SDSS DR13

A summary by Yogesh Wadadekar

DR13 is the first release of SDSS 4

- SDSS1 – 2000-05
- SDSS2 – 2005-08
- SDSS3 – 2008-14
- SDSS4 – 2014-20

SDSS divided by science projects

- Large Scale Structure -LEGACY - 2000-08
- Stars – Optical spectroscopy - SEGUE – 2005-2014
- Stars – near IR spectroscopy - APOGEE1/2 – 2008-2020
- Extrasolar planets – MARVELS - 2008-14
- Supernovae – Stripe 82 - 2005-08
- Cosmology with LRG, Quasar absorbers – BOSS/eBOSS – 2008-20 (also SEQUELS, SPIDERS, TDSS)
- **Manga** – IFU Spectroscopy – 2014-20

What’s new

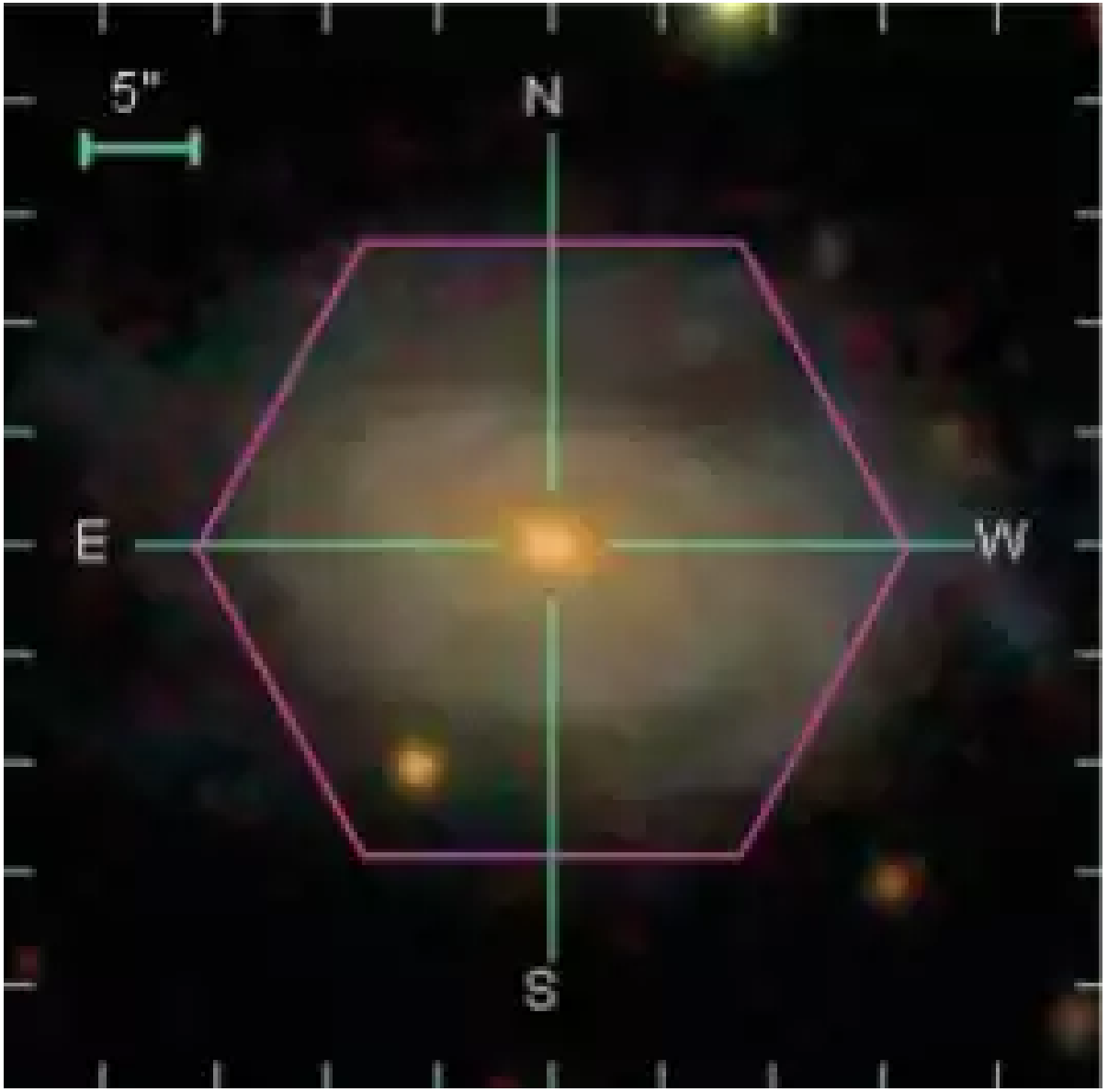
- First and last release of SEQUELS, a sequel to BOSS and a prequel to e-BOSS
- New Apogee Data released
- First MaNGA data release

