

DESI Spectrograph: *in-situ* Calibration System

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Talk outline

- **Overview**
- **Calibration light sources**
 - **Spectral lamps selection**
 - **Calibration boxes design**
 - **Continuum lamps**
- **Lambertian diffusion screen**
- **Current status and planning**

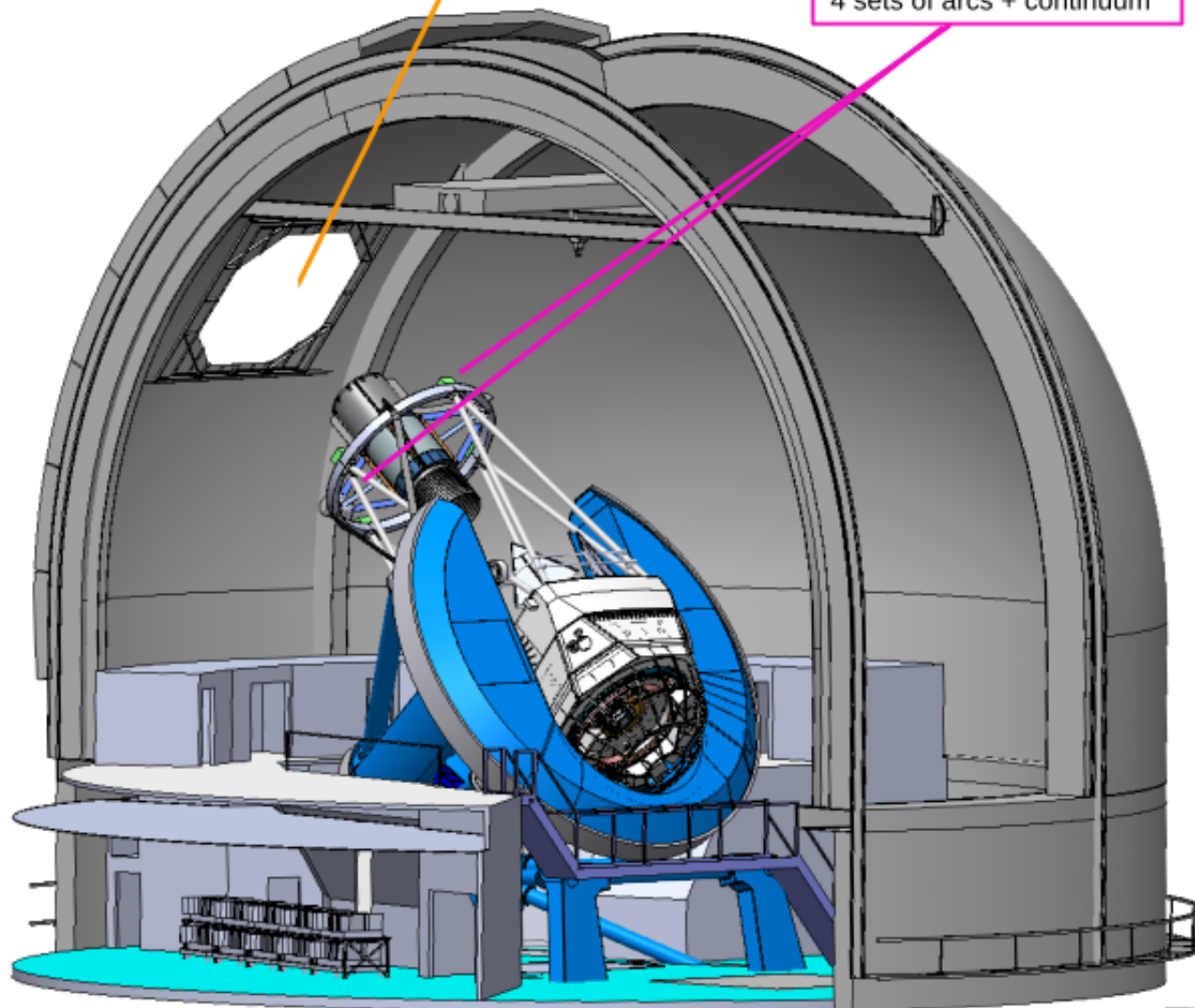


Dome Flat Screen

