THE MANGA FIREFLY CATALOGUE

IN PREP.

I am an integral field unit galaxy survey at the Apache Point Observatory

justus.neumann@port.ac.uk

J. Neumann[1], D. Thomas[1,2], C. Maraston[1], L. Hill[1], J. Lian[3], J. Comparat[4], V. Gonzalez-Perez[5], K. Westfall[6]

The MaNGA Firefly Value-Added-Catalogue (VAC) provides measurements of spatially resolved stellar population (SP) properties in MaNGA galaxies. It is built upon and complements the MaNGA data analysis pipeline (DAP; Westfall et al. 2019), which analyses the data produced by the data reduction pipeline (DRP; Law et al. 2016), and it employs the full spectral fitting code Firefly to derive parameters such as stellar ages, metallicities, masses, star formation histories and dust attenuation. In addition to Voronoi-binned measurements, it also provides global properties, such as central values and radial gradients. Here, we present an update on the MaNGA Firefly VAC that now doubled in sample size as compared to the version published in SDSS DR15 and comprises the complete final MaNGA sample (10,010 galaxies). One of the major new additions is the choice to select the results from fits that used either the MILES (Maraston & Strömbäck 2011) or the novel MaStar (Maraston et al. 2020) stellar population models, the latter of which allow to constrain the fit over the whole MaNGA wavelength range.

1 Institute for Cosmology and Gravitation (ICG), Portsmouth, UK | 2 School of Mathematics and Physics, University of Portsmouth, UK | 3 Department of Physics & Astrophysics, University of Utah, USA | 4 Max-Planck-Institut für Extraterrestrische Physik (MPE), Garching bei München, Germany | 5 Departamento de Física Teórica, Universidad Autónoma de Madrid, Spain | 6 University of California Observatories, University of California, USA

RAW DATA → DRP → DAP → FIREFLY → VAC SCRIPT → FIREFLY VAC

1

Fits file (~6 GB) for each version

10,765
Observations

10,765
Global SP parameters
age and metallicity: in the central 3 arcsec, at 1 Re, radial gradient within 1.5 Re

3,711,856
Spatially resolved SP parameters
Light- and mass-weighted age, metallicity, E(B-V), stellar mass and its partition into stellar remnants, surface mass density, full star formation history

10,010
Unique galaxies

3,711,856
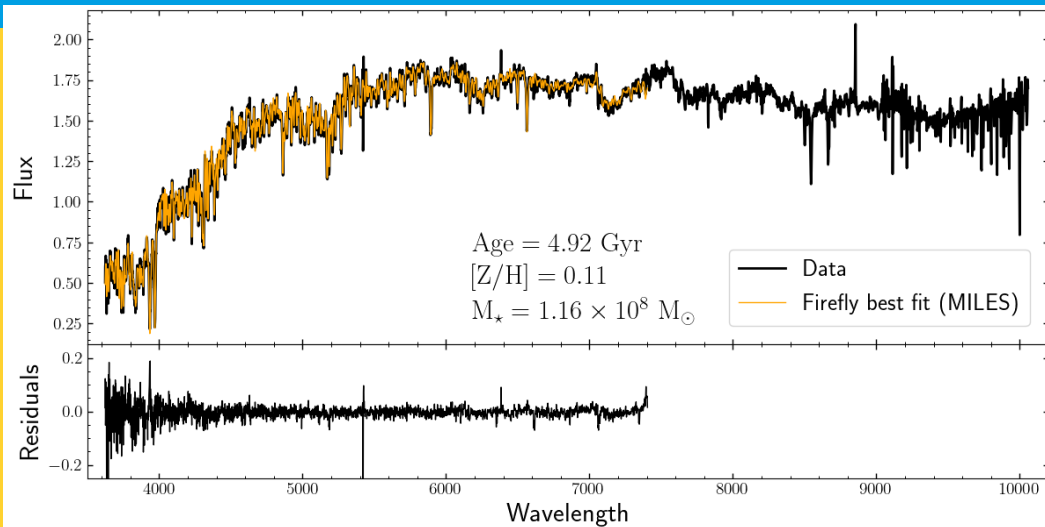**Voronoi bins**
with minimum S/N ~ 10

FIREFLY

a full spectral fitting code
(Wilkinson et al. 2017)

- Firefly is a chi-squared minimisation fitting code controlled by the Bayesian Information Criterion
- It fits combinations of single-burst stellar population models (SSPs) to spectroscopic data
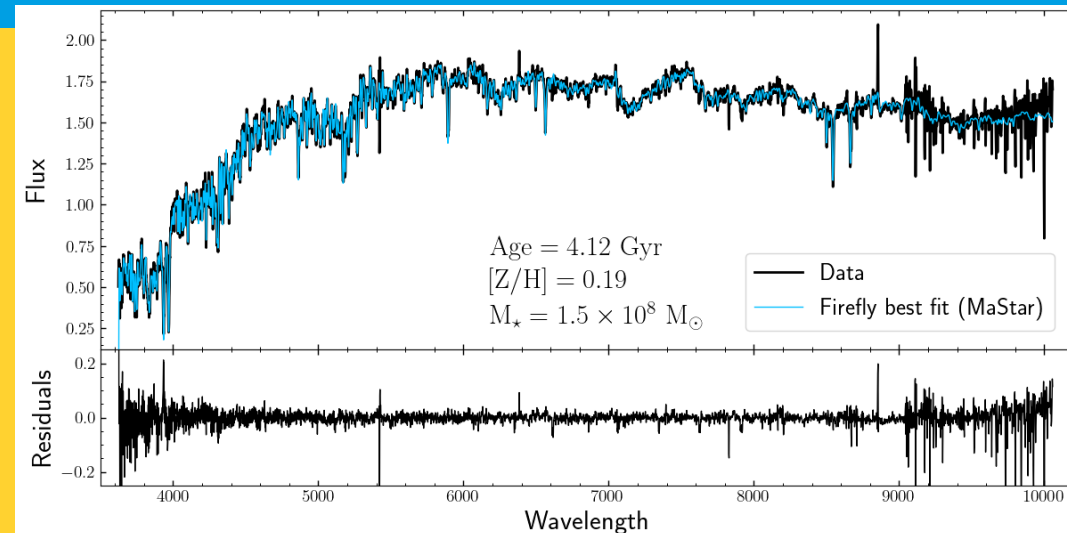- It provides non-parametric, non-regularised star formation histories

www.icg.port.ac.uk/firefly
www.github.com/FireflySpectra/firefly-release

Example of a fit using **MILES** SSP Library

Age = 4.92 Gyr
[Z/H] = 0.11
$M_\star = 1.16 \times 10^8 \, M_\odot$

— Data
— Firefly best fit (MILES)

Example of a fit using **MaStar** SSP Library

Age = 4.12 Gyr
[Z/H] = 0.19
$M_\star = 1.5 \times 10^8 \, M_\odot$

— Data
— Firefly best fit (MaStar)

Examples of 2D SP maps from the VAC