SEQUELS

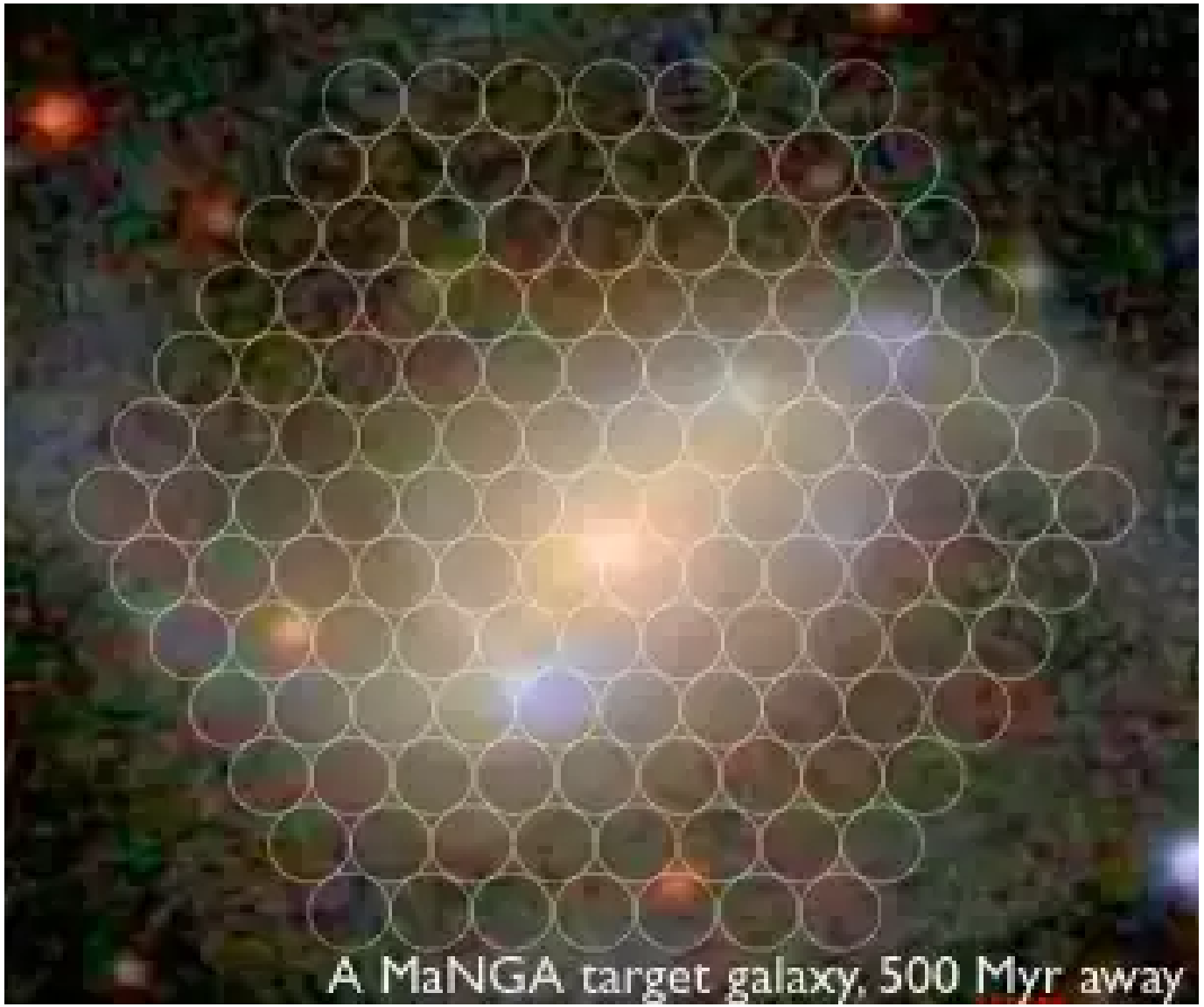
- Data Release 13 includes data from a transitional project between BOSS and eBOSS called the Sloan Extended Quasar, ELG, and LRG Survey (SEQUELS), designed to test target selection algorithms for eBOSS. Some SEQUELS data was released in DR12; DR13 includes the complete SEQUELS dataset. The first release of eBOSS data will occur with Data Release 14 in July 2017.

