

# Current status of DGS group

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KAGRA f2f meeting

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On behalf of DGS subgroup

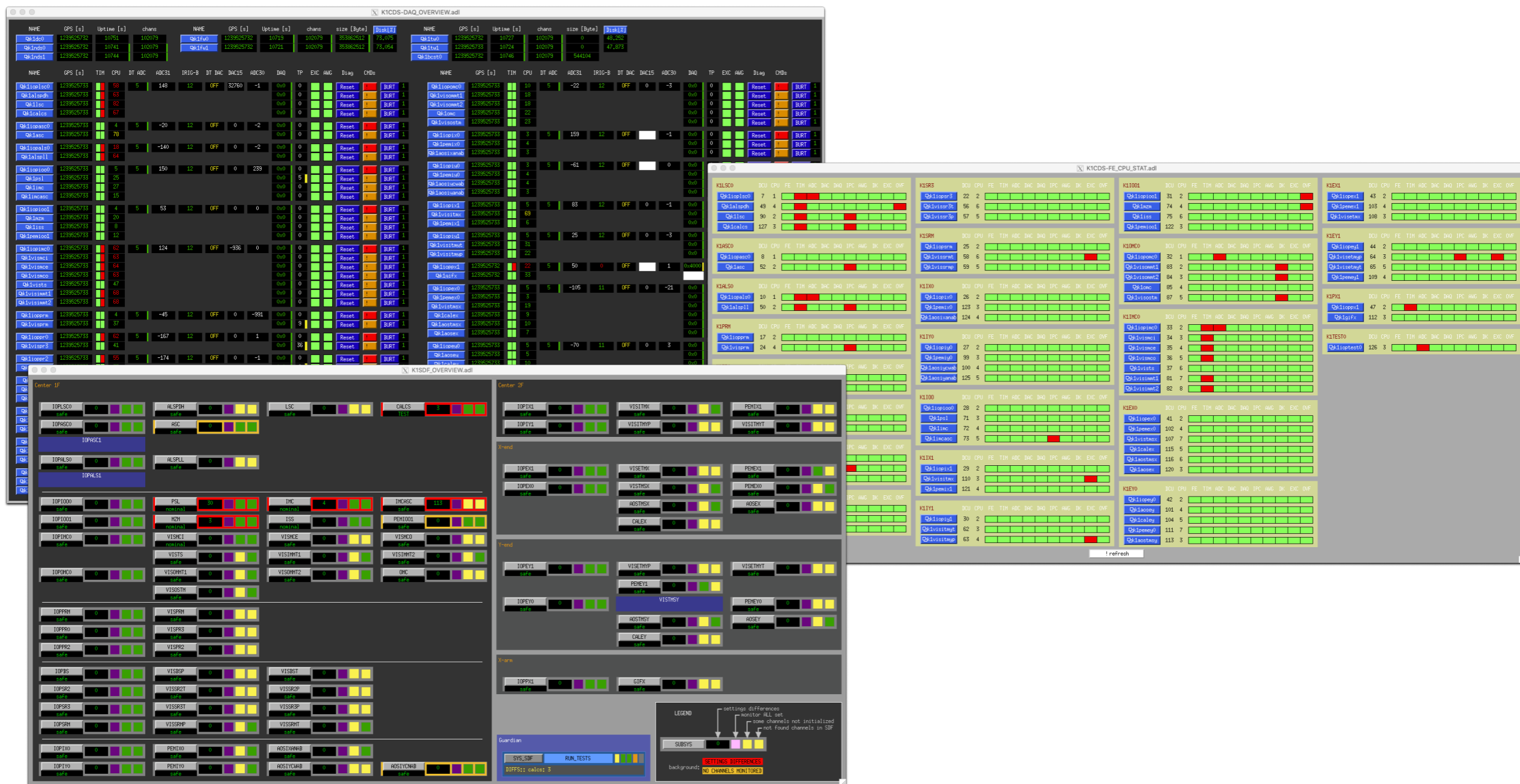
# Topics

**DGS subgroup manage digital control system for KAGRA**

- **SDF**
- **Field rack installation**
- **IRIG-B issue**
- **Software update**
- **DAC glitch issue**

# Status monitor

- Maintain systems that control the interferometer
- Easily check system alert



# SDF(Setpoint Definition File)

- New tool to check and keep status for EPICS channels.
- Monitor the difference between default and current value
- JGW-G1809228

