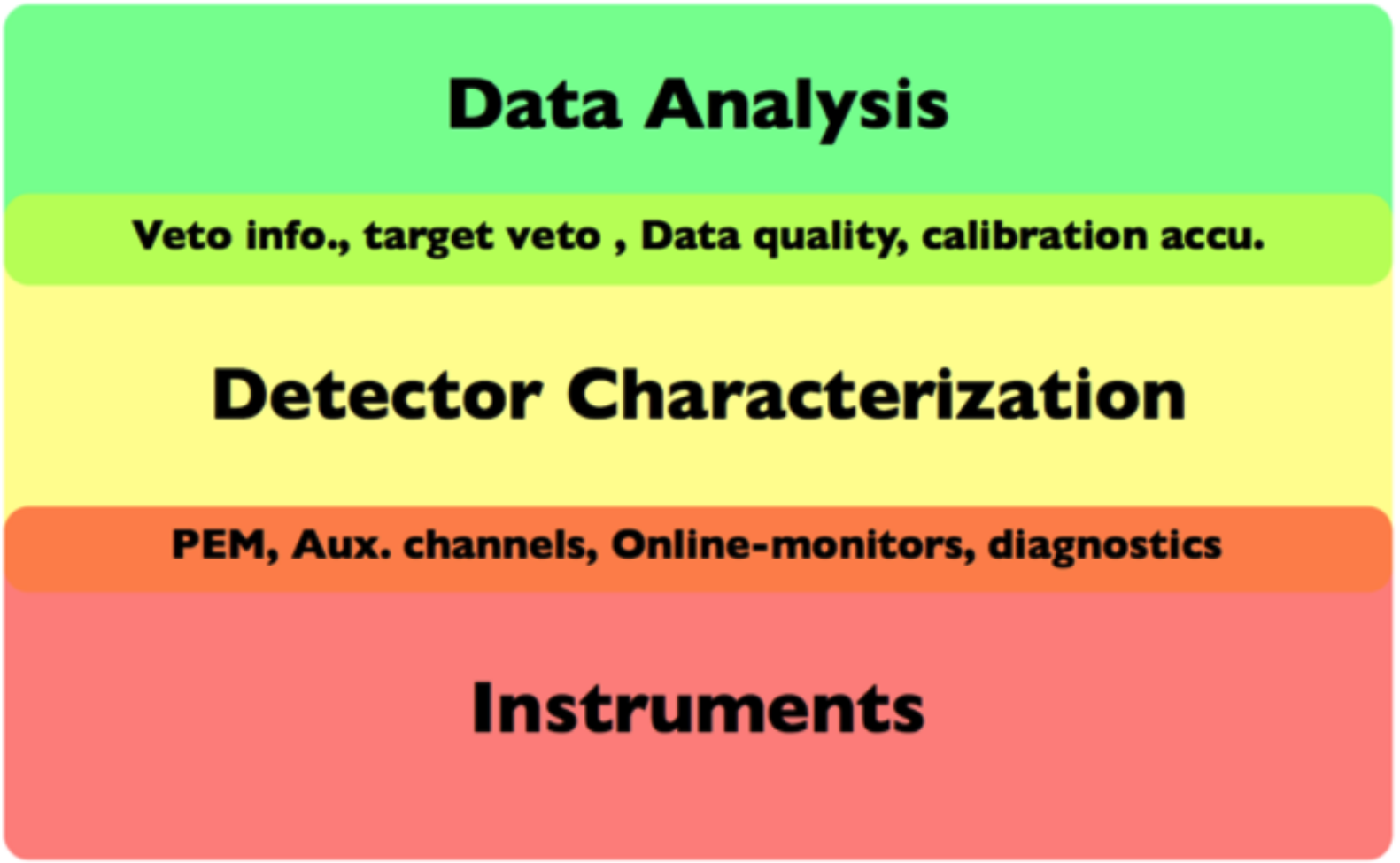
Status of Detector Characterization

Kazuhiro Hayama (ICRR)