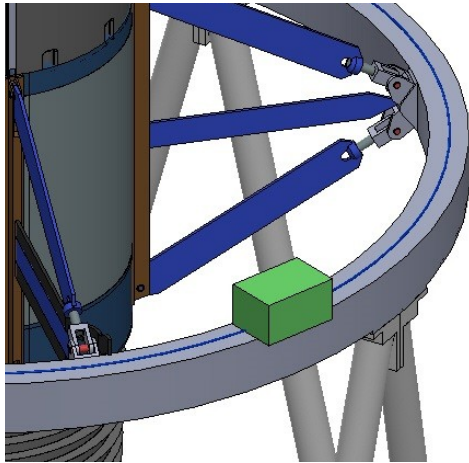
Screen used to project light onto
Slight modification of current screen

Calibration Lamps

4 sets of arcs + continuum

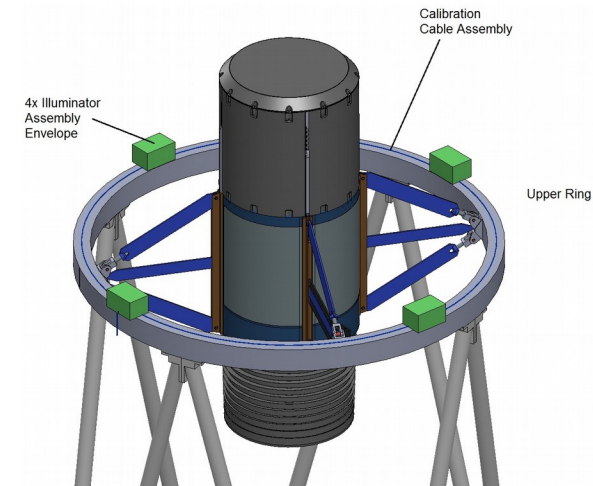


Rationale



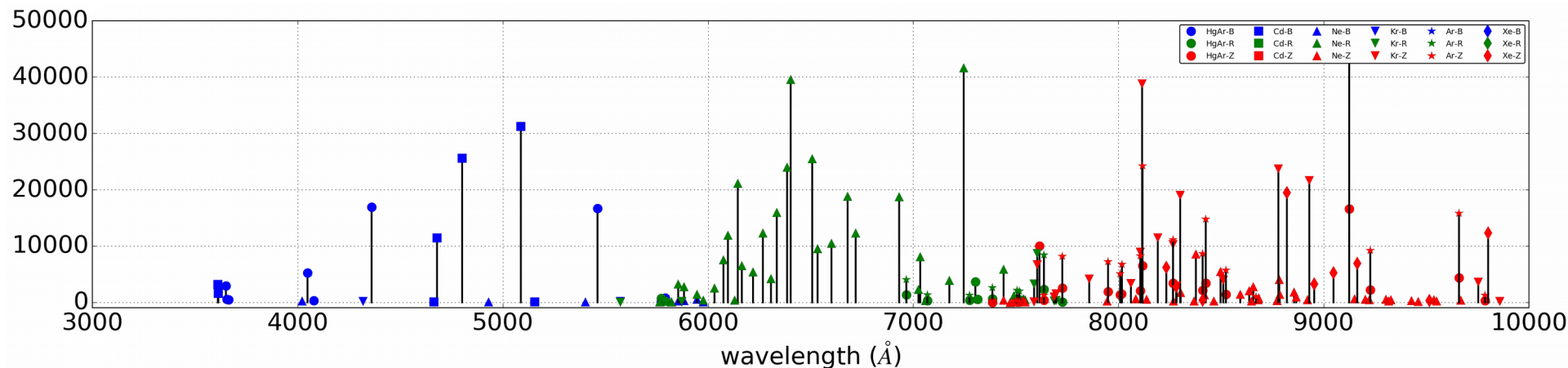
- **Spectral lamps**
to get the wavelength solution
(CCD pixels to wavelength)
- **Continuum lamps**
for flats (fiber to fiber uniformity)

