



Pollux – Calibration Unit

CM LUVOIR - Pollux
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Belgian Contribution

Partnership CSL (ULg), KUL

CSL : design, development, MAI&T of the flight hardware

KUL : ground-based characterisation of the Calibration Unit
EGSE, software and ground calibrations



Calibration Unit

Provide the necessary stimuli for in-flight calibration

- Sources
 - Spectrum, Brightness, Lifetime, TRL, ...
- Injection points
 - Right before the polarimeter
 - Representative
- Mechanisms & mixers
 - One injection point
 - Several sources / calibration item
- Interplay with operational concept

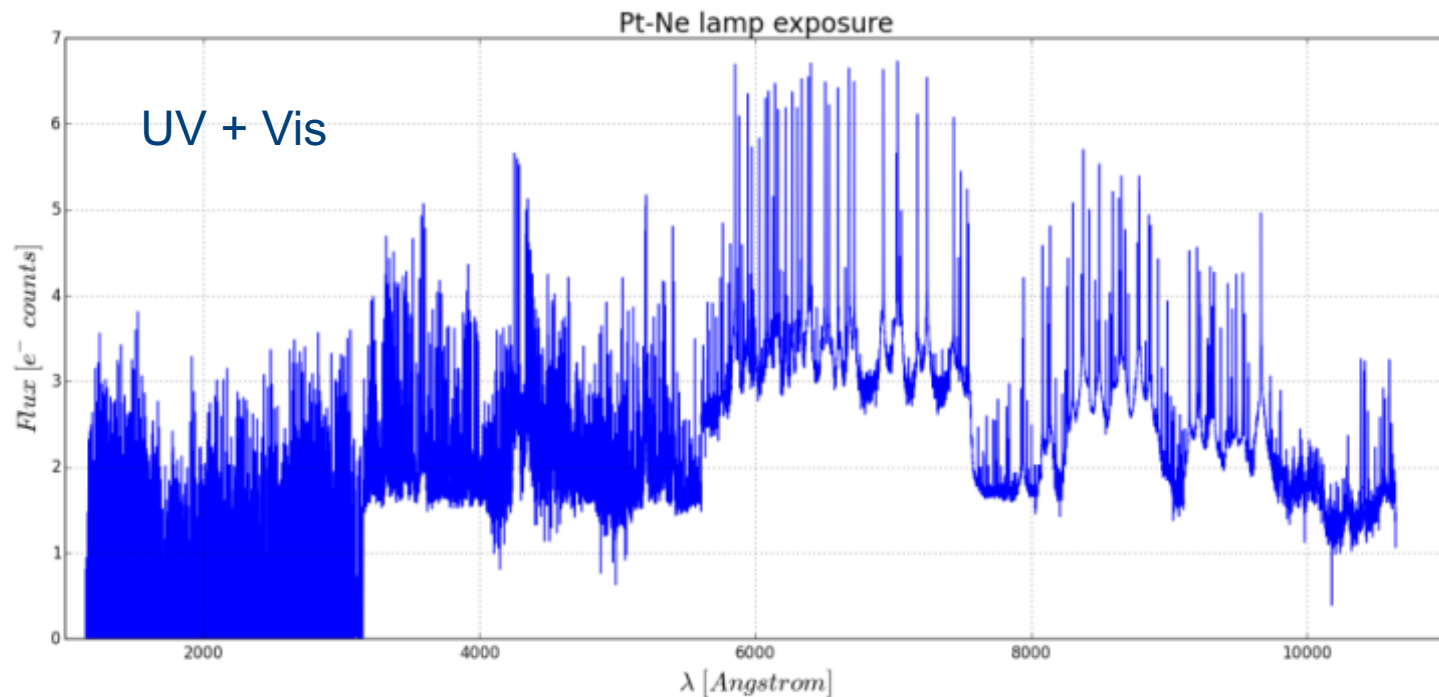
Calibration Items

- **Bias**
- **Dark** → Shutter or 'dark source'
- **PRNU** → flat
- **Blaze & cross-order profile** → flat
- **Linearity** → ground & flat
- **RSRF** → ground / celestial
- **ASRF** : TBD
- **IPRNU** → ground
- ...



