WEAVE: The WHT's new wide-field spectroscopy facility

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WEAVE Survey Paper: https://arxiv.org/abs/2212.03981

https://www.ing.iac.es/WEAVE





WEAVE's characteristics

Telescope, diameter	WHT, 4.2m
Field of view	2° Ø
Number of fibers	960 (plate A)/940 (plate B)
Fiber size	1.3″
Number of small IFUs, size	20 x 11″x12″ (1.3″ spaxels)
LIFU size	1.3'x1.5' (2.6" spaxels)
Low-resolution mode resolution	5750 (3000–7500)
Low-resolution mode wavelength coverage (Å)	3660–9590
High-resolution mode resolution	21000 (13000–25000)
High-resolution mode wavelength coverage (Å)	4040–4650 ("blue") <i>or</i> 4730–5450 ("green") 5950–6850 ("red")







WEAVE as-built





Rare view of the focal plane behind the corrector







Fibre positioner





Crowded Fields, benefit of a pick and place system





The IFU modes







S A



Stephan's Quintet

- Stephan's Quintet (SQ) is a compact group of galaxies (Hickson Compact Group 91) at z=0.0215, i.e., at the distance of Coma
 - Striking example of interacting galaxies ... and a foreground contaminant
 - Four of the five galaxies in the classic SQ are in the group, but there's another just to the east of the group





Stephan's Quintet with WEAVE

- ...so we thought we should look at it too!
- 25 October 2022: spectra taken with WEAVE's Large Integral-Field Unit (LIFU) in Low-Resolution (LR) mode
 - 6 dithered pointings, 17 minutes exposure in each pointing
 - Spatial resolution ~1.6"
 - Spectral resolution R=2500



Stephan's Quintet with WEAVE

- 26 October 2022: spectra taken with WEAVE's LIFU in High-Resolution (HR) mode
 - to be precise, with the green HR grating in the blue arm and the red HR grating in the red arm
 - Again, 6 dithered pointings, 17 minutes exposure in each pointing
 - Spectral resolution R=10000



v red HR

Let's dive deeper!

-400 PPXF -20 -600 -650 -20 DDXF_V x larcse 150 -20 0 x [arcsec] 20 40

PPXF

. Stellar velocity fields!

Early results: raw LR MOS data, R=5000



[NII] Ha [NII] z=0.3





The WEAVE Primary Science Surveys

- The WEAVE Survey consists of 8 primary science surveys:
 - **. 3 Galactic** surveys:
 - Galactic Archaeology (STL: V. Hill, OCA)
 - SCIP (Stellar, Circumstellar, and Interstellar Physics STL: J. Drew, Herts)
 - White Dwarfs (STL: B. Gänsicke, Warwick) (Calibration stars in every field)



The WEAVE Primary Science Surveys

- and 5 Extragalactic surveys:
 - . WEAVE-Clusters (STL: J. A. Aguerri, IAC)
 - . WEAVE-Apertif (STL: J. Falcón Barroso, IAC)
 - StePS (Stellar Population Survey at intermediate redshifts STL: A. Iovino, Milano)
 - WEAVE-LOFAR (STL: D. Smith, Herts)
 - WEAVE-QSO (STL: M. Pieri, LAM)



LSST Synergies

WEAVE Provides:

- . Unique HR capability in the Northern Hemisphere
- Integral Field Modes (at medium and high resolution)

WEAVE lacks:

. Variability measurements (single 1 hour visit is the default)



WEAVE's current status

- LIFU is commissioned!
 - data flow commissioning still in progress
 - further testing of end-to-end data flow, sensitivity function improvement, and telluric corrections underway
 - Science Verification (LIFU) observations almost complete...
 - Offered for community access (in the 30% ING Open Time) starting in trimester 2023B2 (1 November 2023)
- MOS and modes commissioning now, mIFU soon after.
- Survey to start (LIFU) September/October 2023



Operations:

- . 70% of the available nights on the WHT will be for WEAVE surveys for 5 years (at least!)
 - effectively ~227 nights/year, but some of the remaining 30% will be PI-led "open time" WEAVE observations



WEAVE in a nutshell

WEAVE has

- a 2° field of view (covering 16 full moons!)
- roughly 950 MOS fibres (sicence+sky+calibration) per field
 - . and two integral field modes
- a spectrograph that can switch between a low-resolution (LR: R=5000) mode perfect for radial velocities and a high-resolution (HR: R=20000) mode designed for measure the composition of stars

