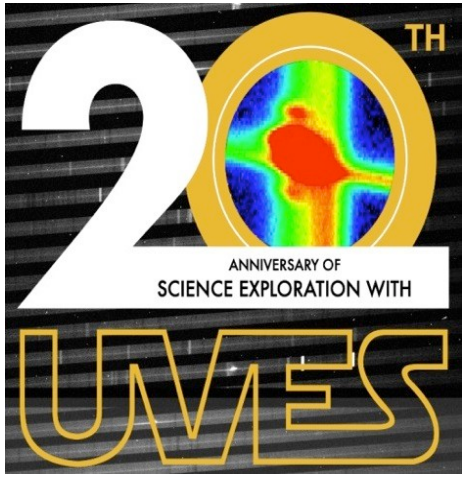
The Ultraviolet-Visual Echelle Spectrograph



Sandra Savaglio (University of Calabria, Italy)
Panelist of the discussion session of the workshop:
"20th anniversary of science exploration with UVES"
ESO, October 2020

- **Unique UV capabilities (after HST)**
- **Wide wavelength interval: λ = 310 nm – 10000 nm**
- **High resolution:**
  - ✦ R = 58000 (v = 5.2 km/s) @ 400nm & m=18
  - ✦ R = 62000 (v = 4.8 km/s) @ 600nm & m=19
- ***Rapid-Response Mode* for transients**
  - ✦ UVES was activated 2 minutes after a Swift GRB alert

Most successful extra-galactic papers in the **years 2000-2001**

7/11: QSO spectra

2/11: metal poor stars & primordial nucleosynthesis

"The beryllium abundance in the very metal-poor halo star G 64-12 from VLT/UVES observations"; Primas et al., A & A (2000)
"The lithium isotope ratio in the metal-poor halo star G271-162 from VLT/UVES observations"; Nissen et al., A & A (2000)
"First accurate measurements of O and Zn abundance in a DLA at z>3" Molaro et al., Ap.J. (2000)
"UVES observations of QSO 0000–2620 : Molecular hydrogen abundance in the damped Lyα system at z_{abs}= 3.3901"; Levshakov et al., A & A (2000)
"The Cosmic Microwave Background temperature at a redshift of2.33771" ; Srianand et al. Nature (2000)
Molecular hydrogen and the nature of damped Lyman-α systems"; Petitjean et al. A & A (2001)
"The Lyman α forest at 1.4 < z <4"; Kim et al., A & A (2001)
"First results of UVES at VLT: abundances in the Sgr dSph galaxy"; Bonifacio et al., A & A (2000)
"Metallicity in a DLA at z=4.466"; Dessauges et al, A & A. (2000)
"A new deuterium abundance measurement from a damped Ly α system at zabs =3.025"; D'Odorico et al. ,A & A (2001)
"Measurement of stellar age from uranium decay" Cayrel et al., Nature (2001)……

Most successful papers are **mainly about the MW**

- 20/60 are extragalactic papers (33%)
- Of these:

    7 QSO spectroscopy (IGM, high-z ISM, DLAs)
    5 Dwarf galaxies

First 8 papers (out of 28)

Normalised by #years since publication

citations

BibCode	Citatio	Years sin	Normaliz ed citations	Title	Author
2009ARA&A..47..371T	734	11	66,73	Star-Formation Histories, Abundances, and Kinematics of Dwarf Galaxies in the Local Group	1.) Tolstoy, Eline; 2.) Hill, Vanessa; 3.) Tosi, Monica
2003ApJ...584...45A	443	17	26,06	Galaxies and Intergalactic Matter at Redshift z~3: Overview	1.) Adelberger, Kurt L.; 2.) Steidel, Charles C.; 3.) Shapley, Alice E.; 4.) Pettini, Max
2006Natur.442.1011P	429	14	30,64	An optical supernova associated with the X-ray flash XRF 060218	1.) Pian, E.; et al.
2003AJ....125..684S	424	17	24,94	VLT/UVES Abundances in Four Nearby Dwarf Spheroidal Galaxies. I. Nucleosynthesis and Abundance Ratios	1.) Shetrone, Matthew; 2.) Venn, Kim A.; 3.) Tolstoy, Eline; 4.) Primas, Francesca; 5.) Hill, Vanessa; 6.) Kaufer, Andreas
2003ApJ...596..768S	337	17	19,82	Metallicity of the Intergalactic Medium Using Pixel Statistics. II. The Distribution of Metals as Traced by C IV	1.) Schaye, Joop; 2.) Aguirre, Anthony; 3.) Kim, Tae-Sun; 4.) Theuns, Tom; 5.) Rauch, Michael; 6.) Sargent, Wallace L. W.
2009ApJS..185..526F	312	11	28,36	Low-resolution Spectroscopy of Gamma-ray Burst Optical Afterglows: Biases in the Swift Sample and Characterization of the Absorbers	1.) Fynbo, et al.
2007Sci...317..924P	301	13	23,15	Detection of Circumstellar Material in a Normal Type Ia Supernova	1.) Patat, et al.