Why is MaNGA needed?

- However, if one were to do an SDSS-like study of galaxies by binning galaxies by stellar mass, environment, and morphology, one quickly loses sample size for significant statistics (e.g. González Delgado et al. 2016).


5"
N
E
W
S

One of the MaNGA targets



10000 galaxy sample selection

- Galaxies are selected from the NASA Sloan Atlas catalog of the SDSS Main Galaxy Legacy Area, with selection cuts applied only to redshift, i-band luminosity, and for a subset of galaxies, NUV-r color.
- The Field Layout Forecast page provides information on where MaNGA has already observed and the on-sky locations most likely to be observed over the course of the survey.

Sample selection

- Roughly flat stellar mass distribution with $M > 10^9 M_\odot$
- Smallest galaxy diameter sampled by 25 spatial bins
- Primary sample: 67%, radial coverage to 1.5 Re (effective or half-light radius)
- Secondary sample: 33%, radial coverage to 2.5 Re
- No size or inclination cuts

Many different sizes of IFU

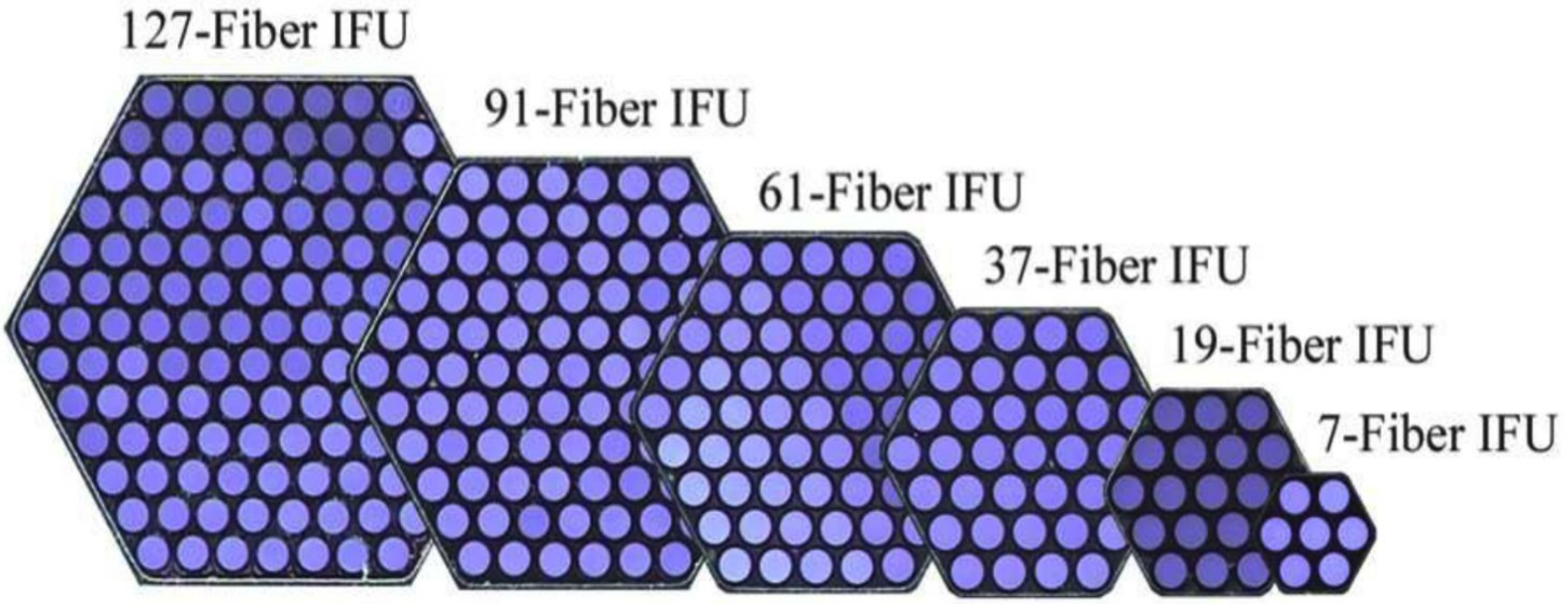
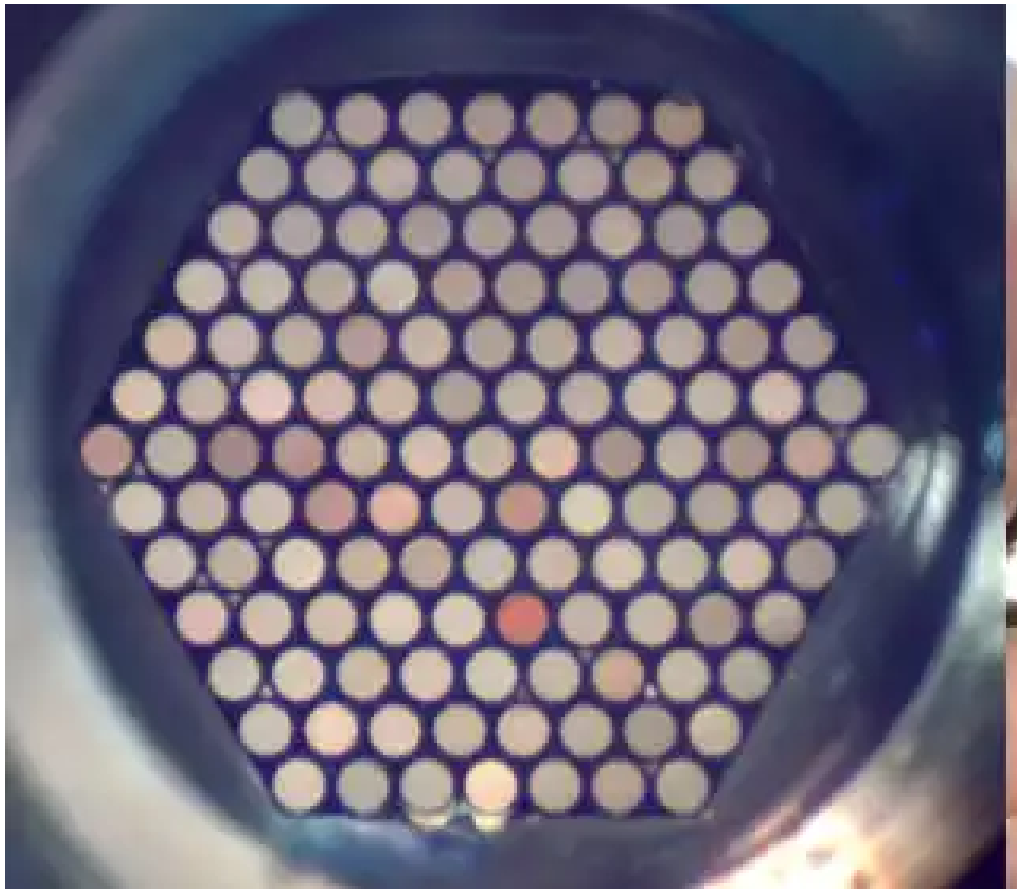