Calibration Items

- **Wavelength** → λ_{cal} Source
→ monitor, or acquire w/ spectra



Calibration Items

- **Instrumental Polarisation**

$$S = [I, Q, U, V]^T$$

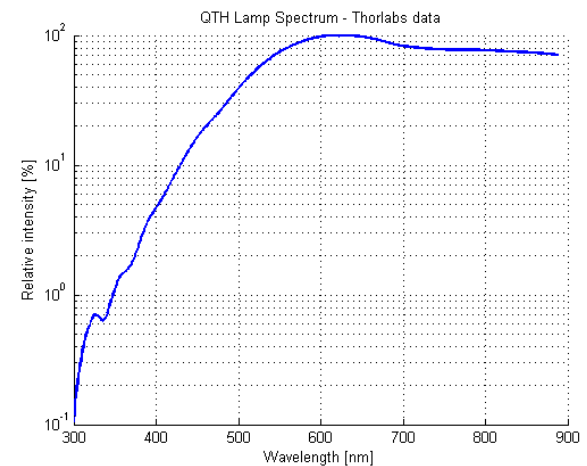
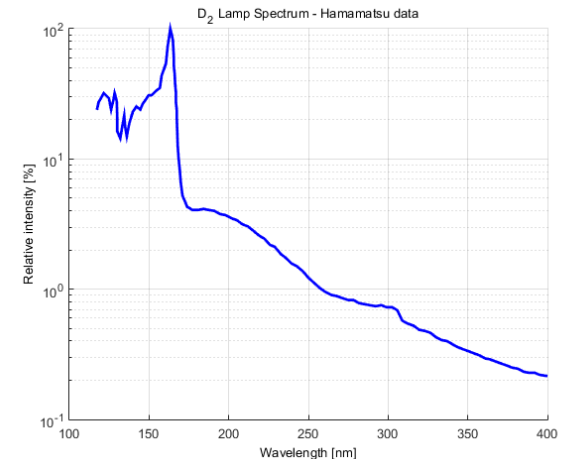
$$S_{\text{out}} = M \times S_{\text{in}}$$

$$M(\lambda, \theta) = \begin{pmatrix} I \rightarrow I & \dots & V \rightarrow I \\ I \rightarrow V & \dots & V \rightarrow V \end{pmatrix}$$

- Ground calibration
- Aging in space → celestial targets

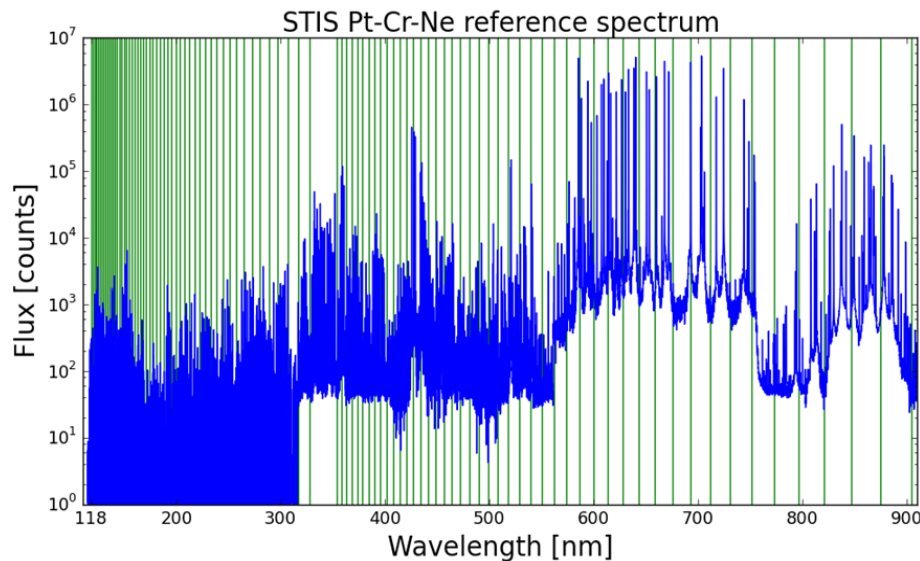
Flat Field Sources

- UV domain: Deuterium D_2 lamp
 - High emission intensity from 120 nm to 400 nm
 - Lifetime around 2000 hours
 - Space heritage
- VIS & NIR: Quartz Tungsten Halogen QTH lamp
 - High emission intensity from 300 nm to 900 nm
 - Lifetime around 2000 hours
 - Space heritage
- Minimum of emission between 300 nm and 500 nm for both type of lamps