Scope

- Detector diagnostics
- Data quality
- Veto analvsis



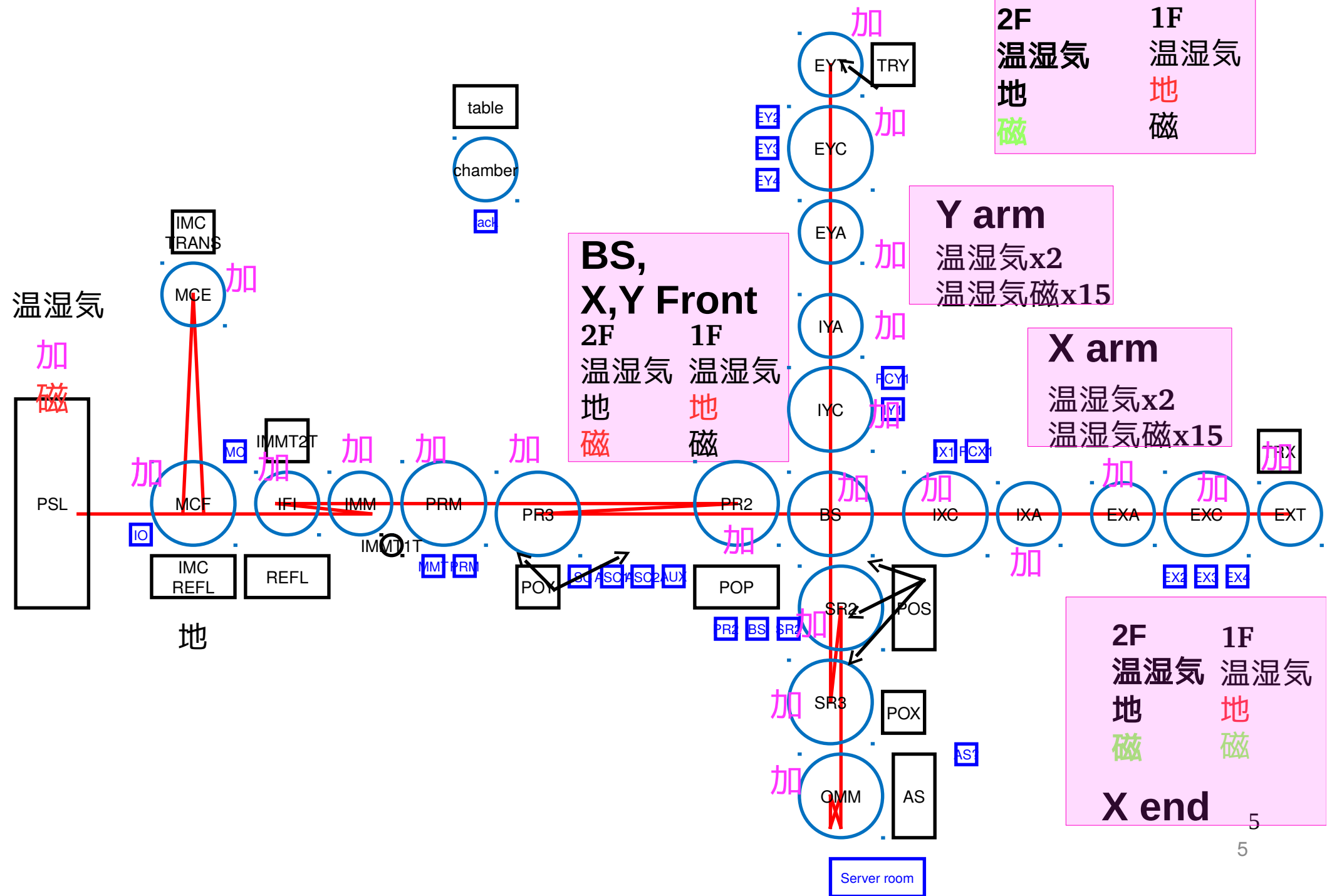
Tasks

- **Support to understand what is happening in KAGRA**
  - DetChar tools
  - Environmental monitor sensors and PEM injection
  - Study of environmental issues
- **Data quality Information for operation, data analysis**
  - To define DQ using DetChar tools
    - Practice : iKAGRA data characterization
  - Selection of channels to use for DQ
  - Distribution of DQ flag to collaborators
- **Veto Information for data analysis**
  - Multi-channel analysis
  - Safe, unsafe channel analysis

DetChar tools

- Main monitors has been implemented
- Dec 2016
  - Command line tools for quick analysis
  - Hands on session (will be held on 9 Dec)
  - Documentation
- Jan ~ April 2017
  - Web based tools will be updated
  - Daily summary page will be updated
  - Test run, then updating again.
- Integrating tools by KGWG detchar