Next 12 papers (out of 32)

Normalised by #years since publication

citations

			citations normalized by		
2004ApJ...617L.119T	**298**	16	18,63	Two Distinct Ancient Components in the Sculptor Dwarf Spheroidal Galaxy: First Results from the Dwarf Abundances and Radial Velocities Team	1.) Tolstoy, et a.
2004PhRvL..92l1302S	**279**	16	17,44	Limits on the Time Variation of the Electromagnetic Fine-Structure Constant in the Low Energy Limit from Absorption Lines in the Spectra of Distant Quasars	1.) Srianand, R.; 2.) Chand, H.; 3.) Petitjean, P.; 4.) Aracil, B.
2003MNRAS.346..209L	**270**	17	15,88	The Very Large Telescope Ultraviolet and Visible Echelle Spectrograph survey for molecular hydrogen in high-redshift damped Lyman α systems	1.) Ledoux, Cedric; 2.) Petitjean, Patrick; 3.) Srianand, R.
2014ApJ...781...31C	**260**	6	43,33	Precision Measures of the Primordial Abundance of Deuterium	1.) Cooke, Ryan J.; 2.) Pettini, Max; 3.) Jorgenson, Regina A.; 4.) Murphy, Michael T.; 5.) Steidel, Charles C.
2003AJ....125..707T	**246**	17	14,47	VLT/UVES Abundances in Four Nearby Dwarf Spheroidal Galaxies. II. Implications for Understanding Galaxy Evolution	1.) Tolstoy, et al.
2008ApJ...681L..13B	**244**	12	20,33	The Kinematic Status and Mass Content of the Sculptor Dwarf Spheroidal Galaxy	1.) Battaglia, G.; 2.) Helmi, A.; 3.) Tolstoy, E.; 4.) Irwin, M.; 5.) Hill, V.; 6.) Jablonka, P.
2009A&A...505.1087N	**241**	11	21,91	Evolution of the cosmological mass density of neutral gas from Sloan Digital Sky Survey II - Data Release 7	1.) Noterdaeme, P.; 2.) Petitjean, P.; 3.) Ledoux, C.; 4.) Srianand, R.
2008Natur.454..302B	**233**	12	19,42	Strong magnetic fields in normal galaxies at high redshift	1.) Bernet, Martin L.; 2.) Miniati, Francesco; 3.) Lilly, Simon J.; 4.) Kronberg, Philipp P.; 5.) Dessauges-Zavadsky, Miroslava
2004A&A...417..853C	**230**	16	14,38	Probing the cosmological variation of the fine-structure constant: Results based on VLT-UVES sample	1.) Chand, H.; 2.) Srianand, R.; 3.) Petitjean, P.; 4.) Aracil, B.
2006PhRvL..96o1101R	**224**	14	16,00	Indication of a Cosmological Variation of the Proton-Electron Mass Ratio Based on Laboratory Measurement and Reanalysis of H2 Spectra	1.) Reinhold, E.; 2.) Buning, R.; 3.) Hollenstein, U.; 4.) Ivanchik, A.; 5.) Petitjean, P.; 6.) Ubachs, W.
2012ApJ...750...67R	**203**	8	25,38	The Gaseous Environment of High-z Galaxies: Precision Measurements of Neutral Hydrogen in the Circumgalactic Medium of z ~ 2-3 Galaxies in the Keck Baryonic Structure Survey	1.) Rudie, Gwen C.; 2.) Steidel, Charles C.; 3.) Trainor, Ryan F.; 4.) Rakic, Olivera; 5.) Bogosavljevic, Milan; 6.) Pettini, Max; 7.) Reddy, Naveen; 8.) Shapley, Alice E.; 9.) Erb, Dawn K.; 10.) Law, David R.

