

In-vessel Calibration Light Source hardware status

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Culham Science Centre, June 24, 2010

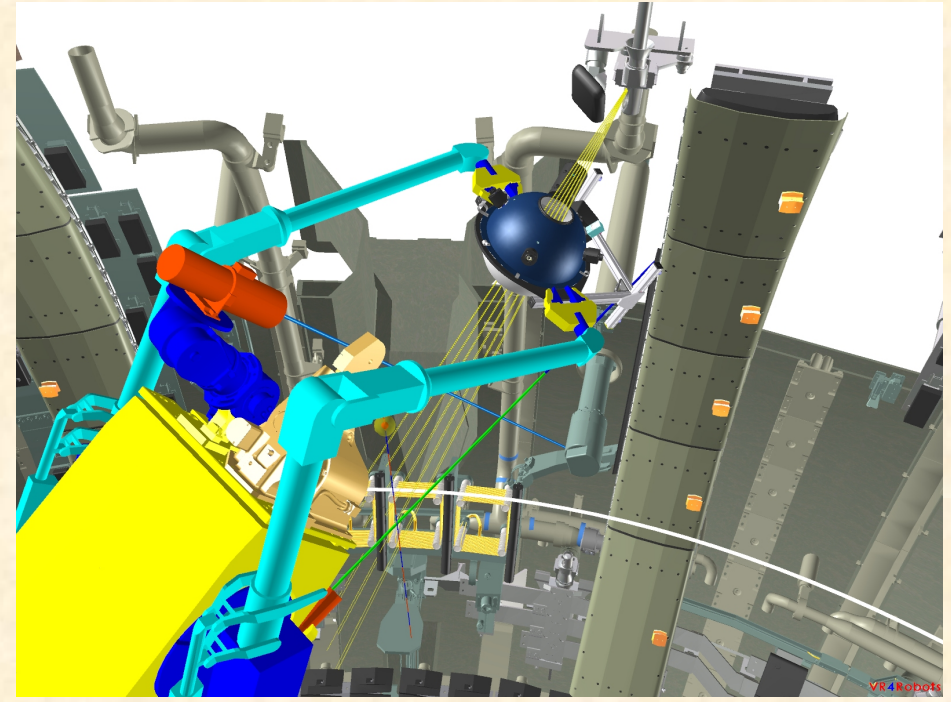
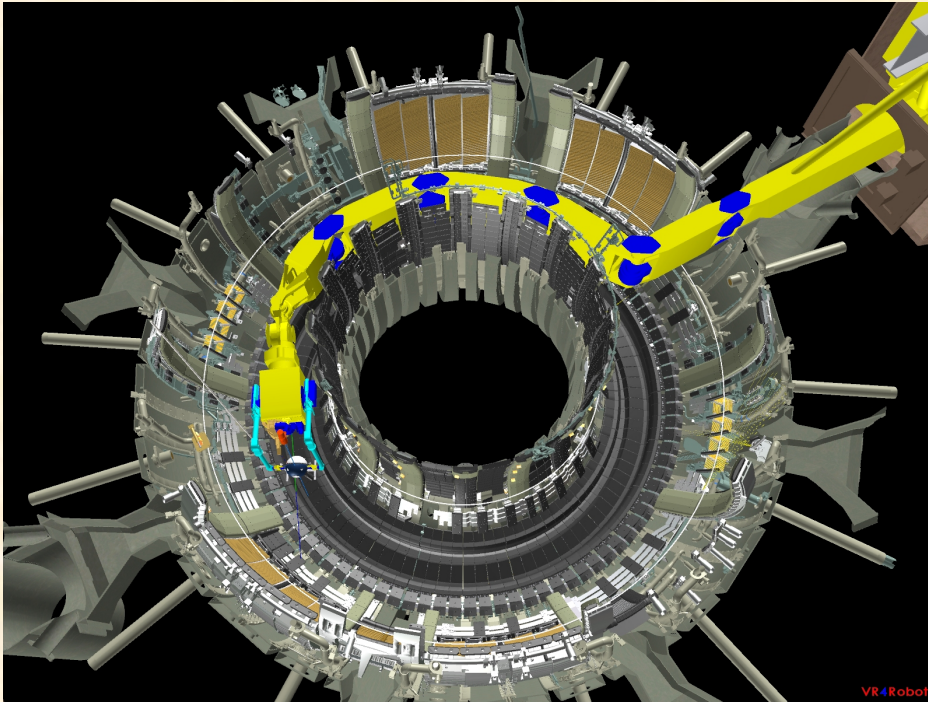
Fusion Energy Division