KAGRA Layout



Environmental monitor sensors

All below plan to run in June 2017

- Seismometer (3)
  - Running at Center, X end
  - Plan to run at Yend in 2017
- Magnetometer (2)
  - Next week, run at the Center (for CRY)
  - 1 is broken. Sent back to the company
- Baro, Hygro, Thermometer (9,13,13)
  - Running at X arm using GIF DAQ
  - Will make more amps to run all.
- Arm mapping (Baro, Hygro, Thermo, magnetometers, not for accurate measurement)
- Microphone :
  - now selecting. Candidate:
    - Bruel and Kjaer 4130 microphone
    - Bruel and Kjaer 2642 microphone preamplifie
- Accelerators
  - Plan to run in 2017

Data quality information

Provide info of
- detector condition
- whether data can be used for search or not

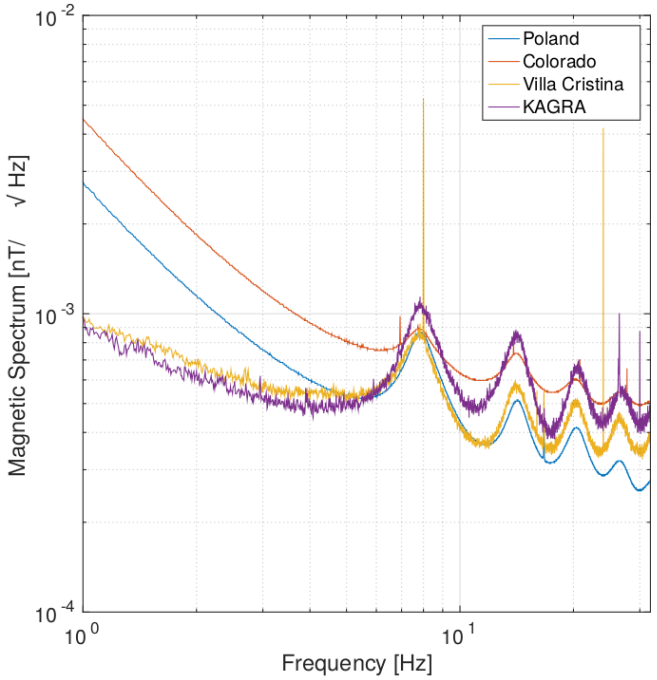
- All tools for DQ plan to be implemented in Feb 2017. (~90 % are implemented)
- DQ categorization (~ March)
- iKAGRA data characterization
  - ~March 2017, analysis
  - April~, report
- Glitch classification (~ middle 2017)
- Safe channel, correlation will be explained by John Oh.

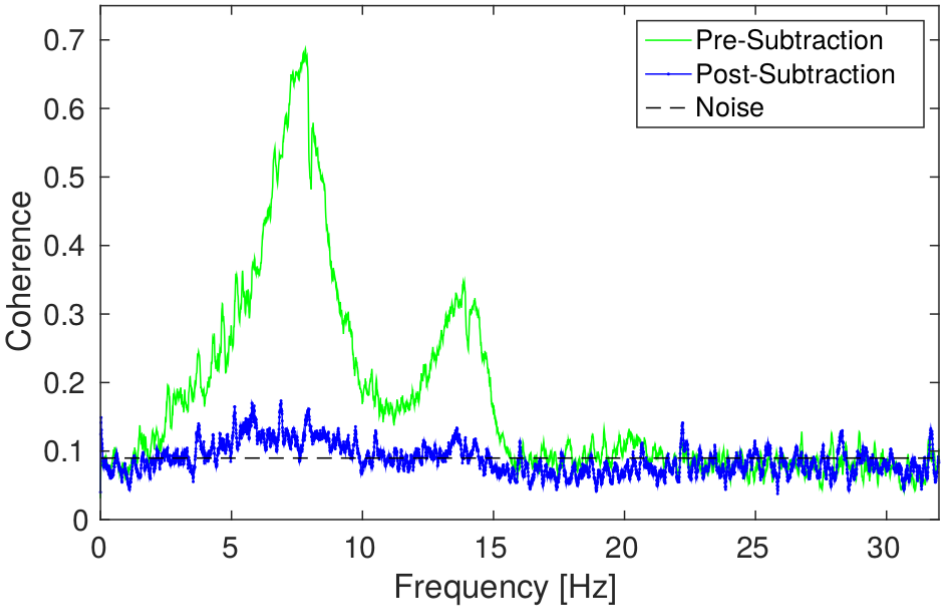
Veto study

- Multiple-channel analysis using iDQ(LSC tools), especially ANN
- CAGMon for correlation analysis
- New development
  - ChirpletMon
  - ...

