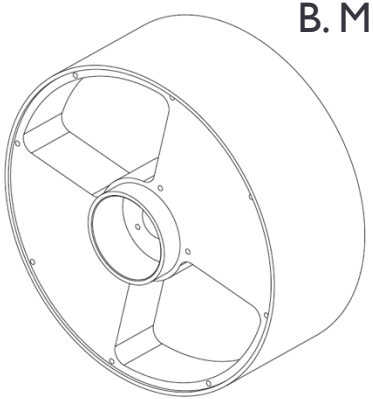
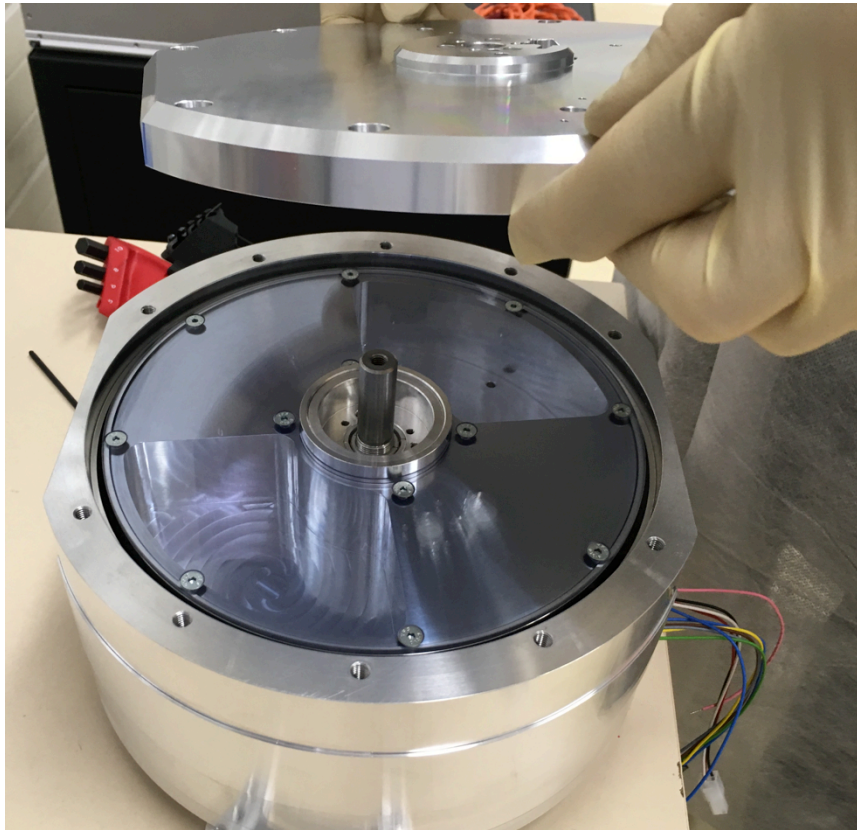
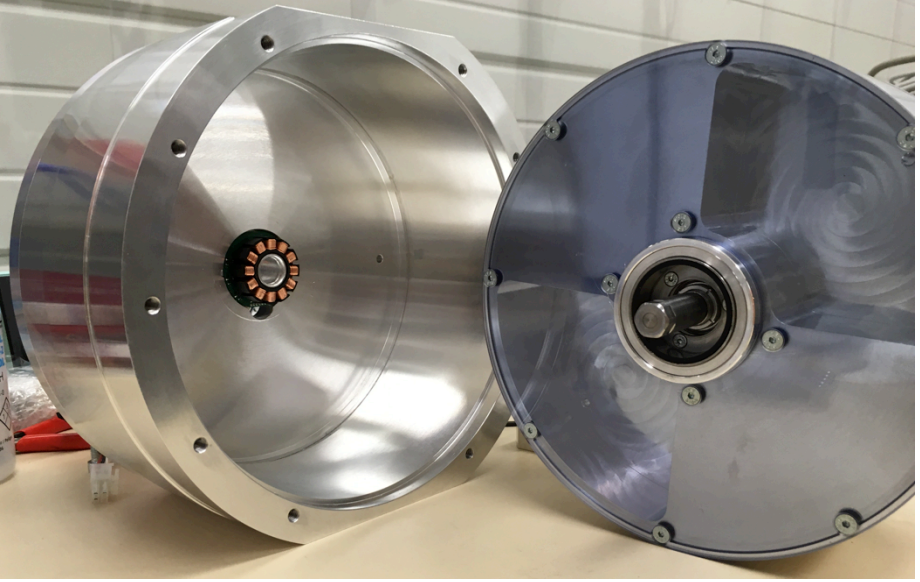
Status of the Virgo second NCal prototype and interface issues