The screenshot displays the K1SDF\_OVERVIEW.adl interface, which monitors the status of various EPICS channels across different experimental stations. The interface is organized into several sections:

- Center 1F:** Contains numerous channel status indicators, including IOPALSCO, IOPALSO, IOPALSI, IOPALSO, IOPALSI, IOP1000, IOP1001, IOP1MCO, IOPMCO, IOPPRM, IOPPRO, IOPPR2, IOPBS, IOPSR2, IOPSR3, IOPSRM, IOPIXO, IOPIYO, ALSPDH, ASC, ALSPLL, PSL, MZM, VISMCI, VISTS, VISOMMT1, VISOSTM, VISPRM, VISPR3, VISPR2, VISBSP, VISSR2T, VISSR3T, VISSRMP, PENIXO, PENIYO, LSC, ASCS, IMC, ISS, IMCASC, PENI001, VISMCE, VISMCO, VISIMMT1, VISIMMT2, OMC, CALCS (TEST, 3), and AOSIXANAB, AOSIYNAB.
- Center 2F:** Contains channel status indicators for IOPIX1, IOPIY1, VISITMX, VISITMYP, VISITMYT, PENIX1, VISITMX, VISITMYP, VISITMYT, PENEX1, PENEXO, AOSTMSX, AOSEX, CALEX, IOPEX1, IOPEXO, VISETMX, VISETSX, CALEX, PENEX1, PENEXO, AOSTMSX, AOSEX, VISTMSY, VISETMYP, VISETMYT, PEMEY1, AOSTMSY, CALEY, PEMEY0, AOSEY.
- X-end:** Contains channel status indicators for IOPEX1, IOPEXO, VISETMX, VISETSX, CALEX, PENEX1, PENEXO, AOSTMSX, AOSEX.
- Y-end:** Contains channel status indicators for IOPEY1, IOPEYO, VISETMYP, VISETMYT, PEMEY1, AOSTMSY, CALEY, PEMEY0, AOSEY.
- X-arm:** Contains channel status indicators for IOPPX1, GIFX.
- Guardian:** Displays the status of the Guardian system, including SYS\_SDF, RUN\_TESTS, and DIFFS: calcs: 3.
- LEGEND:** Provides a key for the status indicators, explaining the meaning of different colors and symbols, such as 'settings differences', 'monitor ALL set', 'some channels not initialized', and 'not found channels in SDF'. It also indicates the background status: 'SETTINGS DIFFERENCES' and 'NO CHANNELS MONITORED'.

# Field rack installation

Center 1F

IOO, IOO1, IMC0, OMC0, **OMC1**

PRM, PR3, PR2

BS, SRM, SR2, SR3

LSC0, ASC0, ALS0, ALS1

IX0, IY0

Center 2F

ICV, IXV1, IXV2, IYV1, IYV2

X-End

1F : EX0

2F : EX1, EX2, **EX3**

Y-End

1F : EY0

2F : EY1, EY2, **EY3**

Recabling and reassign chassis

- Great cooperation from VIS and CRY subgroups

To suppress heat accumulation

These circuits generate much heat

- HP Coil driver
- Whitening Filter
- AA Filter
- AI Filter

# IRIG-B issue

## Problem

- IRIG-B sometimes shows wrong GPS time 9999xx
- It is happened when ADC starts 1 cycle (16usec) faster somehow

## Solution

- To add a delay of 1 cycle on the realtime code
- Change RCG code that way

# Software Update

## **Update Real-time Code Generator (RCG) to version 3.1.1**

- same as LIGO O2
- Real-time system and DAQ system also run v3.1.1

## Details of update

- Supported to record as double precision floating point number
- Improved digital AA/AI performance

# DAC glitch issue

## DAC glitches caused by CPU load

### Problem

CPU load induces DAC glitches (CPU-max issue)

