



UV Opportunities @ ESO

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Some Science Highlights

■ “ Top 10 Results at ESO”

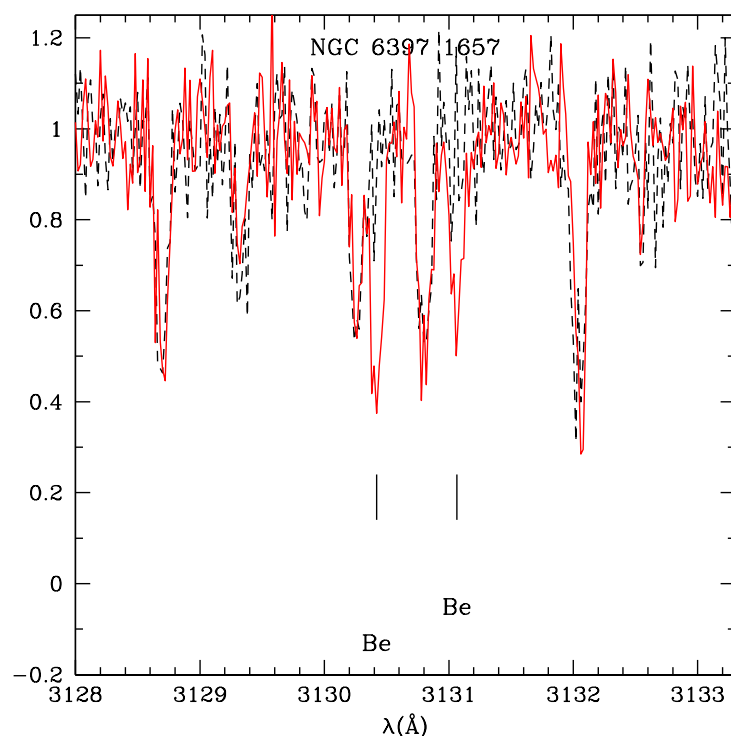
- Measure of the Cosmic Temperature at different Z
- Age of the oldest stars

■ QSO absorption line studies (Molaro), Metal Poor and Extremely Metal Poor Stars (Bonifacio) are in fact two prominent science cases UV spectroscopy



Metal Poor stars(1)

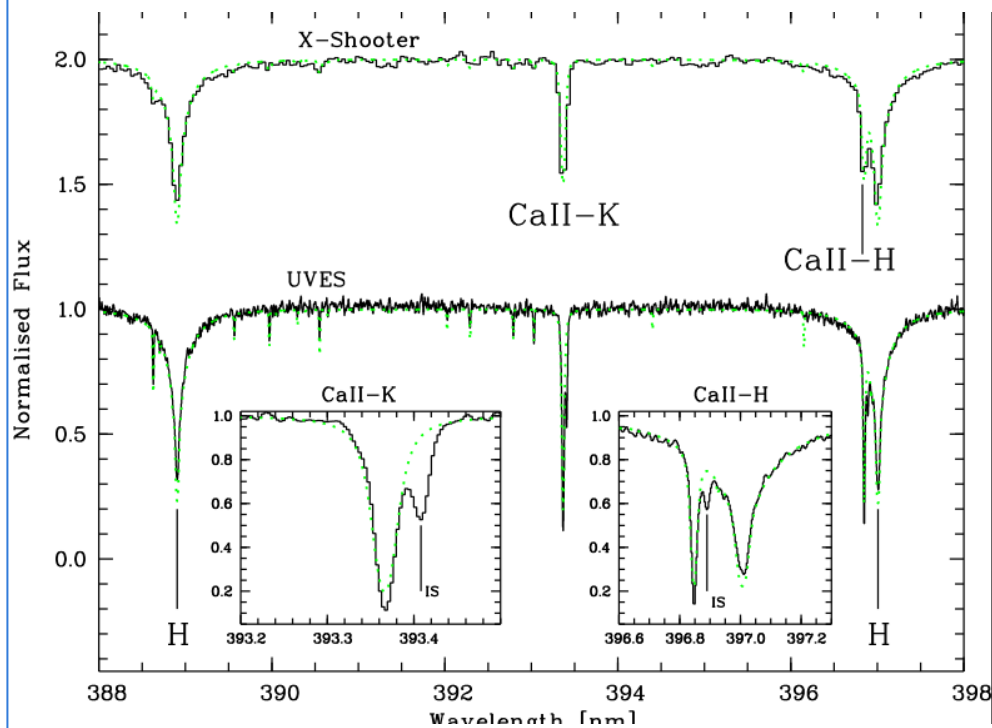
- Super Li-Rich star in NGC6397 ($V \sim 16.3$): Li is 100 times higher than the cosmic value and other cluster stars!