- **Spatial uniformity / pupil uniformity :**
→ 4 identical boxes on the upper ring
→ A quasi perfectly lambertian diffusion screen



Selection and test of spectral lamps

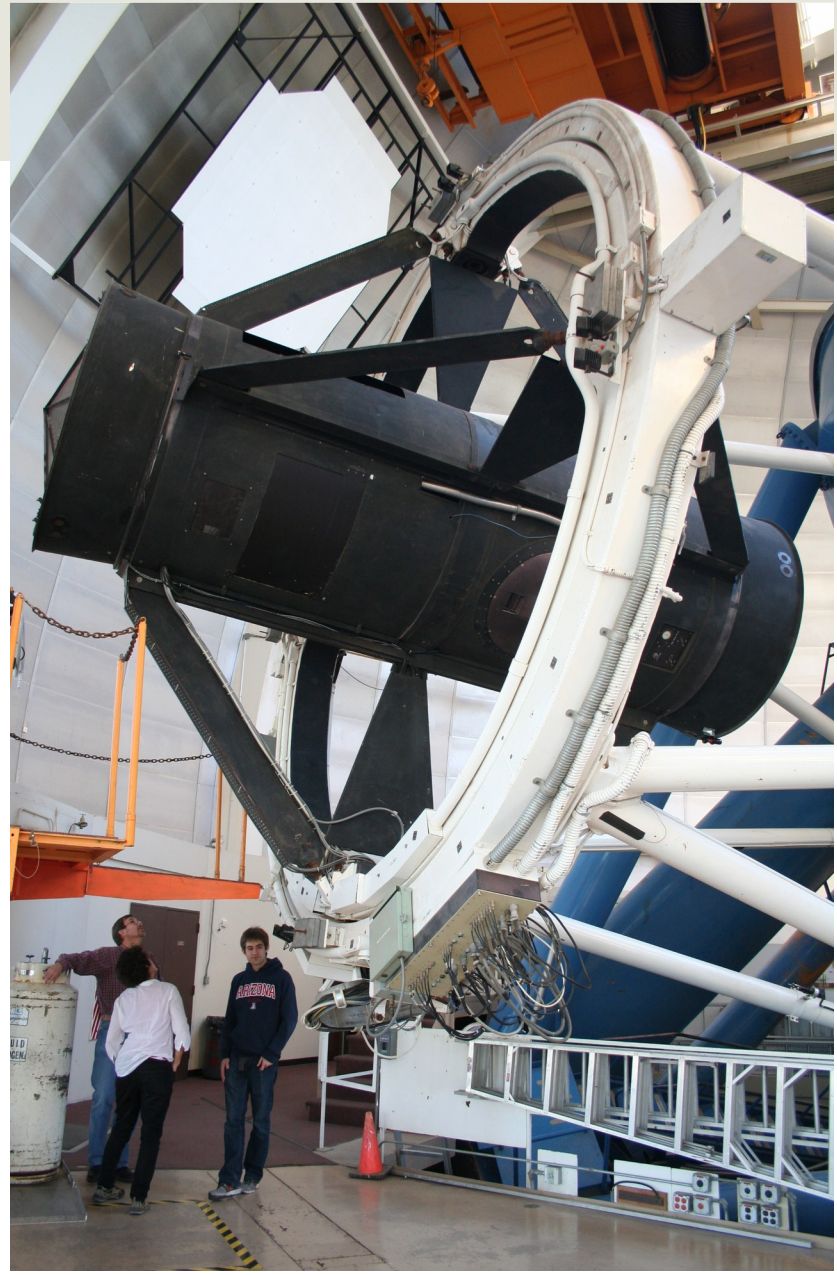
