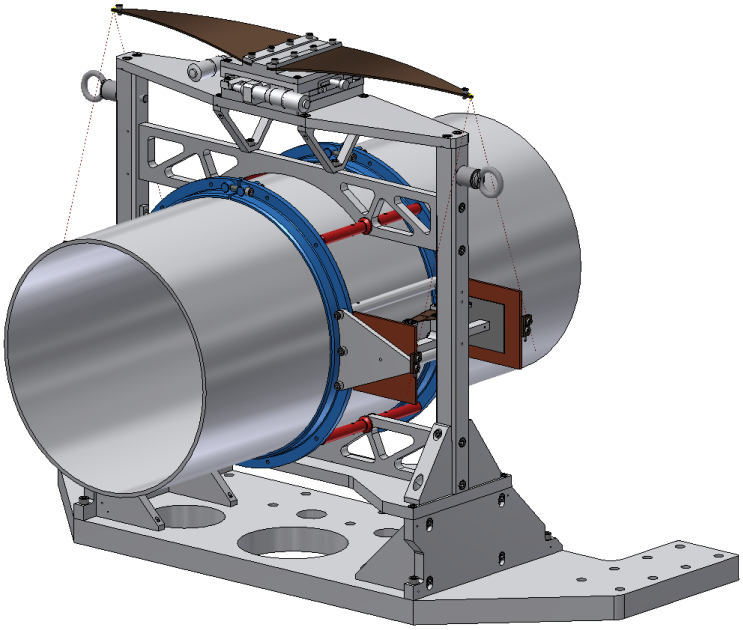
Task List for WAB-cool-down in IYC chamber

The cool-down test of the WAB (wide-angle-baffle) is held in order to proof the feasibility of the whole device in KAGRA's cryostat and get information of its behavior (vibration isolation, thermal contraction, etc.) when the cryostat is activated.
We aim to do the test during bKAGRA phase 1.

The WAB design is related to this document:
https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/private/DocDB/ShowDocument?docid=6474



Installation

The installation of the WAB will be done in the IYC chamber which will not contain a test mass. The most important points for the installation would be:

- **Open the vacuum chamber**
  Doing the opening on one side might be sufficient as there is no payload inside and easier access to all parts is possible. However, if it is not possible to access all parts, we need to open both sides
- **Install telephoto-camera to monitor movement of WAB**
  → Inoue-san has to be asked to do that

- **Implementation of the WAB suspension**
  The suspension is to be assembled outside the chamber together with the WAB itself.
  The suspension base-plate, however, should be inserted into the chamber (and fixed to the optical table) separately (→ may become to heavy otherwise)
  Fixing the suspension to the installed base-plate and releasing the earthquake stopper (maybe Obuchi-san's installation procedure can be tested on this occasion).

  Points to be discussed:
  - thermocouples (Si diodes?) have to be placed in this stage
  - putting small heaters on the attach points of the heat links for simulating 4W scattering
  - wires/cables for the thermocouples need to be prepared (inside the cryostat and outside)
  - cable-connectors through the chambers are needed (existent)
  - digital thermometer to handle the signals from the thermocouples
  - heat links have to be connected (4)
  - installation of mirror-plate for OpLevs
  - electrostatic actuator for checking the change of damping during cool-down
  - wires/cables and connectors for the actuators
- **Closing the cryostat and the vacuum chamber**
- **Installation of OpLevs**
  Probably the pylons cannot be used since they are on the opposite side of the chamber (replacing the WAB may be done but we need to test the device under realistic circumstances).
  Solution: fixing islands to the cryostat flanges and placing a simple OpLev to monitor low-frequency movements
- **Start the cool-down**
  We need to learn how to switch-on the cryostat

Measurement

We need to take measurements of the following parameters:

- Temperature (thermocouples: screw some number on the dummy baffle and measure temperature distribution; for real baffle just use the flanges)
    - We will use approximately 12 – 14 thermometers (probably Si diode thermocouples) for measuring the temperature distribution of the wide-angle baffle (WAB)
    - preferred candidate: Lake-Shore DT-670-CU (or DI?) – CU stands for a four-lead measurement scheme where voltage and current are separated, DI for a two-lead one
        - The CU candidate needs 4 Pins
        - In total, we need thus 48 – 56 Pins for the thermometers
        - Issue: some of the Pins available in the IYC are dead according to Hasegawa-kun (probability: ~ 50% ?)
          Number of available Pins unknown yet; **needs to be proofed!**
- Vibration isolation (electrostatic actuators on the safety structure and the baffle; OpLev mirrors may be screwed on the dummy baffle)
    - Number of necessary plates should be 5 – 6, with 2 Pins for each
    - Thus, we need another 10 – 12 Pins for the actuator plates
    - Material and design of actuator plates needs to be determined (vacuum compatibility)
    - The wires for the actuators should withstand a voltage of 500 – 750V
      (may be not a big problem as long as we have no shunt fault or sparks)
- Long-term movement of the WAB (telecamera from Inoue-san)