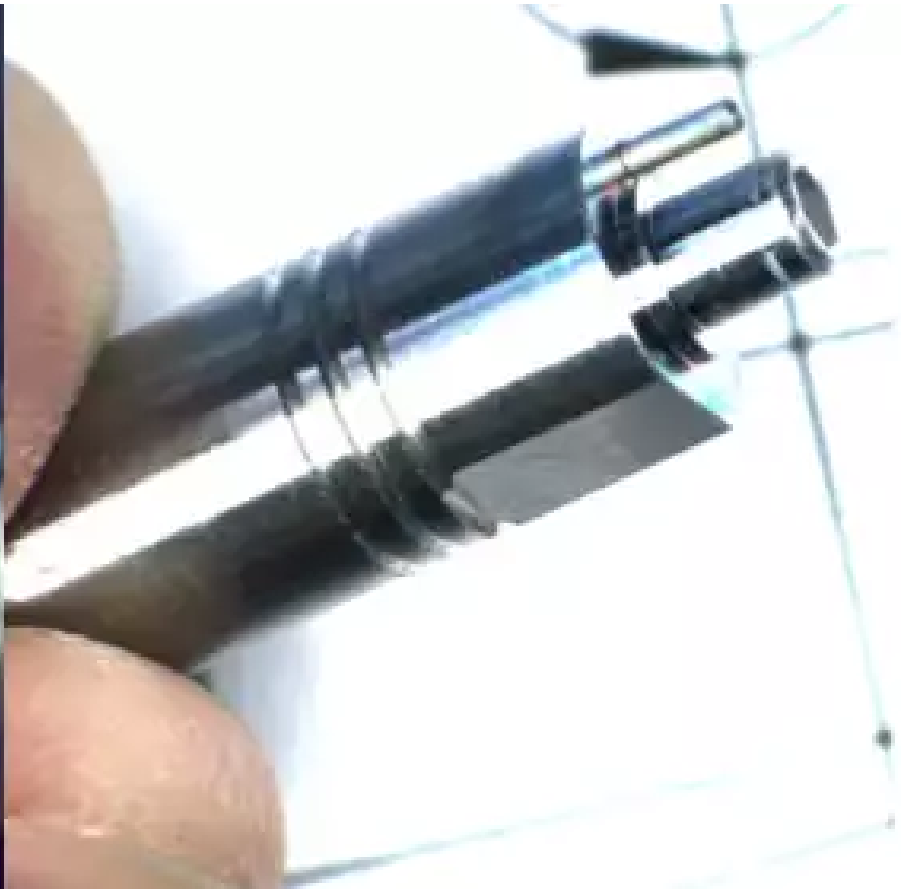
Figure 1. Photographs of MaNGA IFUs, ranging from the largest IFU (127 fibers, left) to the mini-bundle used for standard star observations (7 fibers, right). Individual fibers deviate with an RMS of only 3 μm from an ideal hexagonal packing. Image taken from Drory et al. (2015).