Lockloss occurred by DAC glitches

### Solution

EPICS gateway

**Exchange to faster CPUs**



# DAC glitch issue

## Exchange to faster CPUs

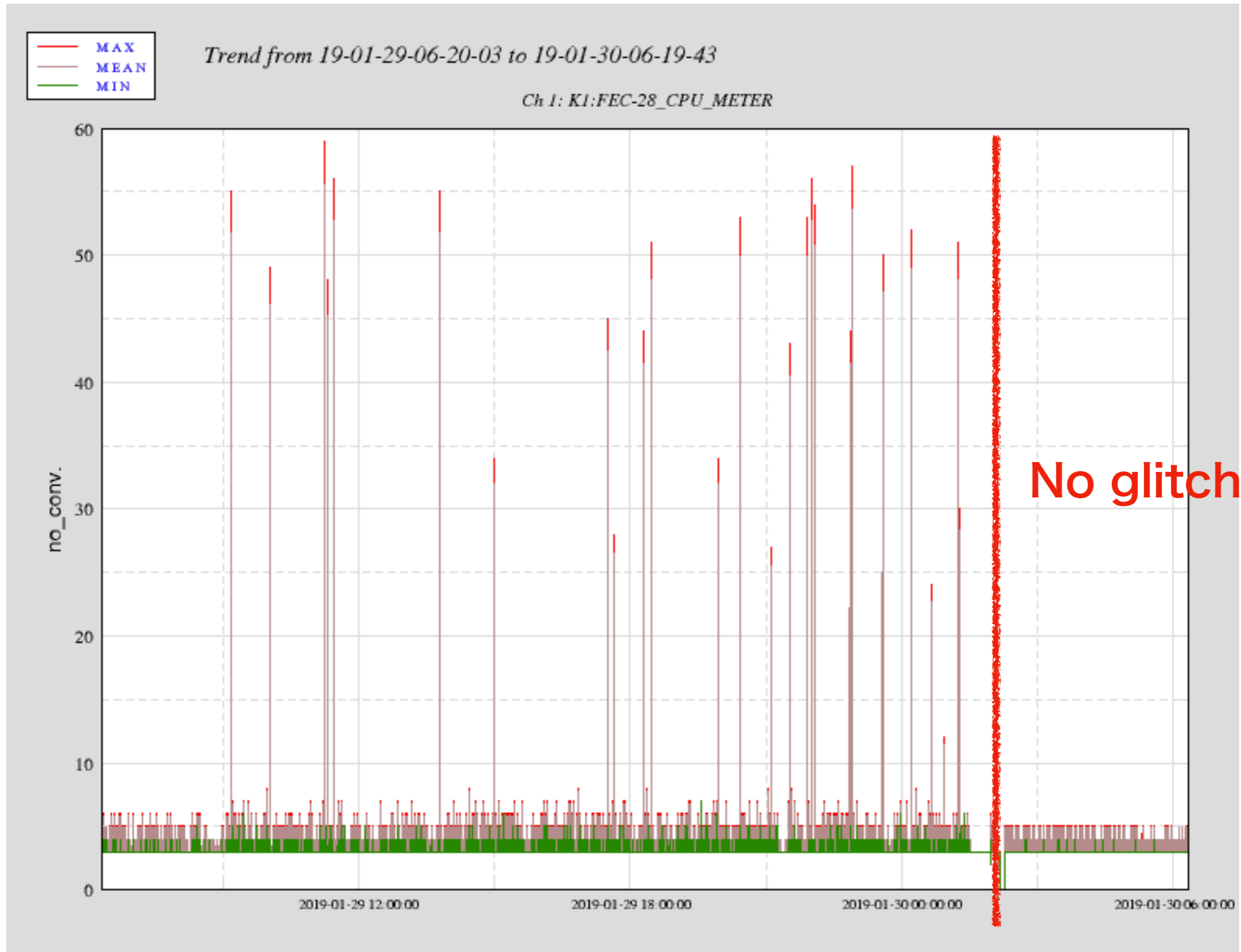
We are using 4 types of CPU

- (1) 2.8GHz v2 CPU : Mainly used
- (2) 3.0GHz v3 : more stable than (1)
- (3) 2.6GHz v4 : more unstable than (1)
- (4) E5-1654 v4 @ 3.6GHz : first CPU

After replacing k1i00 to first one, we had NO CPU alert

We also replace k1ix1, k1iy1, k1ex1, k1ey1 and k1bs

# DAC glitch issue



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This year, we plan to replace 7 machines to faster CPU

# Summary

## What we did

- **Important issues has been resolved!**
- Replaced RTPC to resolve DAC glitch issues
- Rack installation
  - Recabling and reassign chassis
- Software update of RCG to v3.1.1

## Toward O3

- Continue to replace RTPC
- Exchange AC power supply to DC
- Recording time of one frame file to 64 seconds

## After O3

- RCG update to v3.4.3(LIGO O3) or later
- Construct backup system