UVES 20years Workshop - DAY 2: OCTOBER 22

Michael Murphy: Cosmological constants

**** My favourite topic, fundamental mystery why constant and why constant in time ****

Pasquier Noterdaeme: **Molecules in ISM/CGM**

***** Small cloud size, you should see variability ?? Wait a few decades *****

Valentina D'Odorico: Primordial Deuterium

**** Measurements not in total agreement with Planck expectations ****
*** Fantastic deep results on CIV, other elements? To get cloud physics ****

Norbert Christlieb

**** Fantastic data, and [Fe/H] < –7.5 *****
**** UVES still be unique in the UV even after HIRES ****

Annalisa De Cia: Transients

**** 17 GRBs observed with UVES, 3.6% of 467 with known redshift, we need more ****

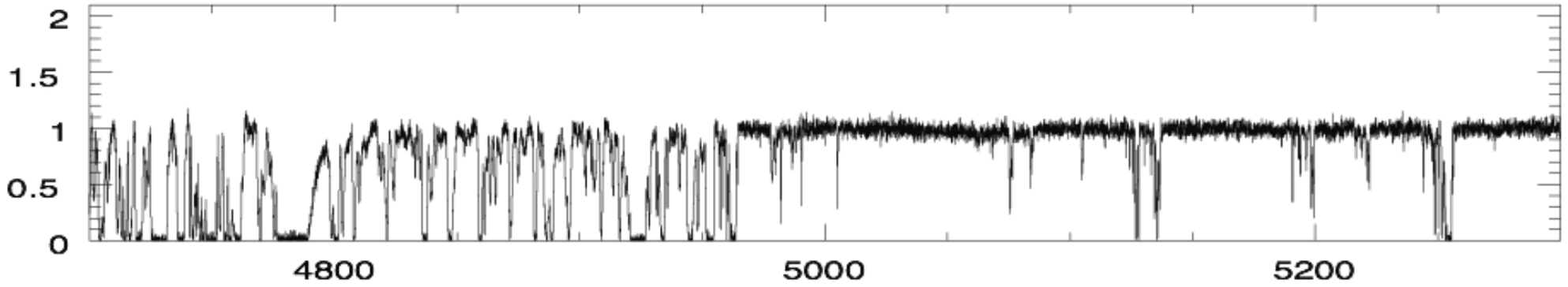
M. Arnaboldi& I. Percheron: 1D spectral product

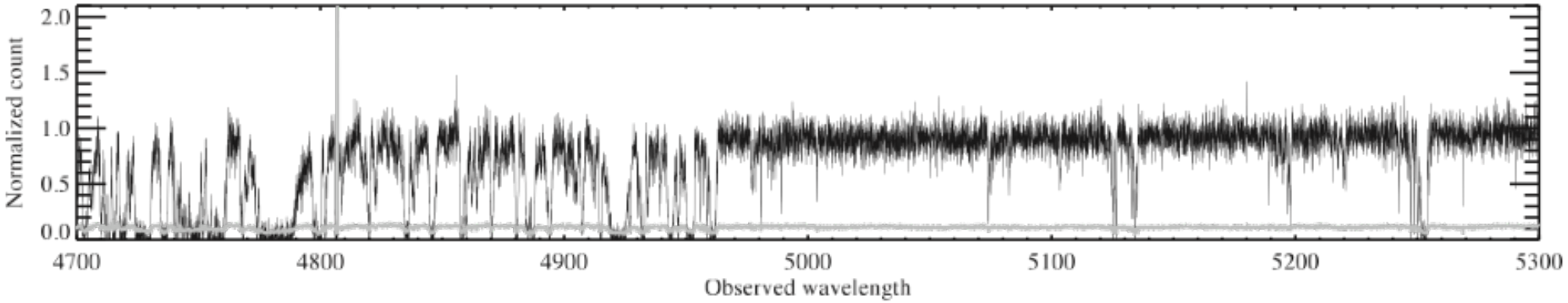
**** 1D spectral products super helpful *****

Pipeline vs. manual data reduction

VLT/UVES spectrum of GRB 060607 afterglow $z = 3.075$

Independent reduction of **SAME DATA** by Cédric Ledoux





Cucchiara et al. (2013)

Explore raw data in the archive or 1D spectral products !?