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In-vessel diagnostic calibration on JET

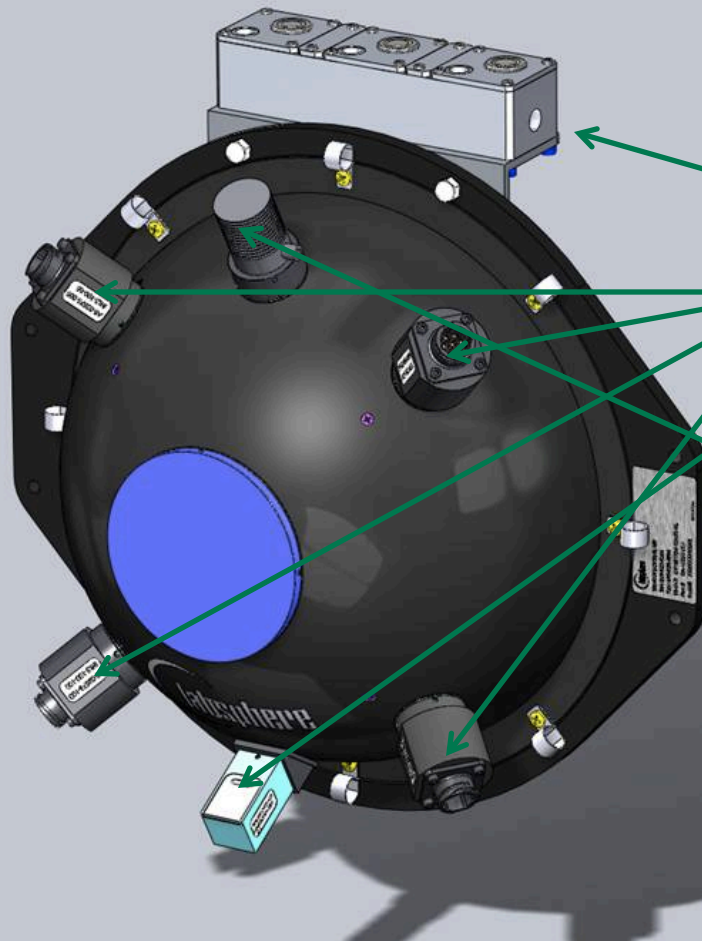


- ITER demonstration technology for *in-situ*, absolute intensity calibration of optical diagnostics via “remote handling.”
- ~20 visible diagnostics to be calibrated on JET in 2010 using this technique.