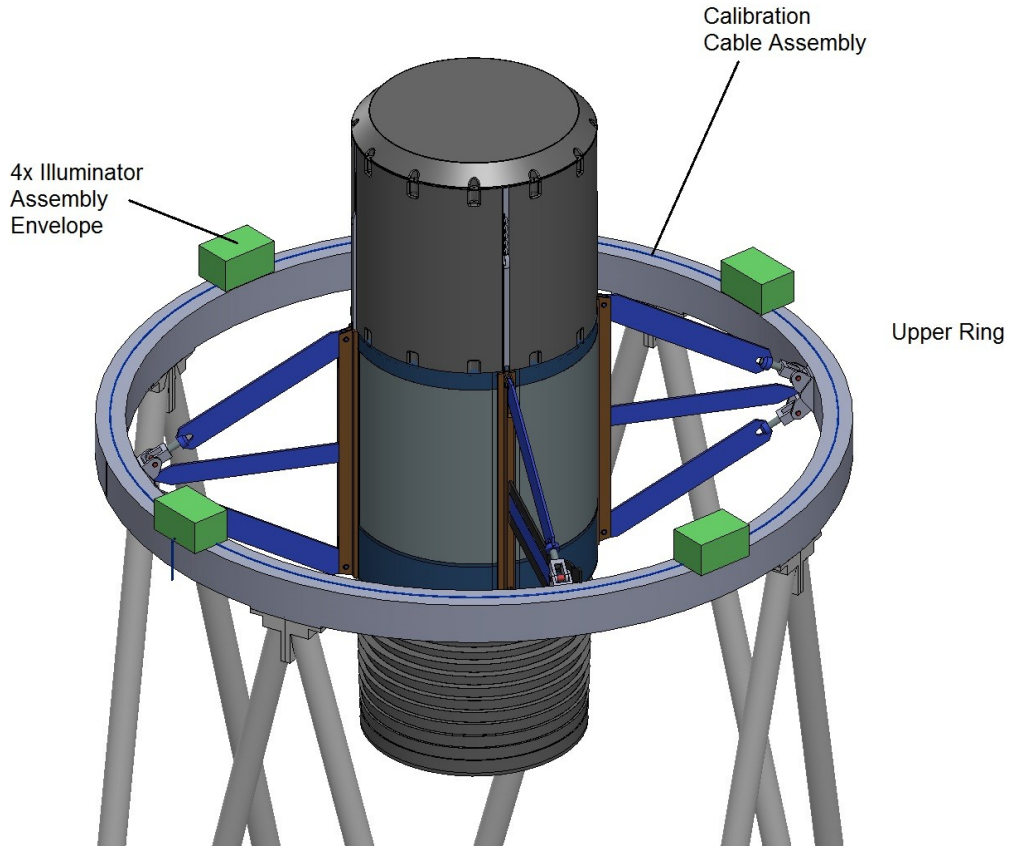
- Tested 7 spectral lamps
- Spectra and flux measured
- Selected a set of 5 : Ne, Kr, Xe, AgHr and Cd (most ions also used for tests at Winlight)
- See DESI-2674 for details