Schumann resonance

- In collaboration with Virgo, LIGO
- Coincident measurement in July, 2016]
- Saw high coherence
- Succeeded to subtract it



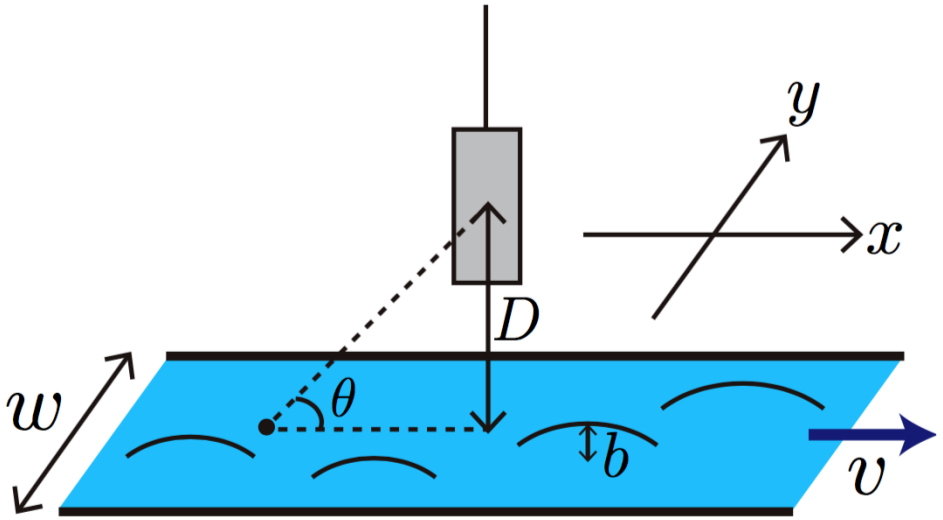


(e) Amplitude Subtraction

Water Newtonian Noise Estimation

Nishizawa

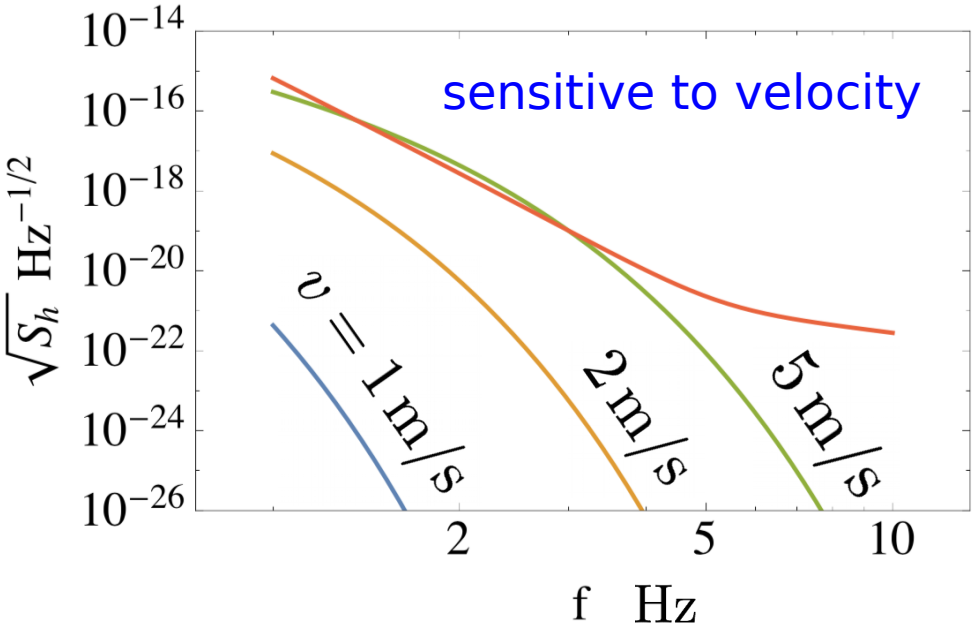
water flow along an open channel



(assuming a smooth surface
for a water pipe and
negligible transverse velocity)

How do we check this?