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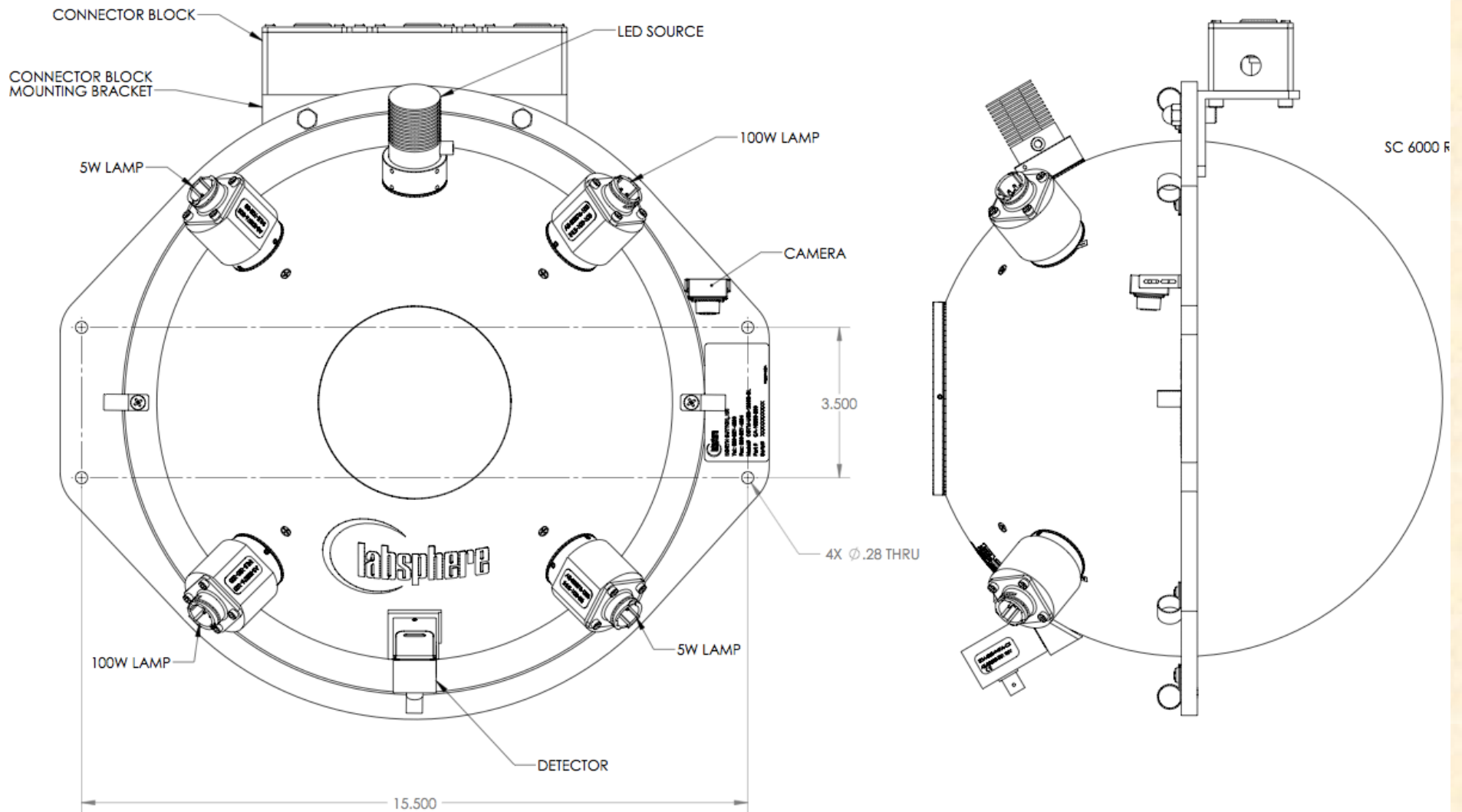
In-vessel Calibration Light Source(ICLS)



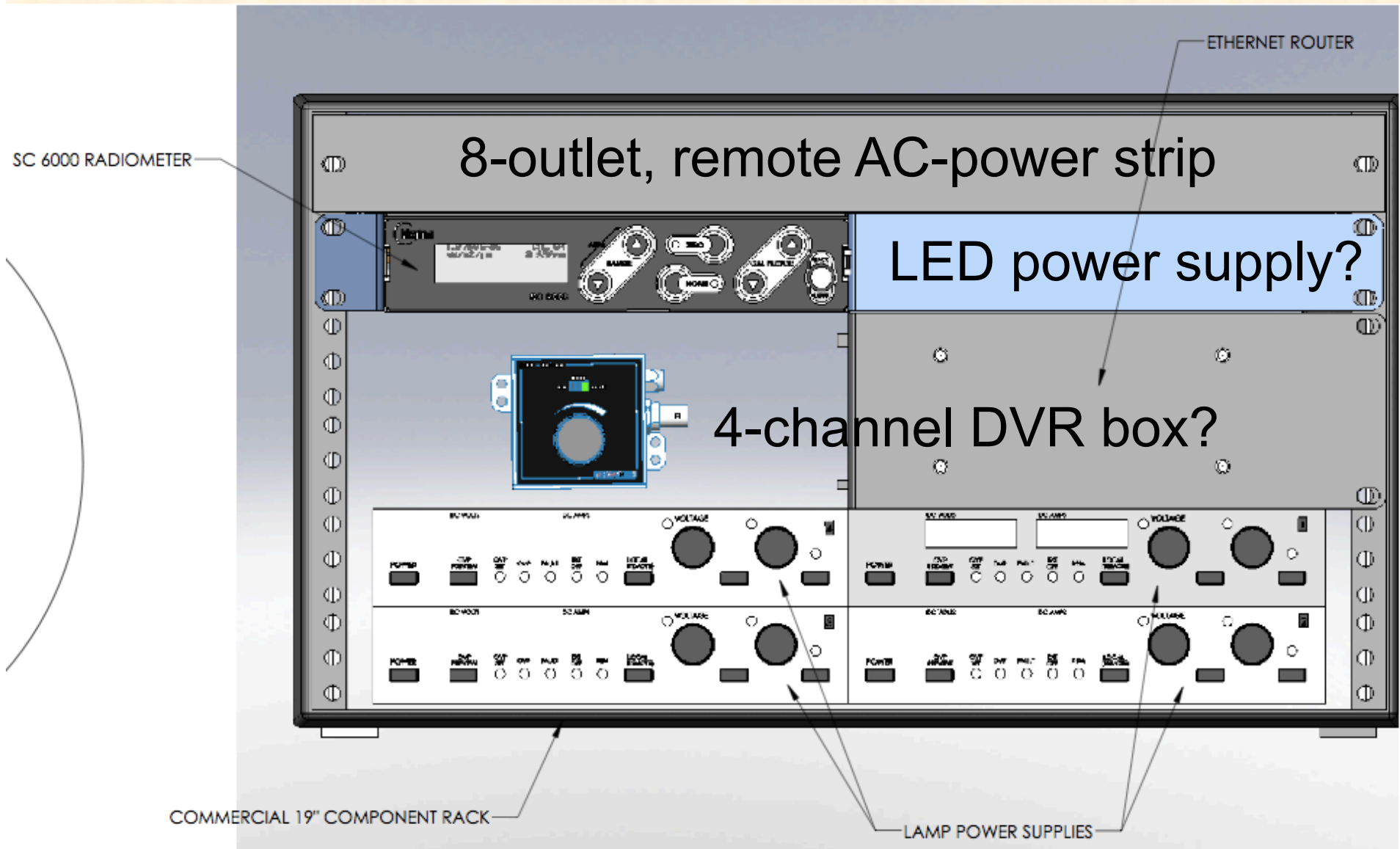
- Engineering Model as of June 7, 2010
 - 3-connector design
 - 4 lamps: 2x 100W, 2x 5W
 - Radiometer
 - LED “torch”
- Iris/shutter missing
- Cameras not included
- RH grip-mounts not shown