MaNGA fiber suite

- Buffered fibers with 120 micron (2″) core diameters
- Close-packed hexagonal fibers IFUs, 54% live-core fill factor
- IFU size from 19 to 127 fibers, diameters from 12″ to 32″
- IFU complement per plate: 2×19; 4×37; 4×61; 2×91; 5×127
- 92 IFU-associated sky fibers
- 12 7-fiber “mini-bundles” for spectrophotometric calibration
- Total number of fibers: 1423

127 Fiber IFU and its housing

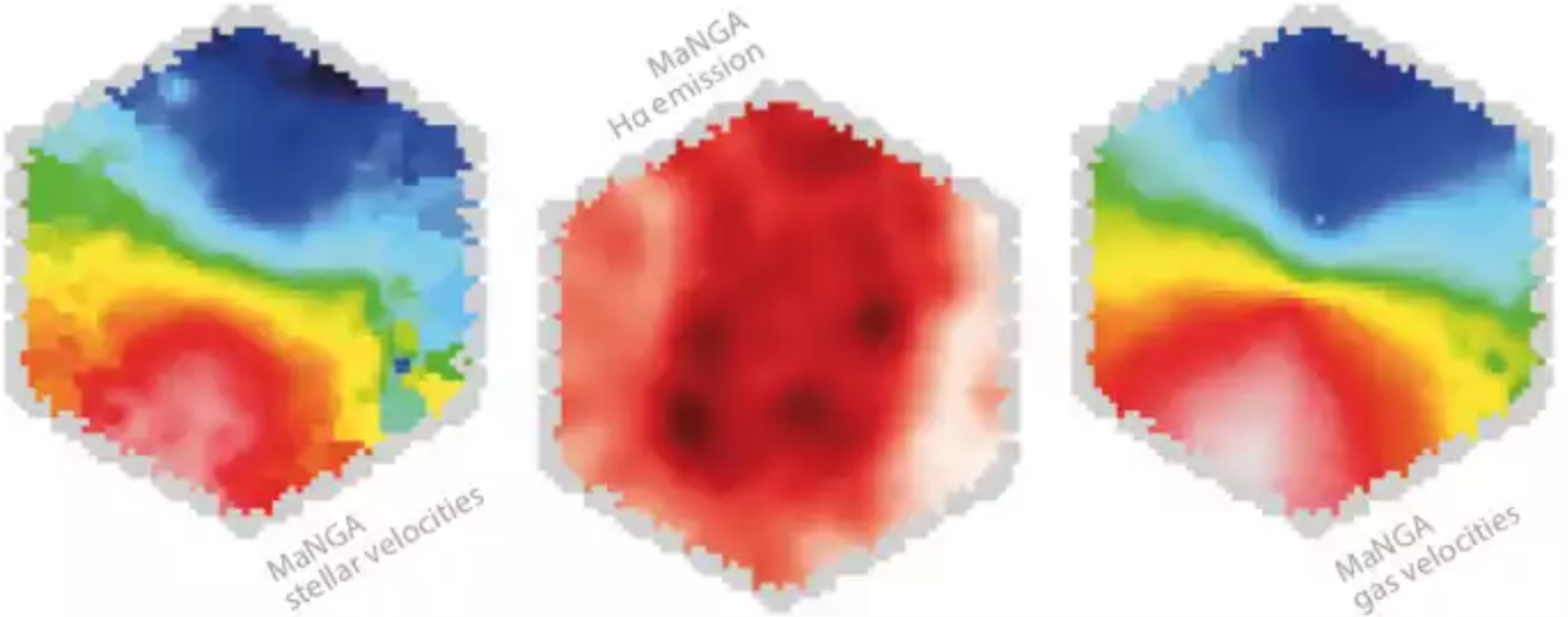




MaNGA Technical Details

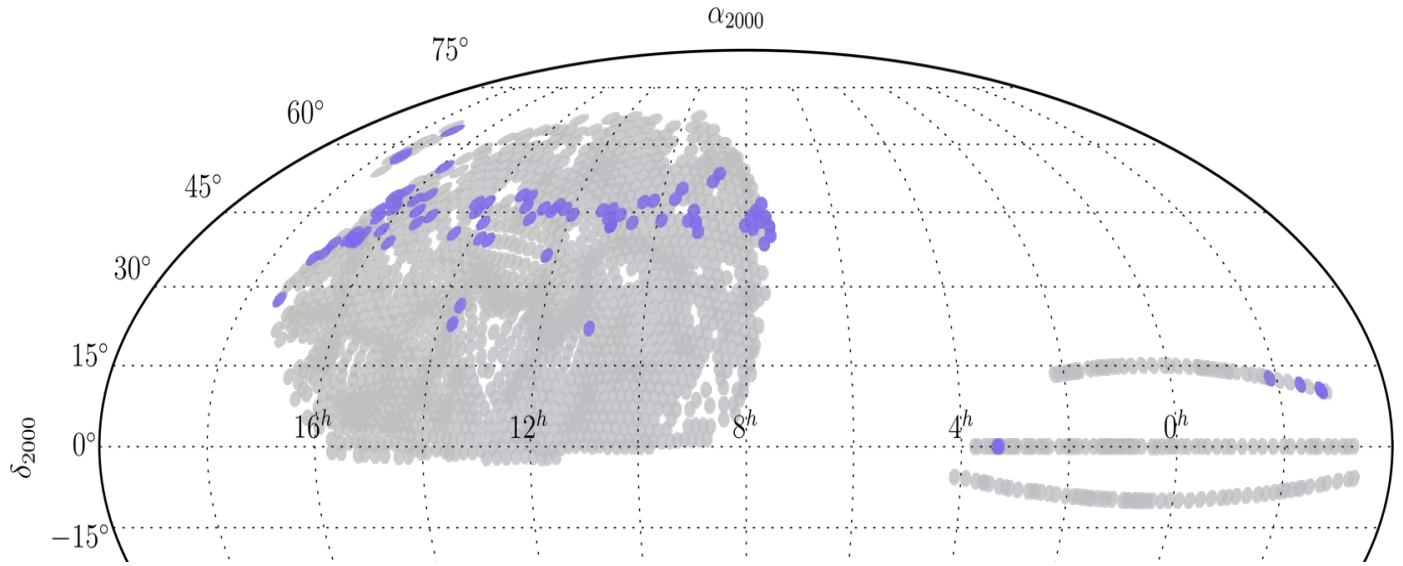
- Dark-time observations
- Fall 2014 – Spring 2020
- 17 IFUs per 7 deg^2 plate
- Wavelength: 360-1000 nm, resolution R~2000
- 10,000 galaxies across ~2700 deg^2, redshift z~0.03
- roughly 3-hour dithered exposures
- Spatial sampling of 1-2 kpc
- Per-fiber S/N=4-8 (per angstrom) at 1.5 R_e

Star formation and velocities



What is released in DR13

- DR13 is MaNGA's first public data release, and contains datacubes and row-stacked spectra (RSS) for 1351 unique galaxies.
- MaNGA observes galaxies with fiber bundles that vary in size from 19 to 127 fibers (12 to 32 arcsec diameter on sky); larger bundles target larger galaxies, resulting in a uniform radial coverage. As a result, the number of spectra within each data cube and RSS file will vary depending on the fiber bundle size.
- The MaNGA data cubes and row-stacked spectra are available through both the SAS and the CAS.


α_{2000}
75°
60°
45°
30°
15°
0°
−15°
δ_{2000}
16^h
12^h
8^h
4^h
0^h

For more information:

- Bundy et al. 2015, ApJ, 798,7
- Yan et al. 2016, arxiv:1607