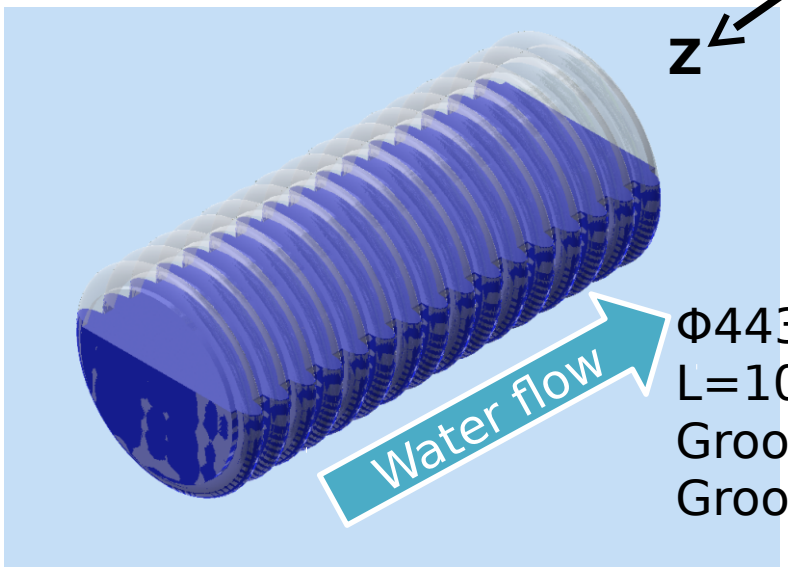
O Sn ~ function of b^(-1/2)
O Sn ~ function of v



CDF

Kasuya (Titech)