- Overall satisfactory coverage
- Could still use a few more lines between 360 and 400 nm

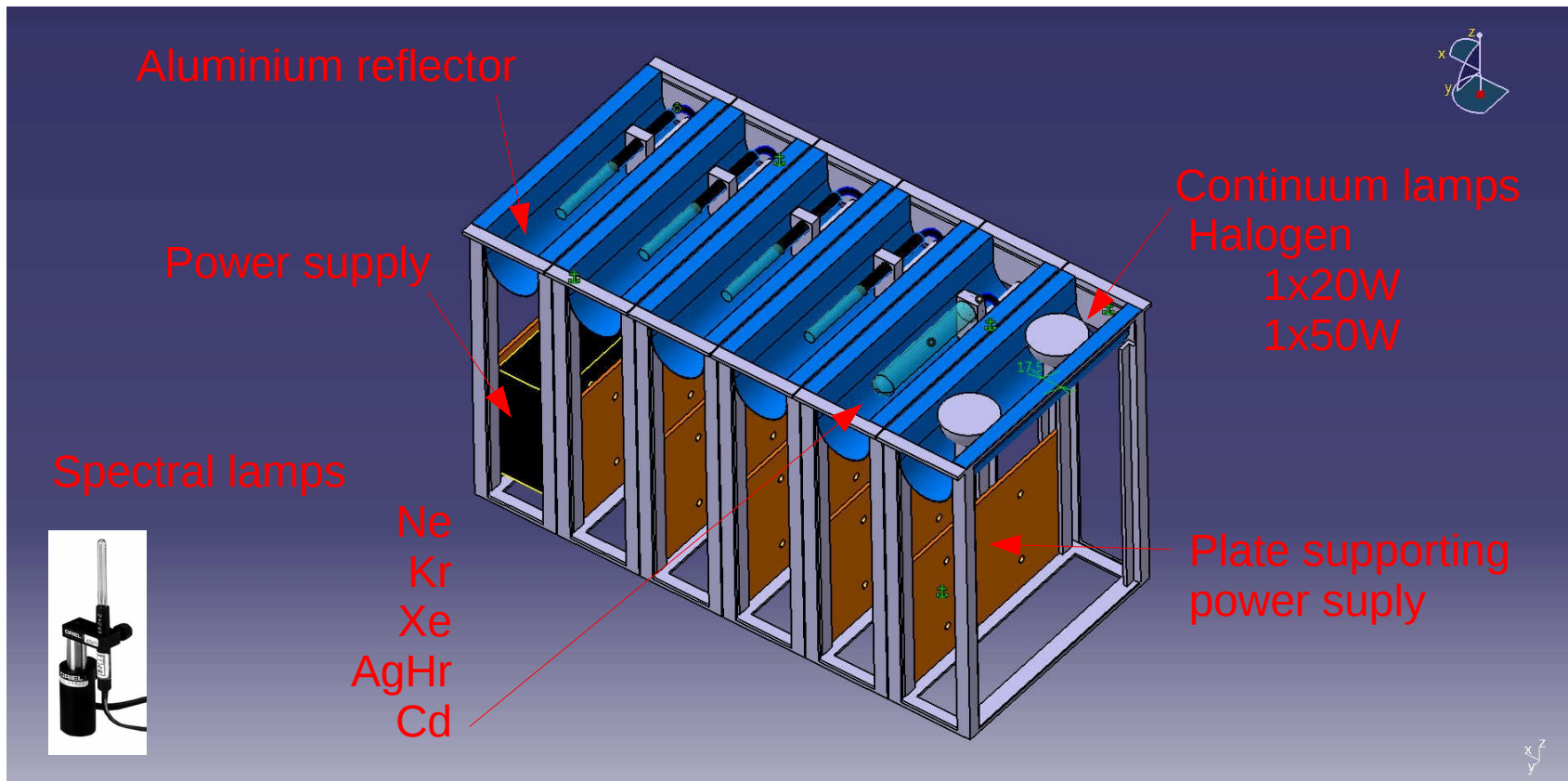


Four Source boxes



Calibration boxes design

- Based on NIM electronics crate
- Modular : one lamp and its power supply = one drawer