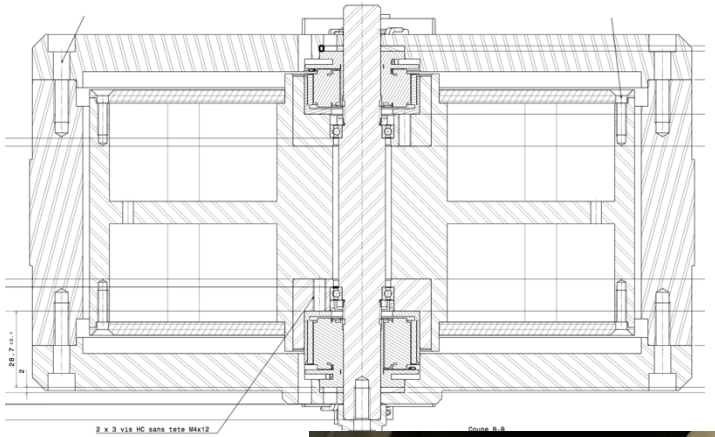
B. Mours for the Virgo calibration team
(LAPP-Annecy)
June 21, 2018



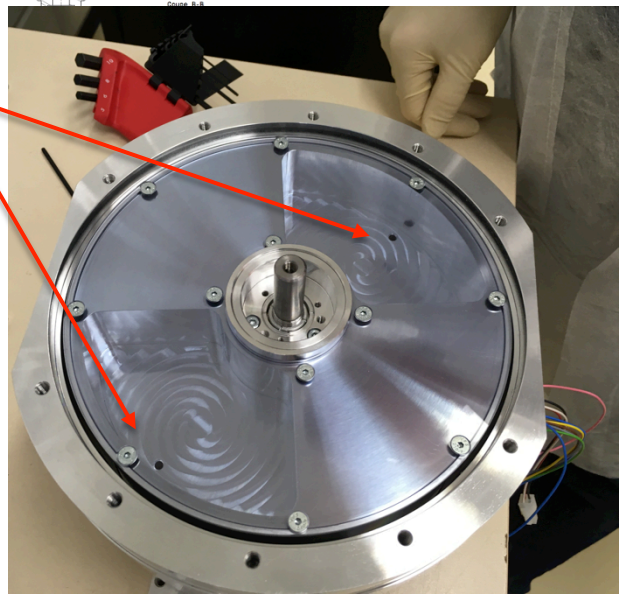




Second NCal prototype



Holes for optical readout
LED + photodiode

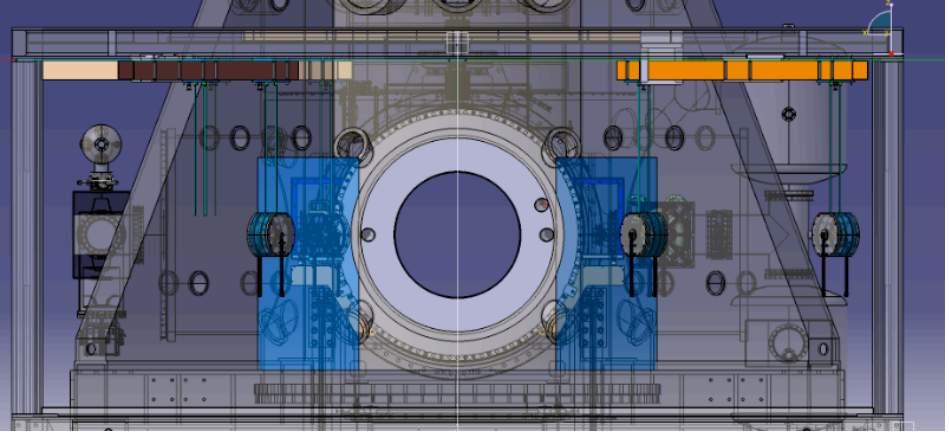


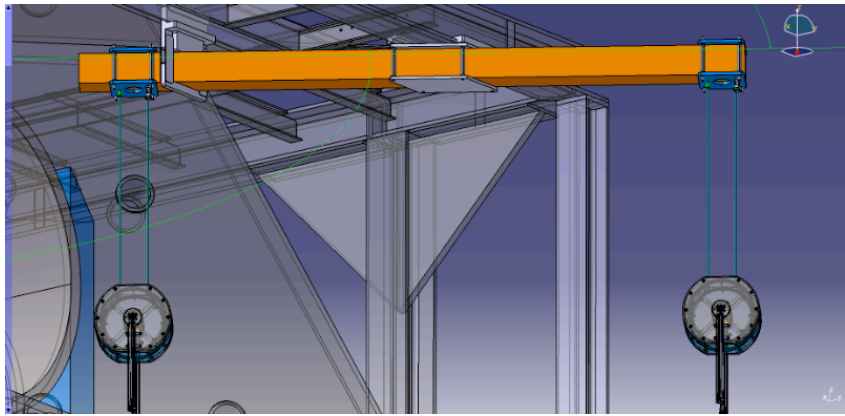
- "NCal 200"; a more compact system
  - 205 mm rotor diameter, 250 mm overall diameter
- Integrated frameless motor
- Speed and phase read by a detecting optical pulses

“NCal-200” development

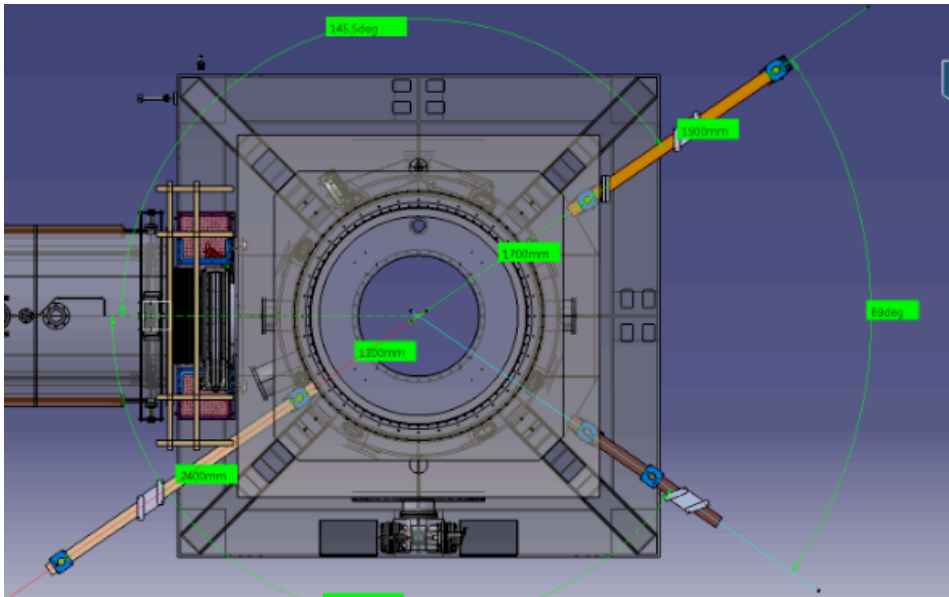
- Rotation speed checked up to 100 Hz → expect signal @ 200 Hz
  - Noise much reduced compared to the first prototype
  - But still significant room for improvement
- Start to practice geometry checks…

Installing the NCal 200





- NCal installed on the ITF plan
  - To minimize the uncertainty of the NCal/mirror vertical position
  - Disconnected from vacuum chamber
- Three possible axis
  - To measure the mirror position
- Distance variation:
  - Up to a factor 3
  - → up to a factor 81 in h(t)
- NCal could be turned "face on"
- Installation on July 11-12



Standard interface: mechanic?

- Q. from Jeff Kissel: Can we build the designs to have inter-changeable "rotors?" i.e. we're all roughly the same size and shape, and the connecting to the rotation device is the same?
- Seems difficult if "rotor" is just the rotating part:
  - Rotor and external box are linked together
    - for motor integration, proper balancing
  - Good to use different motors to study noises coming from the motor
- Suggestion: agree on :
  - A volume that contains an full Ncal
    - Typical size: a cube of 300 mm
  - A standard base plate (top or bottom) for accurate positioning
    - With the option of "face on"
  - A few references position around the mirror
    - At least two symmetric position around the mirror
  - Remark: might need a safety box around it that remains at each sites

Standard interface: controls?

- What readout / monitor electronics are present on the system?
  - Currently we are reading the speed of the motor from the motor control unit and the optical pulse produced at each half turn of the rotor.
- Can we standardize them?
  - At least for the optical readout producing the pulses for the speed/phase
- How does the control electronics interface with the GW detector's electronics (i.e. in LIGO, the CDS system)?
  - The motor control units is powered by a standard power supply
  - Speed is set by sending a DC voltage (0-5 V) to the control unit
  - Accurate phase control will requires some simple digital control loop
- Can we standardize (at least) the control and the device outputs such that it's trivial to interchange these devices and/or side-by-side compare?
  - Probably: need at lest a DAC channel to set the speed and an ADC channel for the pulse readout