Model

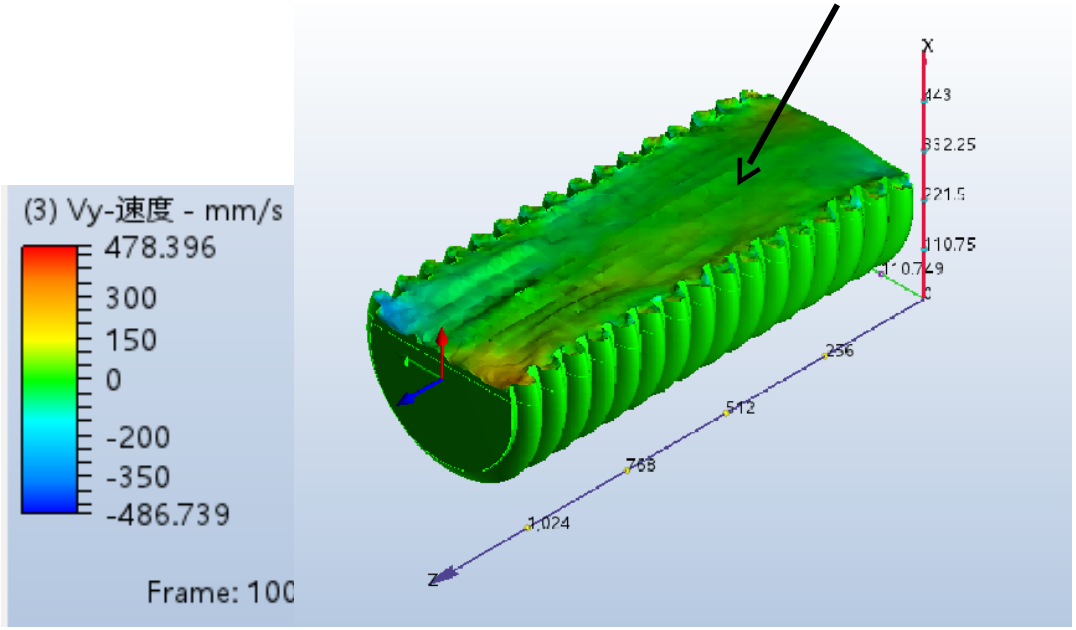


Φ443 mm
L=1024 mm
Groove width: 20 mm
Groove height: 38 mm

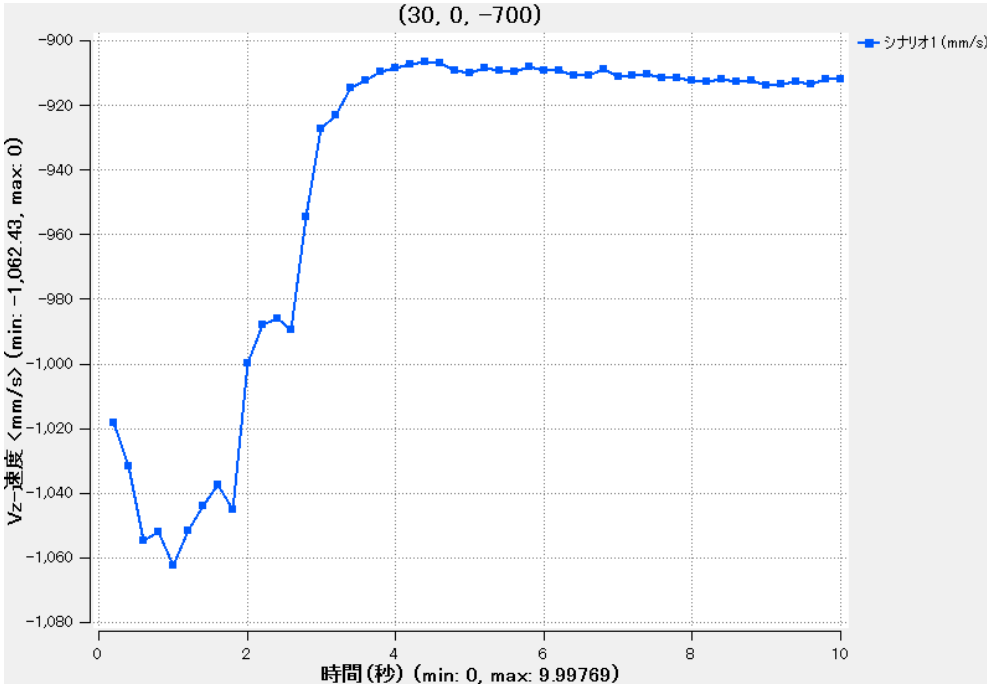
Conditions

Material: Water
Initial Velocity: 1000 mm/s
Initial water surface height: 220+38 mm
Boundary flow velocity:1000 mm/s
Analysis time: 10 sec

Result



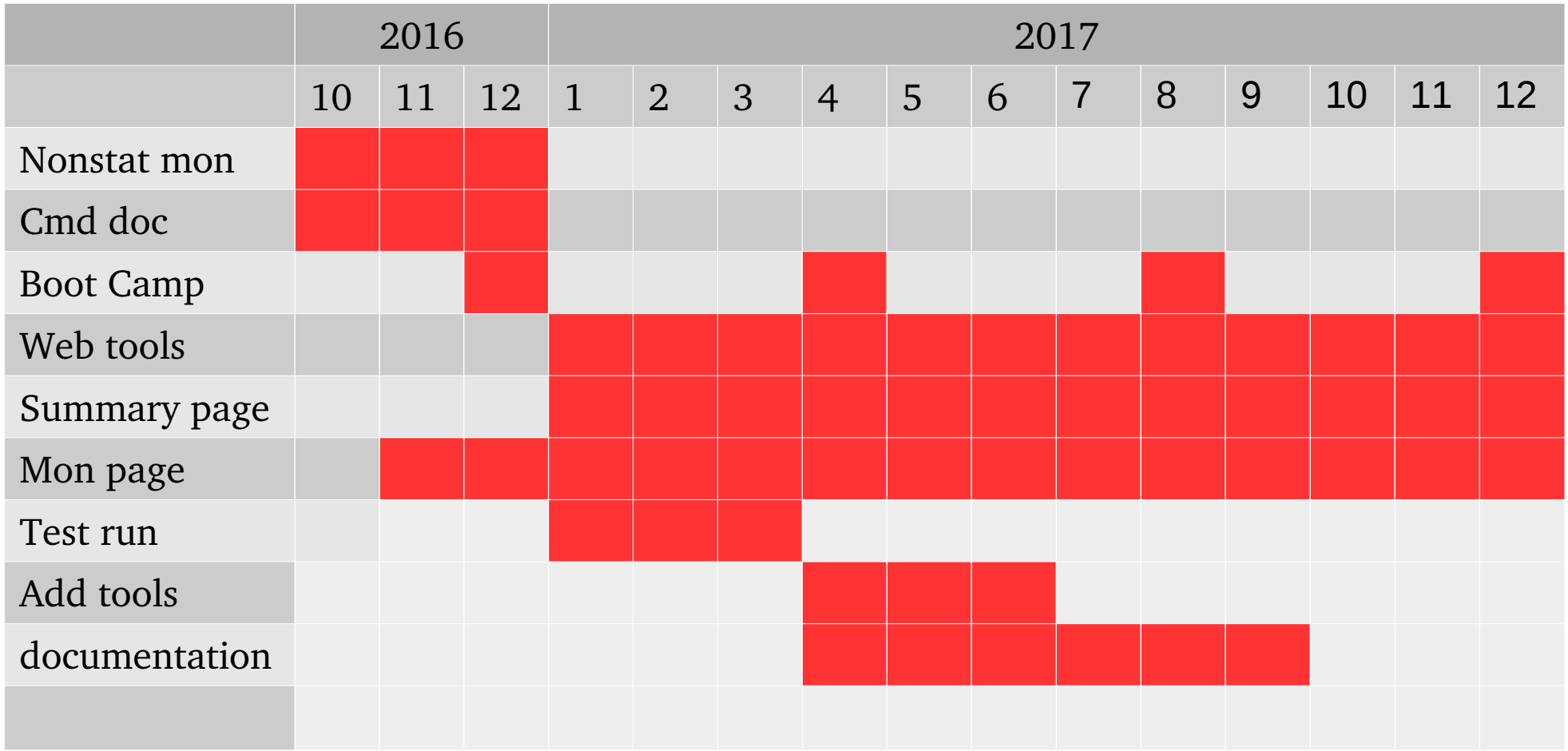
Time vs Vz Flow Velocity at(30,0,-700)