ICLS detail view

- Engineering Model as of June 23, 2010



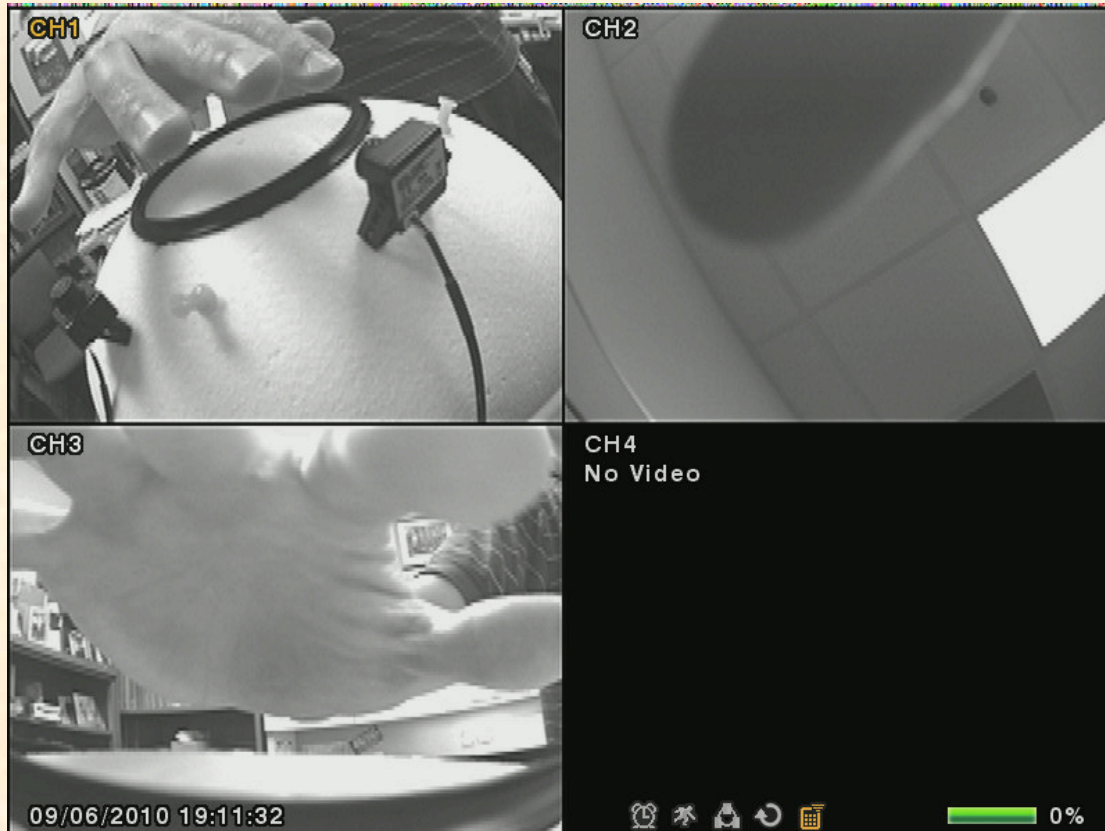
ICLS ex-vessel electronics



ICLS ex-vessel electronics (cont.)

- **Inputs to ex-vessel electronics: AC power and network cables**
- **Outputs**
 - ICLS umbilical
 - Network to PC:
 - Labsphere control: lamps, shutter
 - AC power (on/off): cameras (2), LED “torch” (1), lamp power supplies (4), DVR box (1)
 - DVR data: camera signals (~5 day continuous recording capacity)
- **PC can be located anywhere on JETnet**

Ancillary electronics tested



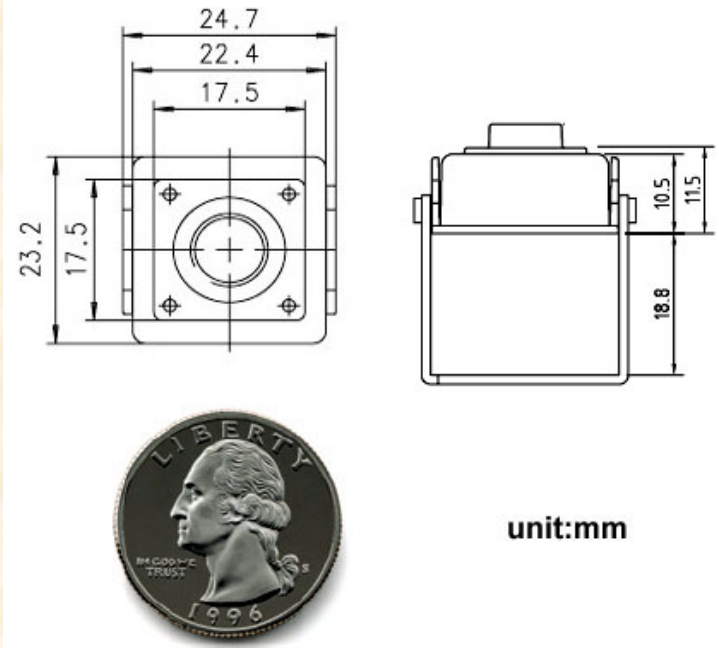
- Mock-up of sphere with cameras, DVR, remote-AC, etc tested using ICLS PC
- Successful!
- PC, DVR, cameras, remote-AC, etc shipped to Labsphere (NH, USA)
- Equipment selected to be US/UK power and NTSC/PAL dual compatible

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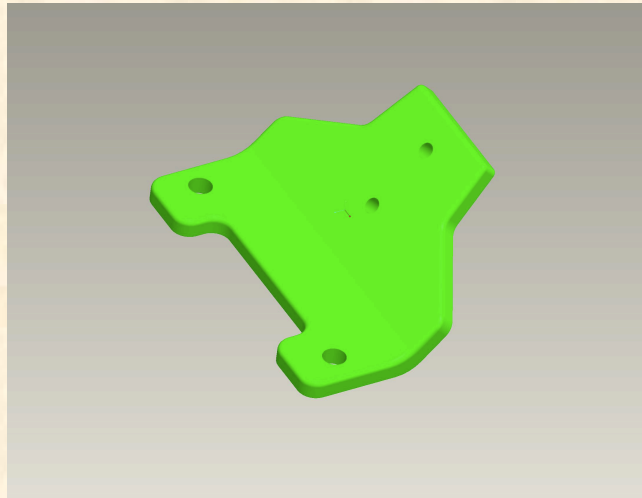


Camera/DVR details

- **2 B&W cameras**
 - 600 TV lines (507x492 pixels)
 - 0.0003 lux sensitivity
 - auto-exposure
- **DVR: simultaneous record, playback, transfer**
 - 4-channel, 120 fps
 - 250GB capacity
 - ~5 days continuous recording (full resolution)
 - Web-viewable w/o loss of performance at 4 connections