Calibration boxe prototype



Aluminium reflector

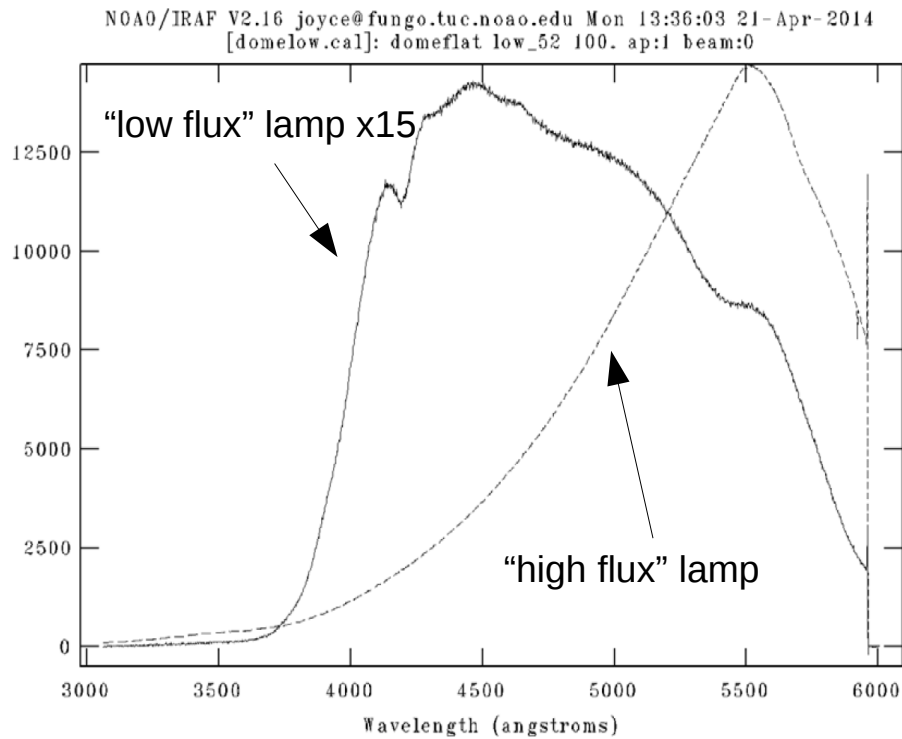


Power Distribution Unit

- Switch Lamps ON/OFF
- Remotely controlled (SNMP)
- Monitor current
- Environment sensors connected
- Provide safety feature : switch off on temperature and/or current criteria



Continuum lamps



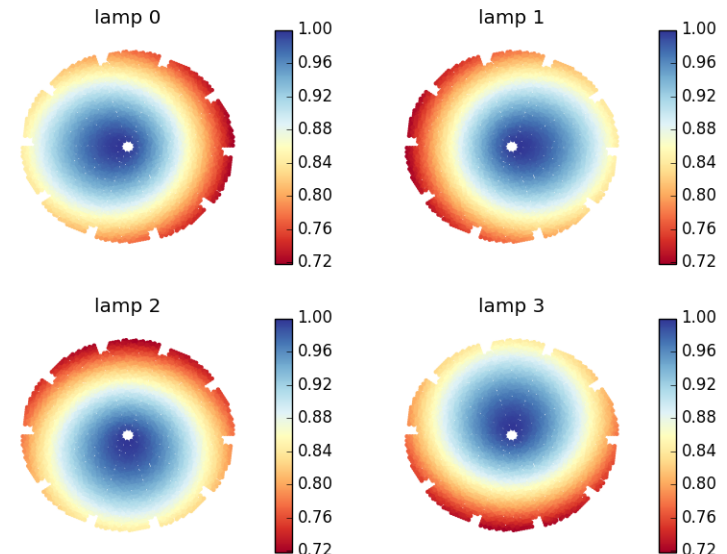
current continuum lamps (halogen)
at the Mayall
“low flux” lamps have a blue filter to
balance their spectrum.

- Existing continuum lamps are getting obsolete, replacement ordered, spectrum to be checked
- R&D on a set of powerful LEDs