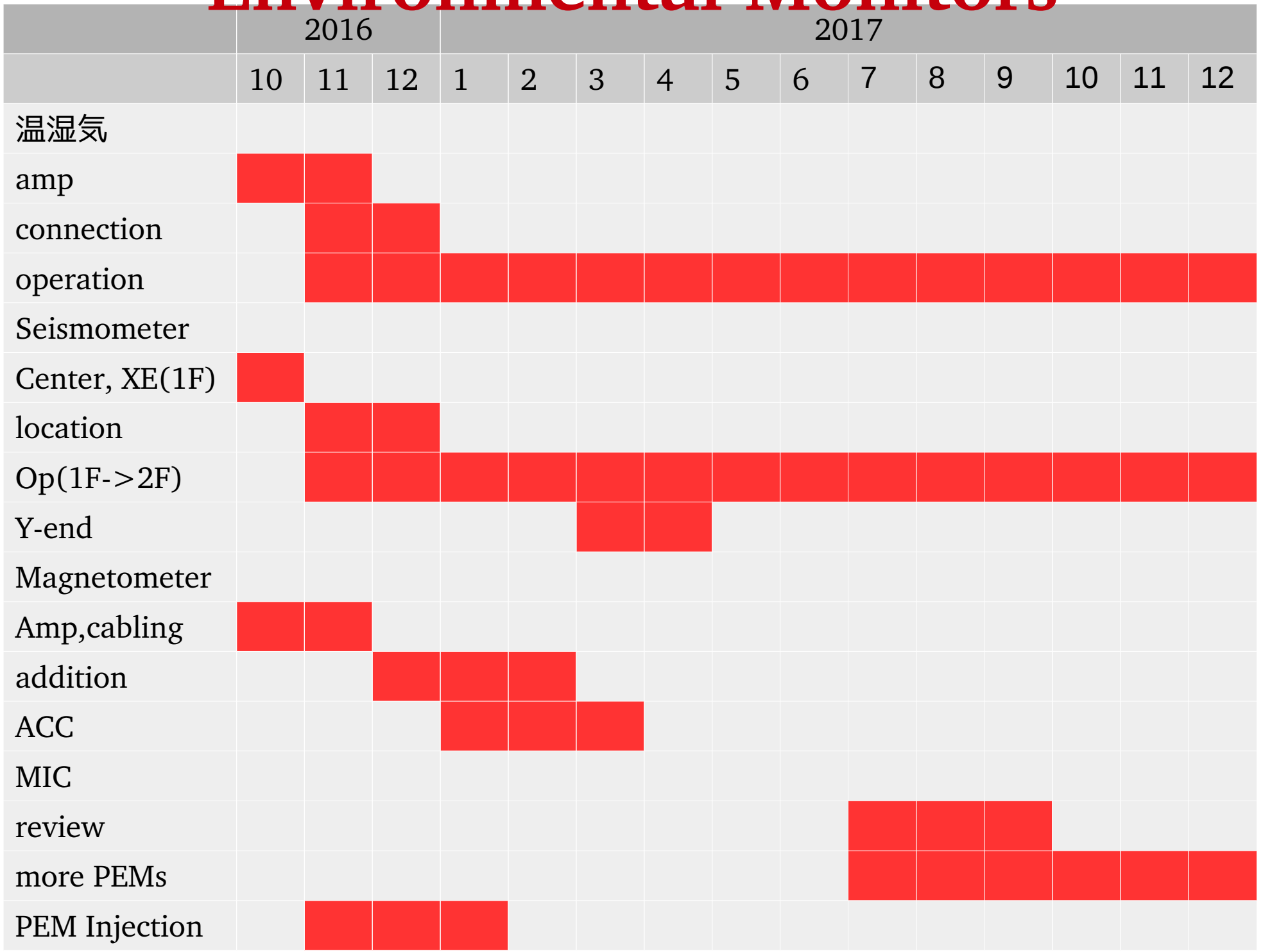
Current

- [**Next week**] : Measurement of the magnetic field around the cryostat at X front
- [**Started**] run of hygrometer, barometer, thermometer at X arm using GIF DAQ
- [**On going**] : iKAGRA data characterization
- [**In progress**] : Documentation of tools
- [**In progress**] Water issue:
  - From theoretical and simulation, not a big problem , but need measurement
  - Continuous measurement of water gage of the pools
- [**Finished**] method to mitigate effects of Schumann resonance
  - Coincident measurement at KAGRA, Virgo, Poland, Colorado
  - Proposed method to mitigate it worked well

