UV Opportunities @ ESO

L. Pasquini (ESO)
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.
Super Li-Rich star in NGC6397 (V~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, VLTI resolution, Time…)
- JWST (High Res., diffraction at short $\lambda$, 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

<table>
<thead>
<tr>
<th>Year</th>
<th>Phase A/ Prel. Study</th>
<th>Design/ Construction</th>
<th>Delivery</th>
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<tr>
<td>11</td>
<td>ERIS MOS</td>
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<td>12</td>
<td>CUBES CRIRES Up.</td>
<td>ERIS</td>
<td>KMOS VIMOS Up.</td>
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<td>13</td>
<td>MOONS CRIRES Up.</td>
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<td>MUSE SPHERE PRIMA astr.</td>
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<td>4MOST CUBES(?)</td>
<td>VISIR Up. GRAVITY LFC for HARPS</td>
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<td>15</td>
<td>New I</td>
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<td>AOF MATISSE</td>
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<td>16</td>
<td>New II</td>
<td>New I</td>
<td>CRIRES Up. ESPRESSO VLTI</td>
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<td>17</td>
<td>New III</td>
<td>New II</td>
<td>ERIS CUBES(?)</td>
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<td>MOONS</td>
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<td>19</td>
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The telescope shall transmit in the wavelength range 0.3 µm to 24 µm.

The telescope total transmission (assuming 5 clean reflections) shall be >50% at >0.35 µm, >60 % at >0.4 µm, >70% at 0.7 µm, and >80% at wavelengths longer than 1 µm, at the Nasmyth focus.

Most Likely Not optimal for UV, none of the 6 planned instruments below <~370 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 ...