RH grip mounts in production



- “grip mounts” interface between RH MASCOT grippers and the ICLS sphere
- ORNL designed from JET “reference”
- Currently in production
 - Expected in “2 weeks”
 - To be shipped to Labsphere

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JET production of hardware

- **Transfer/storage “cradle” design waiting for Labsphere shutter drawings and final model**
- **RH connectors and socket box**
 - **LEMO shells and pins “in stock”**
- **Umbilical cable (3 cable bundle: 20m, 10m)**
 - **2 of 3 LSZH cables are on-site with 20m sheathing**
 - **1 cable and 10m sheathing in transit from US**
 - **RH technicians to fabricate ASAP**
 - **Ship to Labsphere**

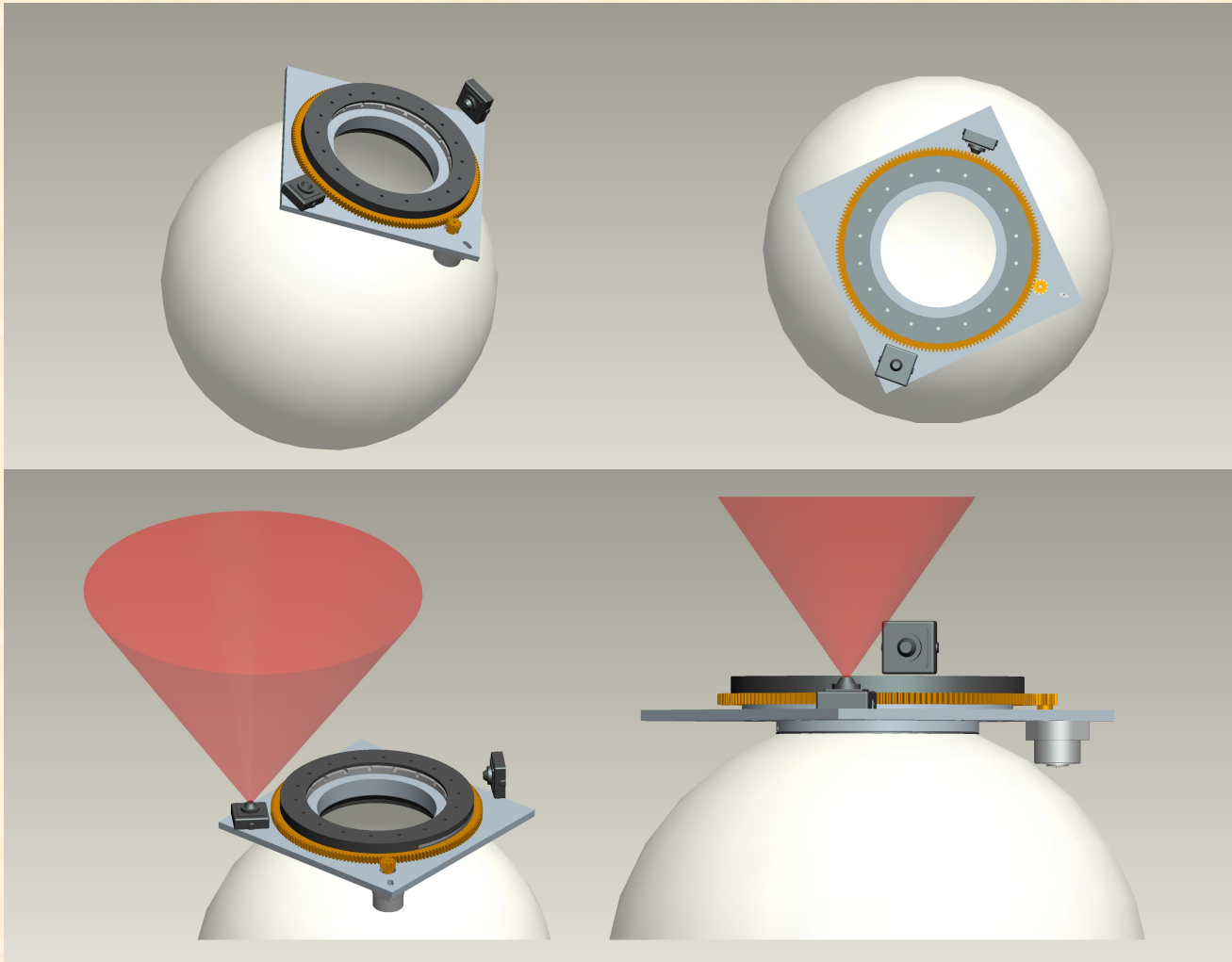
Labsphere production of hardware

- **Engineering drawings for shutter assembly**
- **Produce sphere shell, shutter, lamps, electronics, etc.**