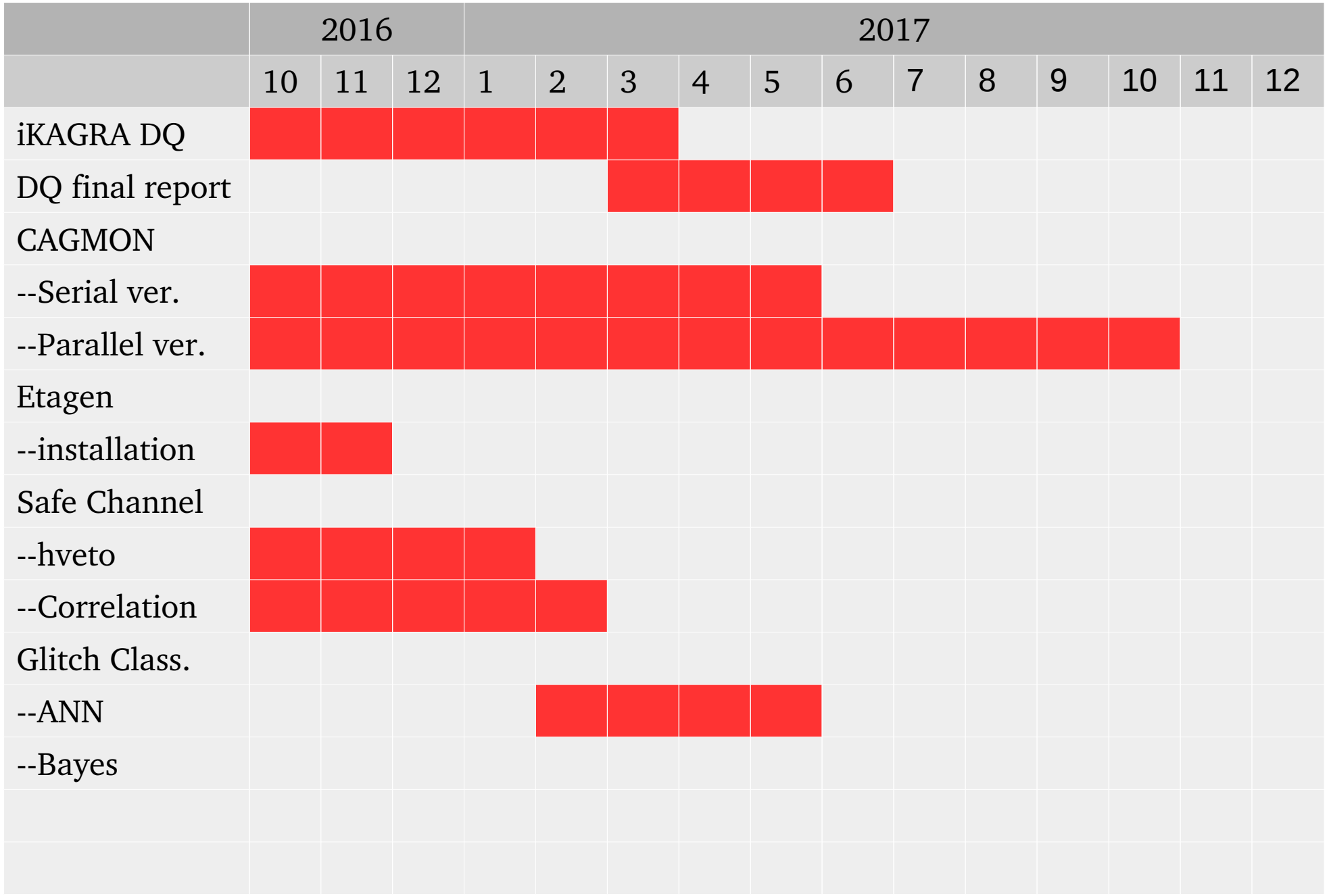
DetChar Tools



Environmental Monitors



Data Categorization



Glitches during iKAGRA test run