RATIONALE FOR A MID-RESOLUTION+POLARIMETER MODE

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"AVAILABLE" SPECTROSCOPIC INSTRUMENTS IN LUVOIR DESIGN STUDY.

- **LUMOS** wide field imaging spectroscopy capability.
  - Dispersion: 30,000
  - Range: 900-3000 Angstroms
  - Spatial Resolution: 60 mas (FoV: 1.6x3 arcmin)
  - Resolving power: 40,000
  - Sensitivity: Effective Area (120nm: 1.2e5 cm² – 150nm: 5e4 cm² – 210: 3e4 cm² - 250nm: 2e5 cm²) Sensitivity: 1e-19 erg/s/cm-2/A G120M/G150M in conditions similar to COS reach 1e-17 erg/s/cm-2/A

- **POLLUX**
  - Dispersion: 120,000
  - Range: 900-4000 Angstroms
  - Spatial Resolution: N/A
  - Sensitivity with polarizer: Effective Area (120nm: 5.26e3 cm²)
  - Sensitivity without polarizer: Effective Area (120nm: 1.05e4 cm²)
No (efficient) spectropolarimetry
No simultaneity in the 115-315 nm range
CRITICAL ISSUES

- SCIENCE I: As designed is not possible to have an **efficient** “non-polarization” mode.
- SCIENCE II: As designed is not possible to reduce the dispersion to 30,000 (ARAGO-like) with polarization.
SCIENCE I: “LOW” EFFICIENCY HIGH DISPERSION SPECTROSCOPY (WITHOUT POLARIZERS)

- VARIATION OF THE COSMOLOGICAL CONSTANTS WITH TIME AND GRAVITY

Webb et al. 2011
Dispersion: 80,000-100,000
10 m telescope (VLT, Keck)

ANA I GOMEZ DE CASTRO - POLLUX MEETING, OCTOBER 2017
Detection of structures in young planetary disks

β Pic
Wilson et al. 2017

V = 3.86
A6V
F = 1e-14 erg/s/cm²/A
COS – 2 orbits/per frame

AK Sco
Gomez de Castro et al. 2015

V = 9.00
F5V
F = 1e-14 erg/s/cm²/A
COS – 1000 s/5 lines
Cool stars magnetic fields evolution

K0 TTS @ 140 pc

F=1e-14 erg/s/cm²
F=1e-15 erg/s/cm²
F=1e-17 erg/s/cm²
SCIENCE II: AS DESIGNED IS NOT POSSIBLE TO REDUCE THE DISPERSION TO 30,000 FOR SPECTROPOLARIMETRY.

V*V645 Cen, flare star: M6Ve
V=11.3
F=3.4e-14 erg/s/cm²
FWHM=0.16 Å
T exp = 60 min
Primary: 10 m
Throughput: 0.019
Counts: 1.25e5

D=120,000 (δλ = 0.013 Å) / 2.5 pix = 5.2e-3
32 pixels in λ & 2.5 pixels cross
Counts/pixel = 1.3e3 counts/pix
SNR=36 in 60 min
Yougblood et al. 2016

SCIENCE II: AS DESIGNED IS NOT POSSIBLE TO REDUCE THE DISPERSION TO 30,000 FOR SPECTROPOLARIMETRY.
The Hyades (d=47 pc, McArthur et al. 2011), the Pleiades (d=136 pc,) and the Taurus star forming complex (d=140pc) span an area of 18° in the sky.

Contents:
cool stars from the pre-main sequence to the white dwarf stage

Another possibility: the Keppler field and the North America/Pelican Nebula Complex