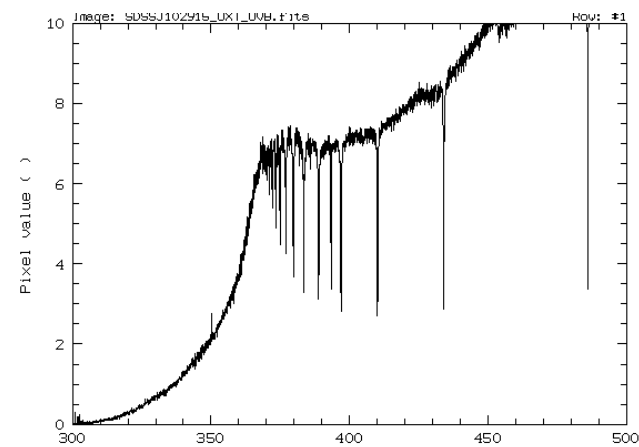
No Be Enhancement !!
(9 Hours VLT+UVES)
 (Pasquini et al. 2014)
 Discard: Planets, standard spallation

Metal Poor stars(2)

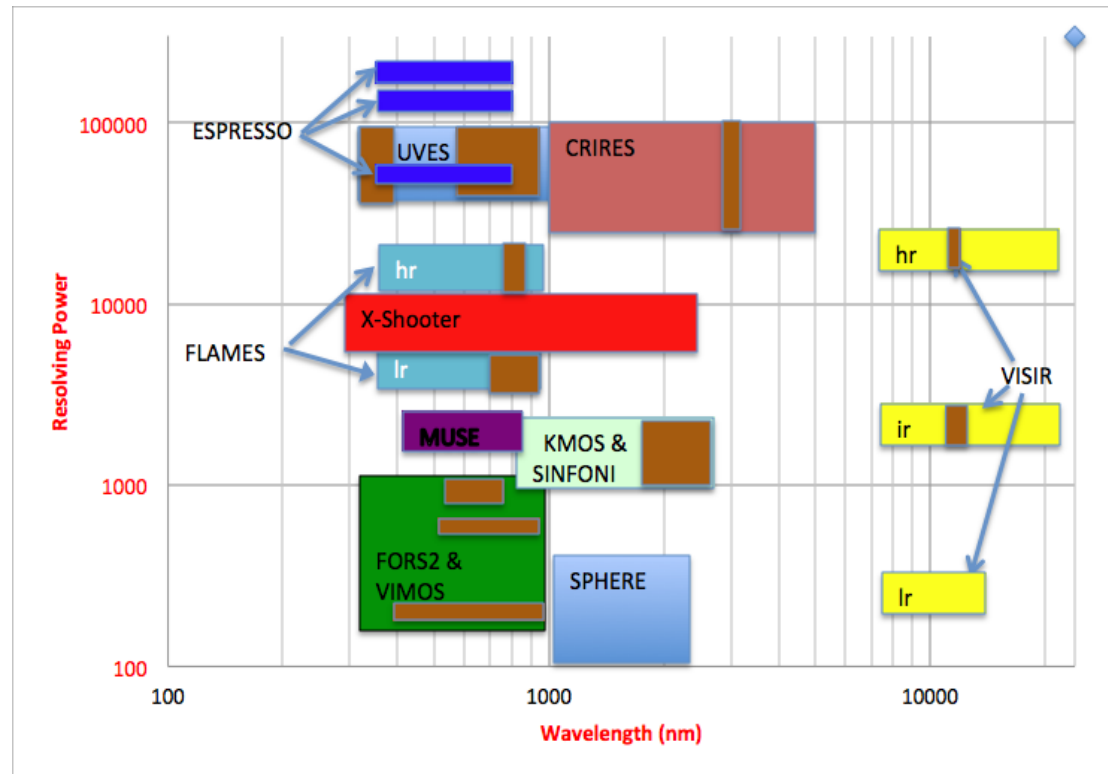
- Super metal poor star (Caffau et al. 2012)



