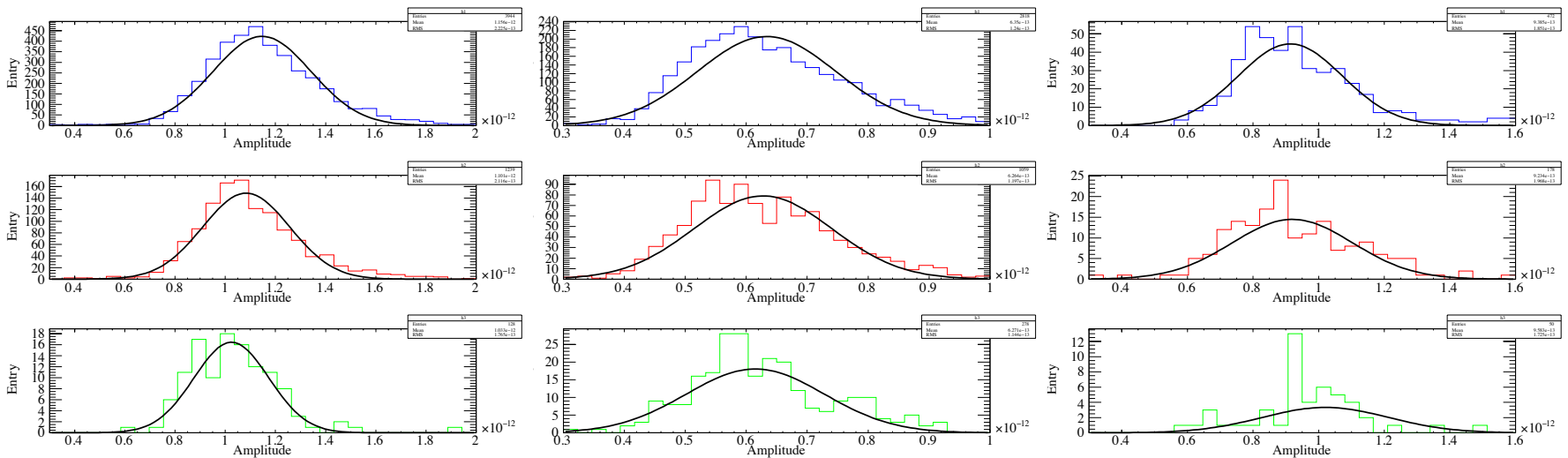


We concluded the fluctuation of the resonant frequency is obeyed Gaussian distribution

Data Quality

■ Line-Tracking (calculated by Ueno-san)

Tracking the **Amplitude** of schumann resonance(1st 2nd 3rd)



We concluded the fluctuation of the amplitude of schumann resonance is also obeyed Gaussian distribution

Winner Filter can remove the schumann resonance!!

Data Quality

- Spectrogram

Conclusion & Future works

We concluded :

1. Measurement and calibration were success
2. Data quality was enough to make a Winner filter
3. Magnetic field inside the tunnel was larger than outside but we could not understand the reason.

In the future :

1. To make the winner filter
2. Evaluate the performance of the filter
3. Understand the difference between inside and outside of tunnel

with Virgo team