Continuum lamps intensity control

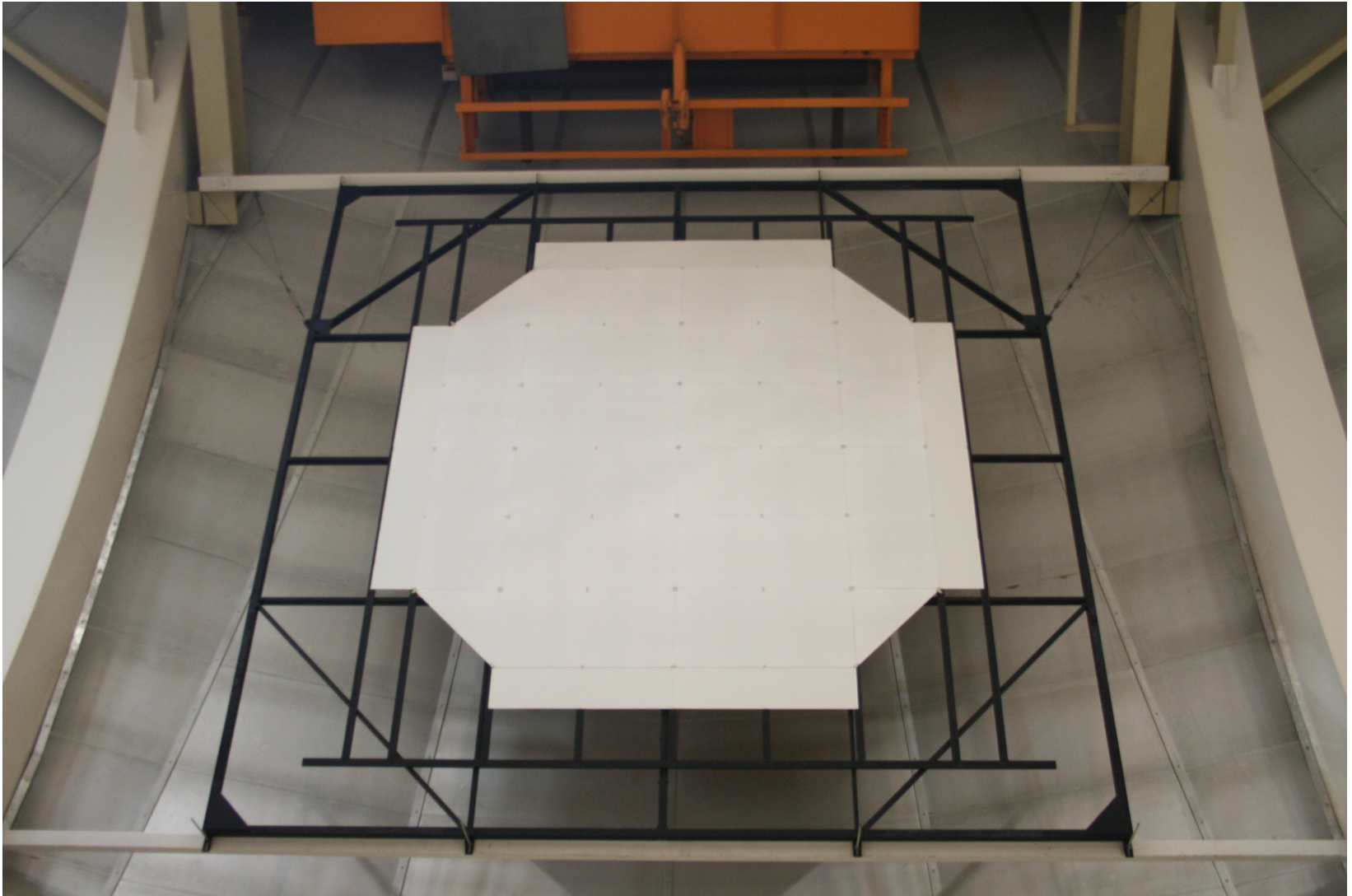
- **Current practice : (pseudo) uniform lighting of the screen in each shot with all the lamps ON**
 - **Need equal intensity in the 4 lamps, monitor and adjust for aging**
- **New idea : combine 4 shots with one different lamp ON in each**
 - **Easy modelization of the combination**
 - **No need to insure equal intensity or monitoring**
- **See DESI- 2761 for details**



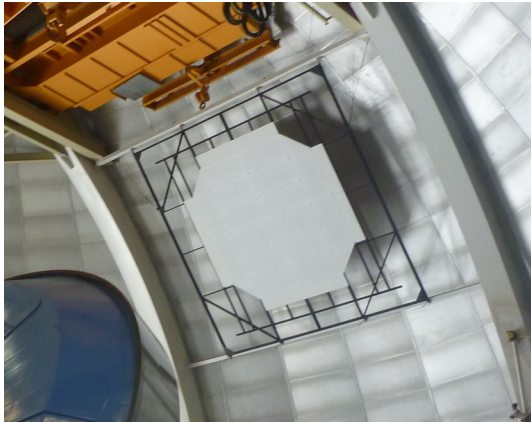
Focal plane illuminated by each of the 4 lamps separately