Many more (SDSS..) and FAINTER



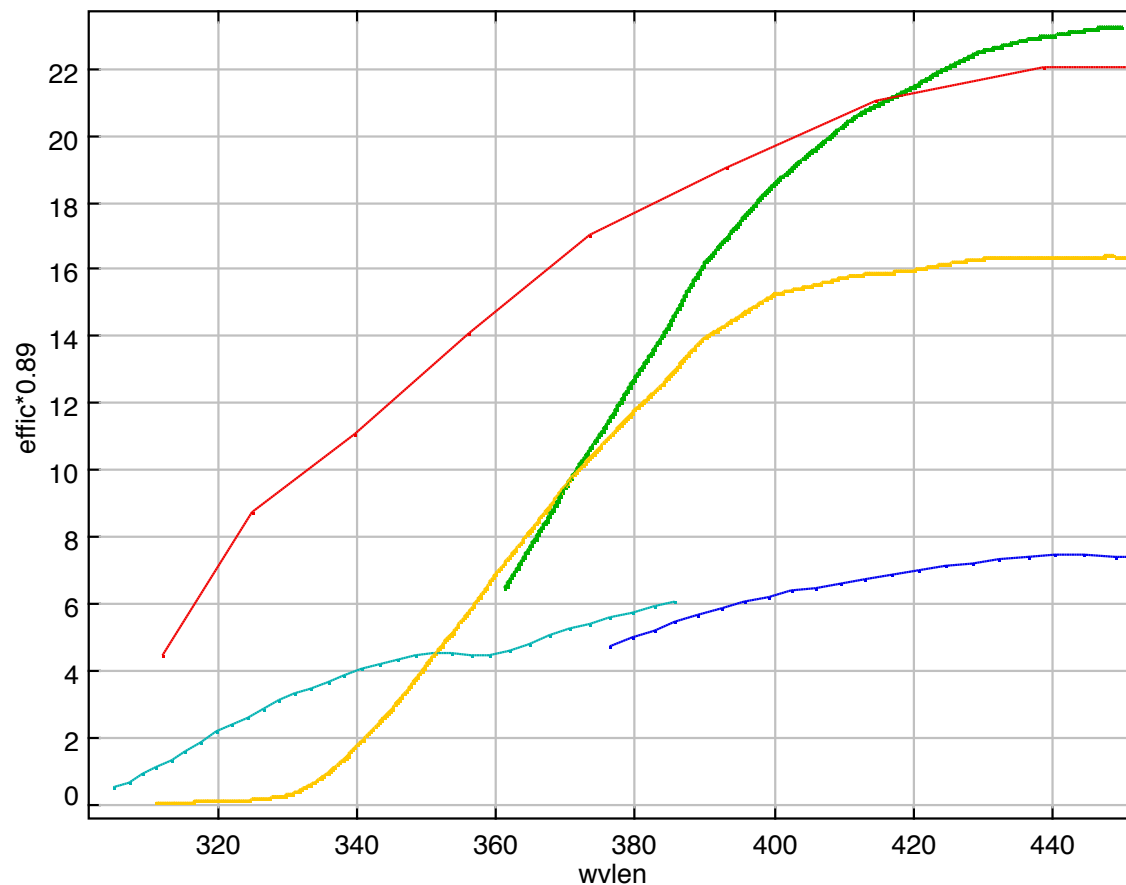
Current: VLT



UVES and X-shooter to atmospheric cutoff . FORS to 330 nm



Current: VLT



Seeing=0.8"
Airmass=1.0
Slit=1"

Yellow and Green: FORS R~700

Red: X-Shooter R~5000

Cyan and Blue: UVES R~40000





Future: The VLT

- Recognition of dividing the decade into 2 phases:
 - Phase 1: 2013~2017
 - Long Term opportunities beyond 2018 (science in the mature E-ELT era)



Programmatic Drivers

- **Complement ELT (Large Field, VLT resolution, Time...)**
- **JWST (High Res., diffraction at short λ , wide field....)**
- **Take some HST capabilities (Optical High Res. Imaging)**
- Driven by ESO community
- **Maximize efficiency: Wavelength Coverage, Throughput, sharing focus?**
- Quality, Reliability
- Instrument develop time: advanced concepts, procedures to shorten, higher risk? New class – mixed scheme?
- Focus occupancy – all foci are occupied.
- La Silla: 4M can be an added value: Call for NTT instruments, funded by the community.