Spectral Source

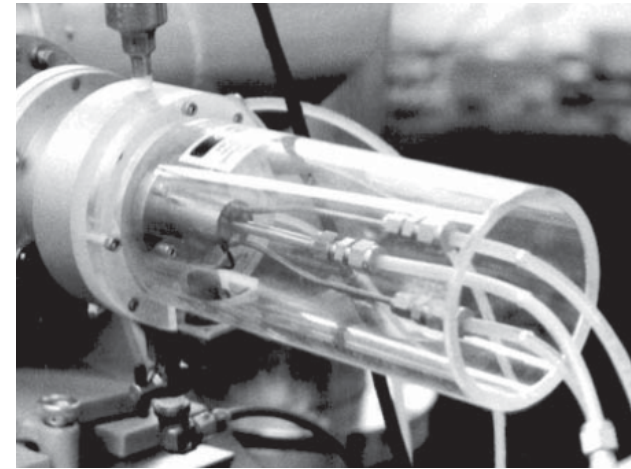
- Pt-Cr-Ne HCL
 - Heritage from STIS and COS (HST)
- High number of spectral lines in the UV
- Aging with usage & with time



Far UV

Windowless HCL

Old tech, (n)ever flown ?

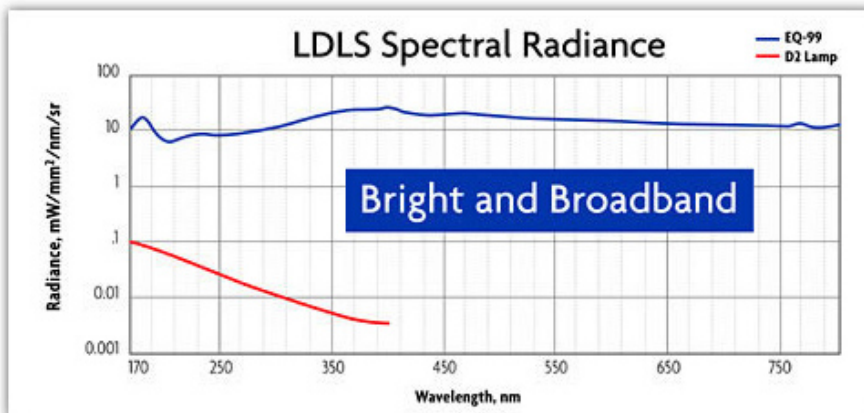
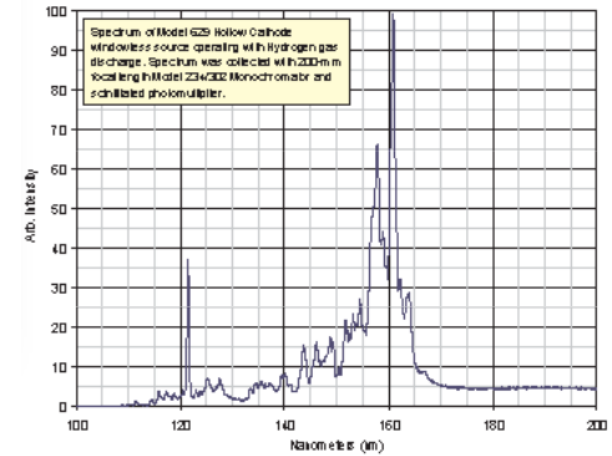