- **Attach “usual” connectors to umbilical**
- **Attach socket box leads to ICLS components**
- **Interface with ancillary electronics (DVR, cameras, etc.)**
- **Calibration of lamp radiances**
- **Ship by August 1st directly to JET**
 - **T.B. visit to Labsphere to “accept” ICLS**

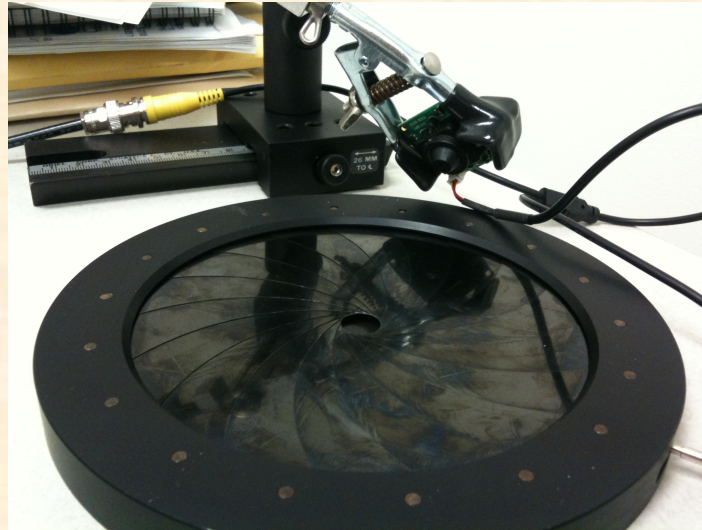
Schedule and other

- **Engineering drawings of the shutter and complete sphere**
 - imminent
- **Ensure JET hardware and cable headed towards Labsphere**
 - June/July
- **Production and testing of ICLS system**
 - July
- **Shipment to JET**
 - “August 1st, 2010”
- **RH testing and prep.**
 - mid to end August
- **ICLS use in JET**
 - September

Iris and cameras implementation: 1



Iris and camera implementation: 2



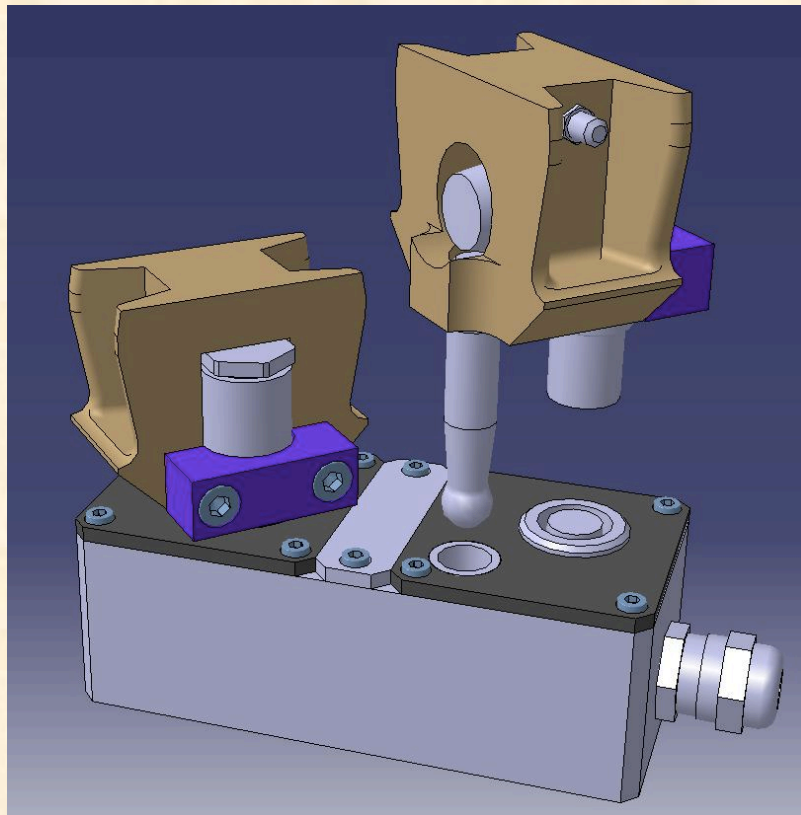
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T.M. Biewer, ORNL