The existing screen is too small

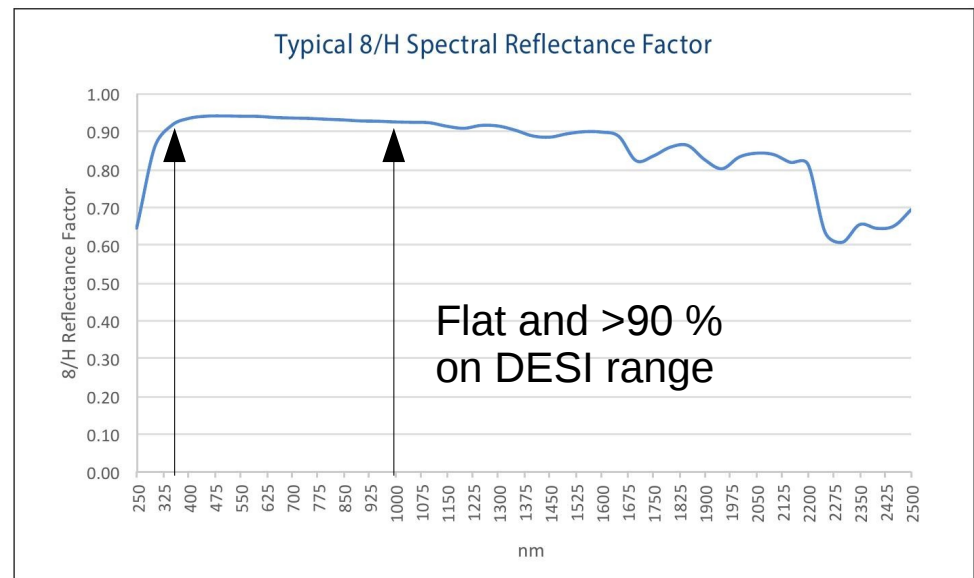
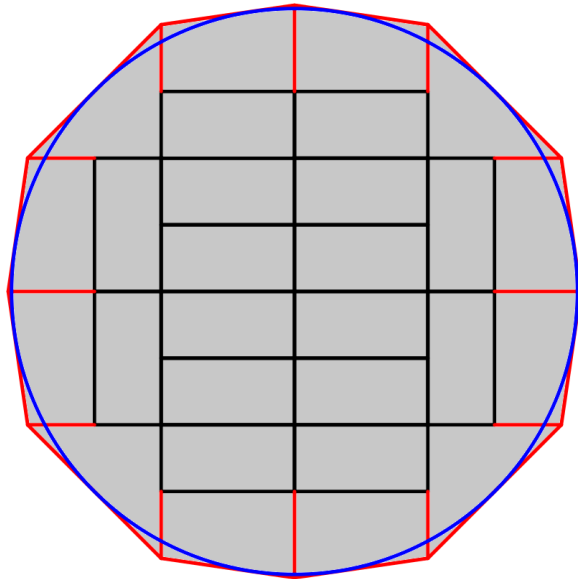
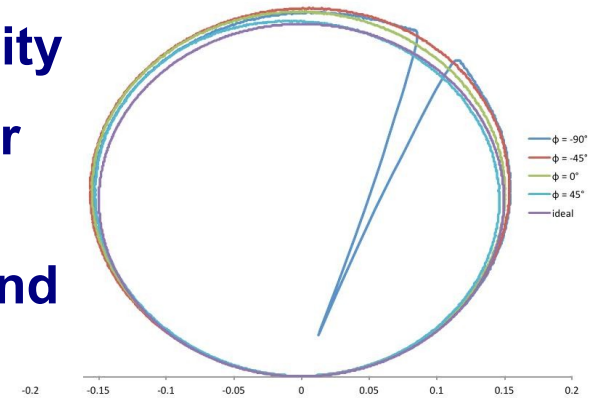


Lambertian Screen upgrade



- « Permafect » coating
→ Lambertian reflectivity
- Replacing all panels for better uniformity
- Order placed on May 2nd by NOAO

rmafect - 94 BRDF at 20° Incident Beam



Status and Planning

- **Done** : Requirements, specifications, preliminary design
- **Now:**
 - **Prototype + final design of the sources boxes**
 - **Order screen panels (NOAO)**
- **Soon:**
 - **Sources boxes tests and production (4) (end 2017)**
- **Later:**
 - **Mounting screen (depending on Mayall schedule)**
 - **Mounting the boxes on upper ring (early-2018)**
 - **Tests and Commissioning (end 2018)**



References

- **DESI-1673-v3** : On site calibration system for DESI spectrographs.
- **DESI-2674** : Characterization of spectral lamps candidates for DESI calibration system.
- **DESI- 2761** : On the continuum lamps relative calibration