VLT Instrument Roadmap

year	Phase A/ Prel. Study	Design/ Construction	Delivery
11	ERIS MOS		
12	CUBES CRIRES Up.	ERIS	KMOS VIMOS Up.
13		MOONS CRIRES Up.	MUSE SPHERE PRIMA astr.
14		4MOST CUBES(?)	VISIR Up. GRAVITY LFC for HARPS
15	New I		AOF MATISSE
16	New II	New I	CRIRES Up. ESPRESSO VLT I
17	New III	New II	ERIS CUBES(?)
18	New IV	New III	MOONS
19	New V	New IV	4MOST
20	New VI	New V	New I



Future: The ELT

- The telescope shall transmit in the wavelength range $0.3 \mu\text{m}$ to $24 \mu\text{m}$.
- The telescope total transmission (assuming 5 clean reflections) shall be $>50\%$ at $>0.35 \mu\text{m}$, $>60\%$ at $>0.4 \mu\text{m}$, $>70\%$ at $0.7 \mu\text{m}$, and $>80\%$ at wavelengths longer than $1 \mu\text{m}$, at the Nasmyth focus.

Most Likely Not optimal for UV, none of the 6 planned instruments below $\sim 370 \text{ nm}$



UV Spectrograph Requirements

- UV Spectroscopy at VLT will lead at least until ~2030
- EFFICIENT, DEDICATED instrument
- INTERMEDIATE-HIGH RESOLUTION
- Likely NICHE, so EASY TO EXCHANGE
- Main, basic requirements for CUBES

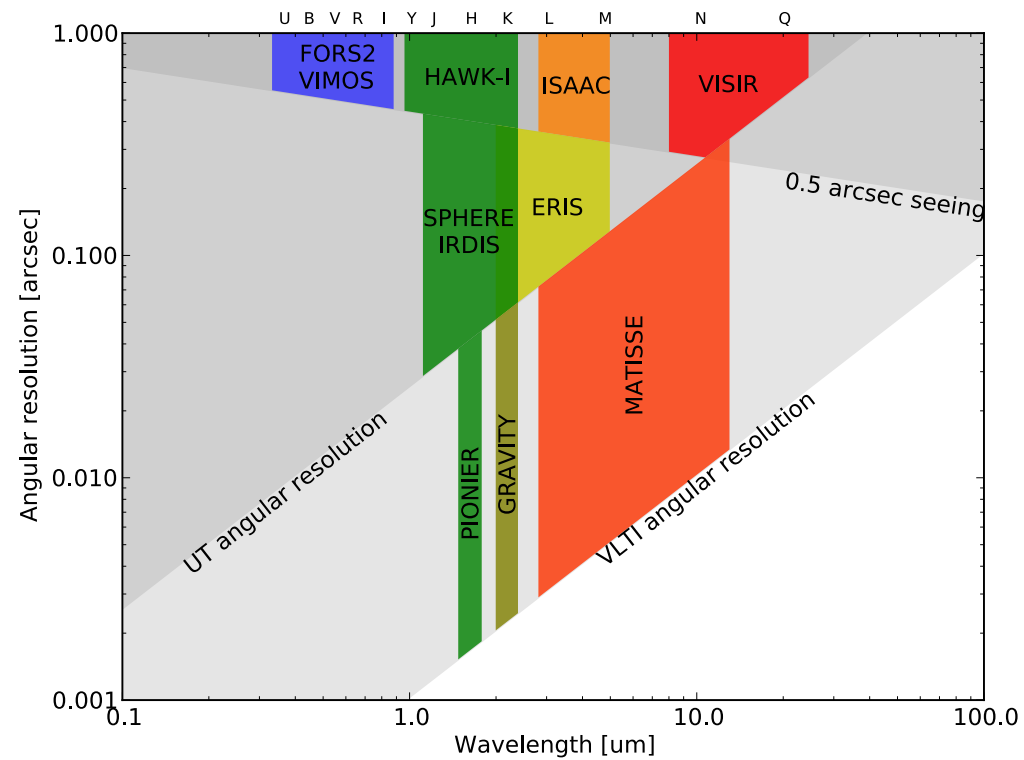


U Band Imaging...

- VST! .. (OmegaCam) 1x1 Degree
Supporting Surveys at other wavelengths?
Space missions ?
- VLT VIMOS(14x16 arcmin) FORS (6.8x6.8 arcmin)

Angular Resolution

- Beautiful resolution in the Visible and Blue..





Future: Push resolution?

- One of the new VLT instruments will likely be AO assisted (AOF, UT4)
- High resolution imaging in V (and bluer) identified as a possible interesting area after HST
- Terrific challenges ... but e.g. GALACSI+MUSE aims at Strehl 10% at 650 nm
- Requirements TBD ...