LDLS

New tech

~~Vacuum~~

~~Windowless~~ - FUV

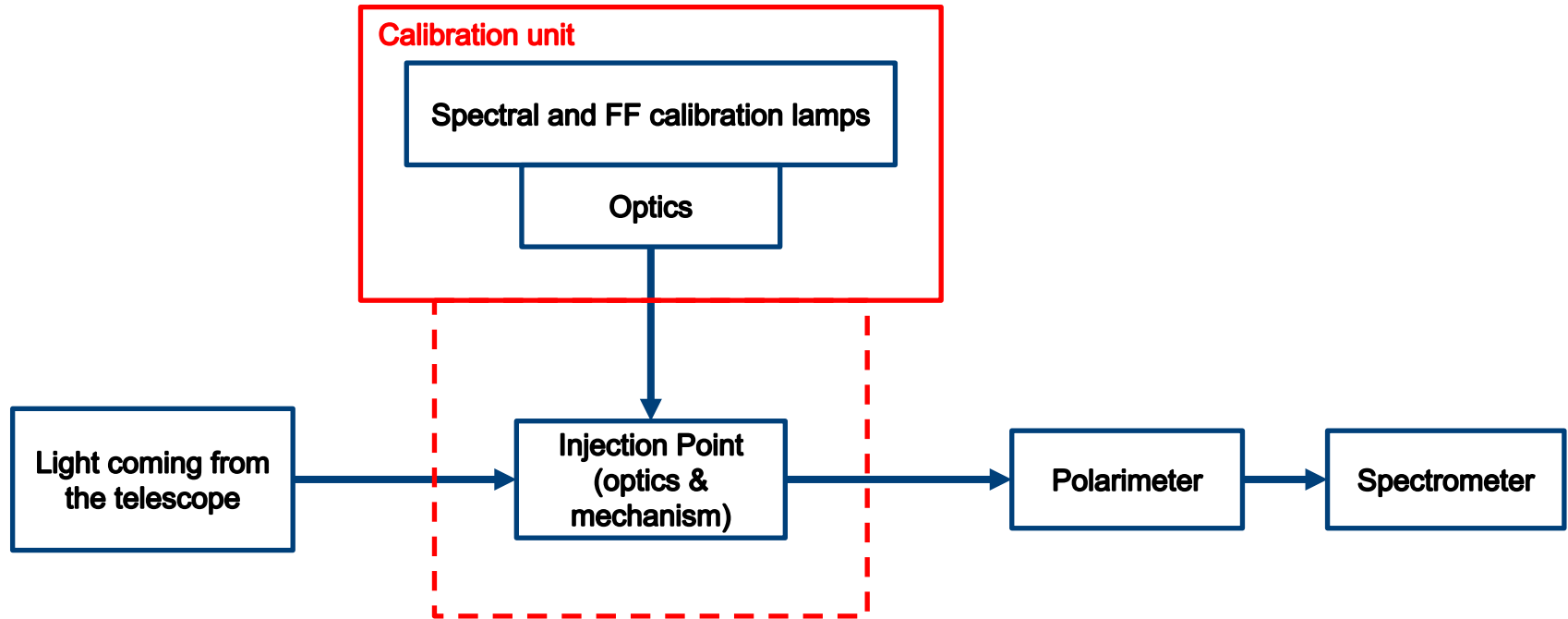


Far UV

Possible sources:

White Dwarfs

Calibration Unit: Block Diagram



Calibration Unit

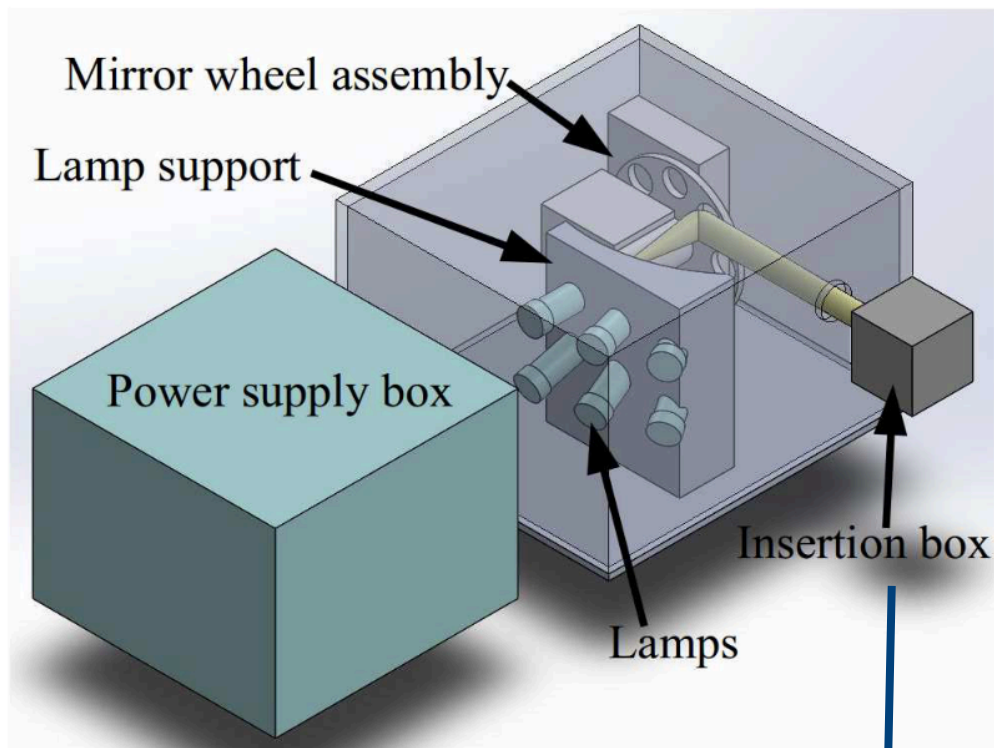


Figure 16: Calibration unit.