<http://www.youtube.com/watch?v=RD9XPvIlduY>



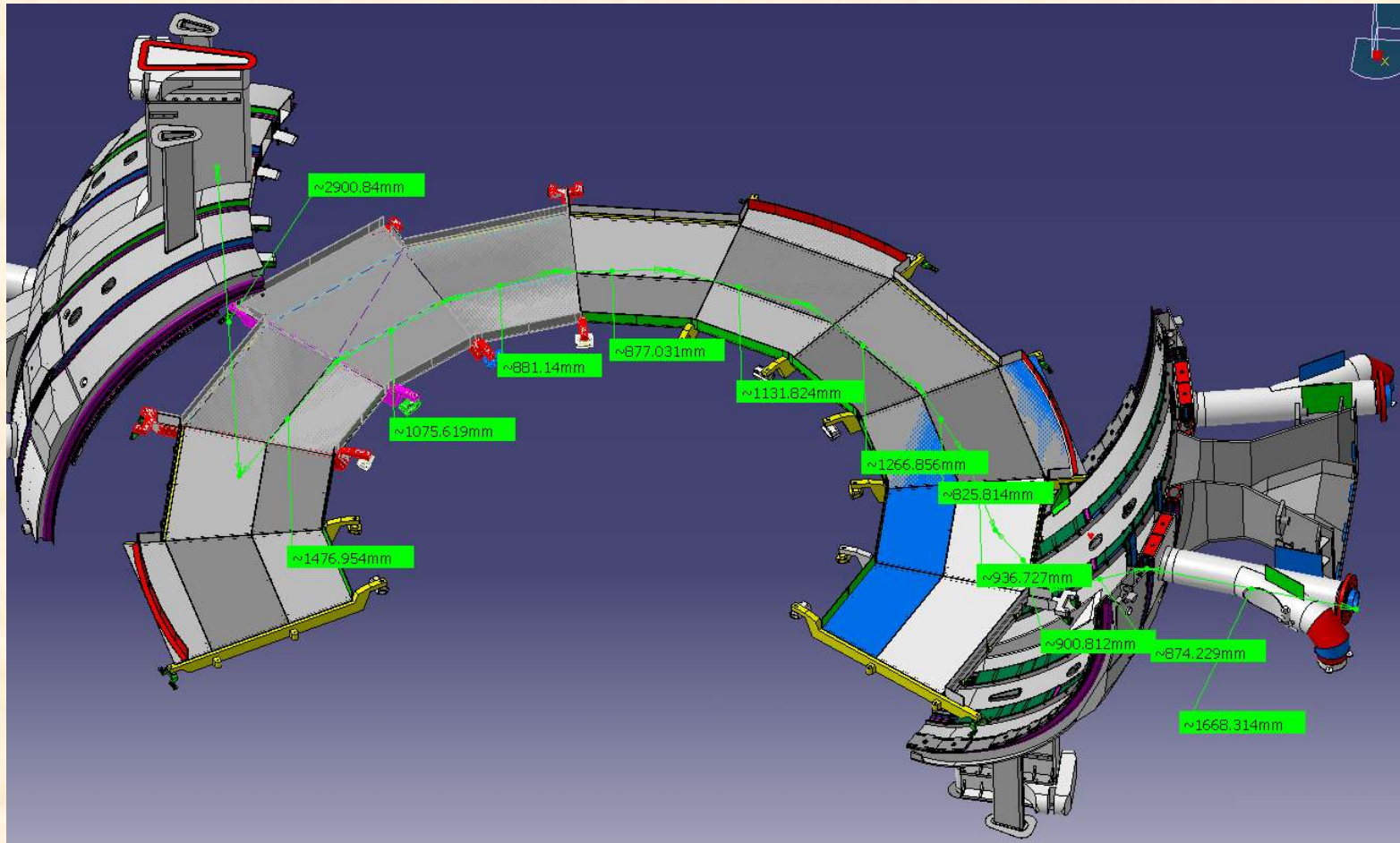
RH compatible connectors



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Cable length verification



Estimated cable length from Oct outer limiter guide tube to top of outer vessel at Oct 5 = ~15m. However, some extra might need to be added to be safe. This does not include the length required ex-vessel to the power supply etc.

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