

# Bayesian Analysis of Galaxies for Physical Inference and Parameter Estimation

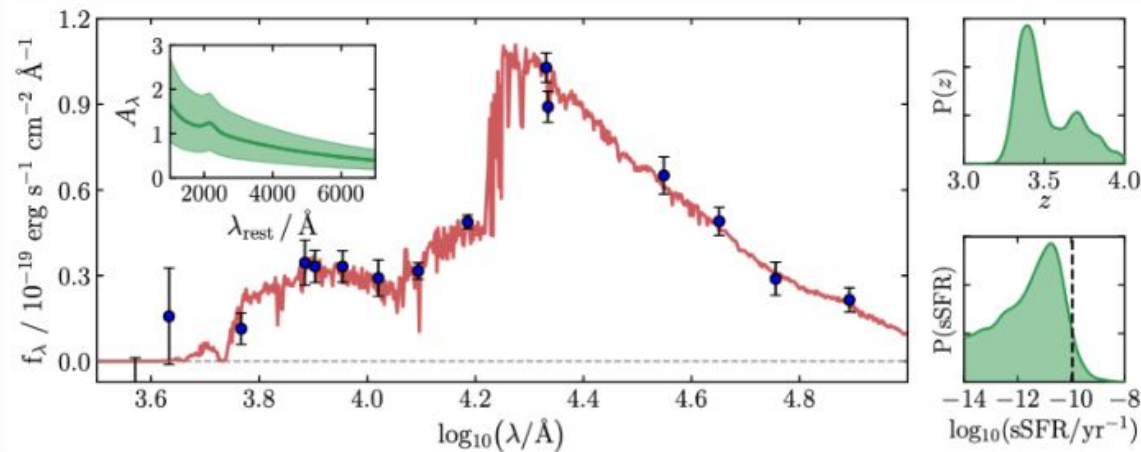
“bagpipes”

developed by A. C. Carnall - [github.com/ACCarnall/bagpipes](https://github.com/ACCarnall/bagpipes)  
Carnall+2018, Carnall+2019b

# What is bagpipes?

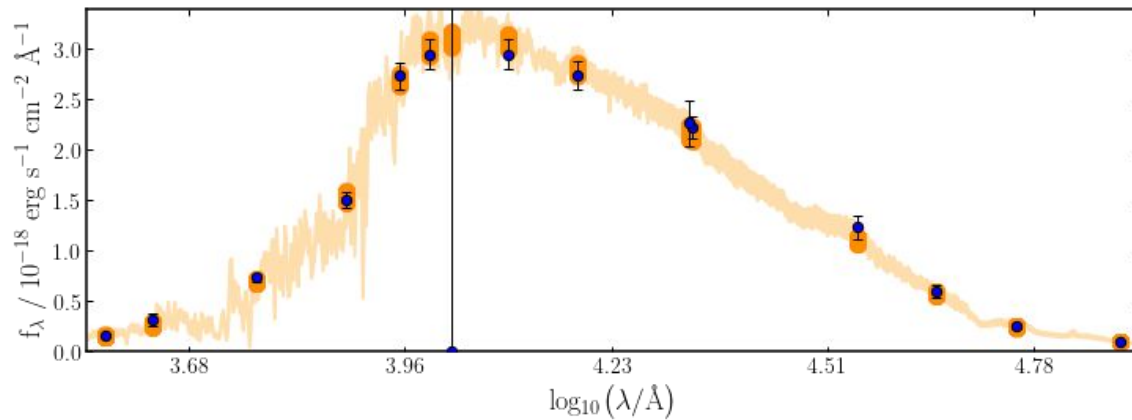
python code for

- modelling galaxy spectra
- SED fitting
- spectroscopic fitting



today

- SED fitting  
w/ HST & JWST photometry



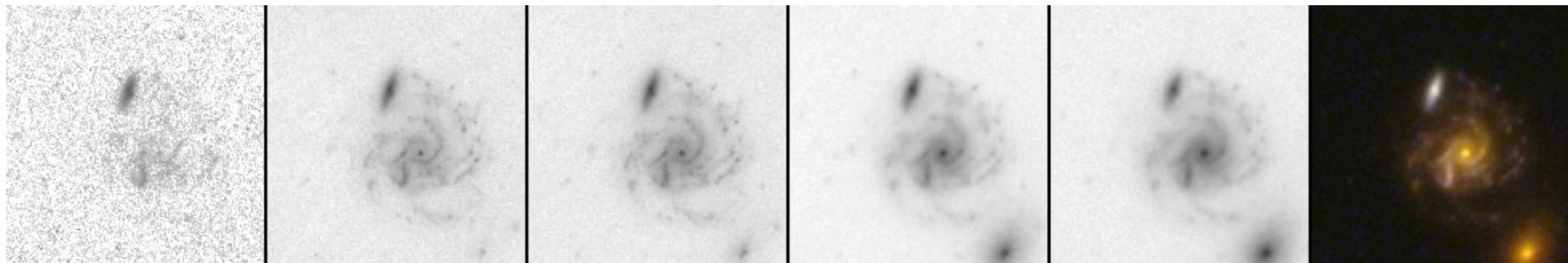
# What do we need?

→ prepped photometry catalog  
phot\_cat\_bagpipes.csv

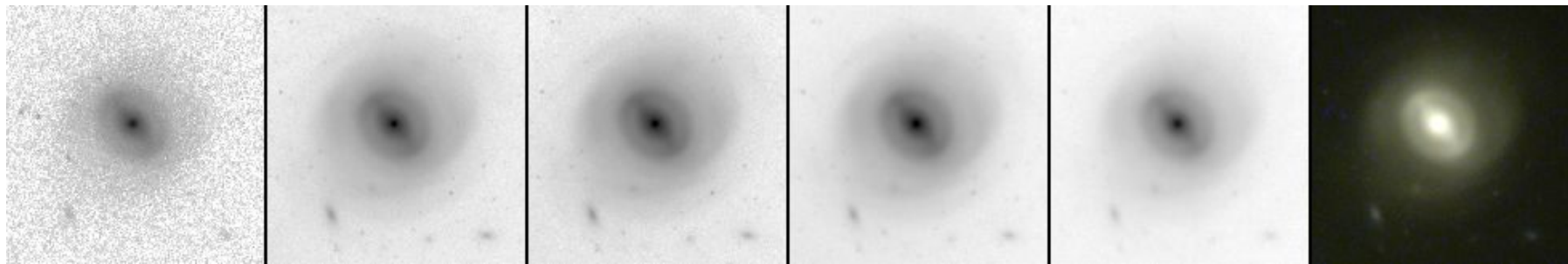
- Photometry
  - flux and flux errors in several filter bands
    - from personal experience >5
- filter transmission curves

Abell 2744 galaxies (selected by eye)  
DJA cutout  
(GLASS+UNCOVER+DD-2756)

1



2



# How does it work?

- bagpipes can fit single objects
- the better tool usually will be `pipes.fit_catalogue()`
  - define a load photometry function
  - a model component dictionary
    - global parameters - redshift, velocity dispersion, ...
    - SFH parameters - **burst**, **constant**, **exponential**, dblpaw, custom
    - Nebular component
    - Dust attenuation & emission

# Outputs

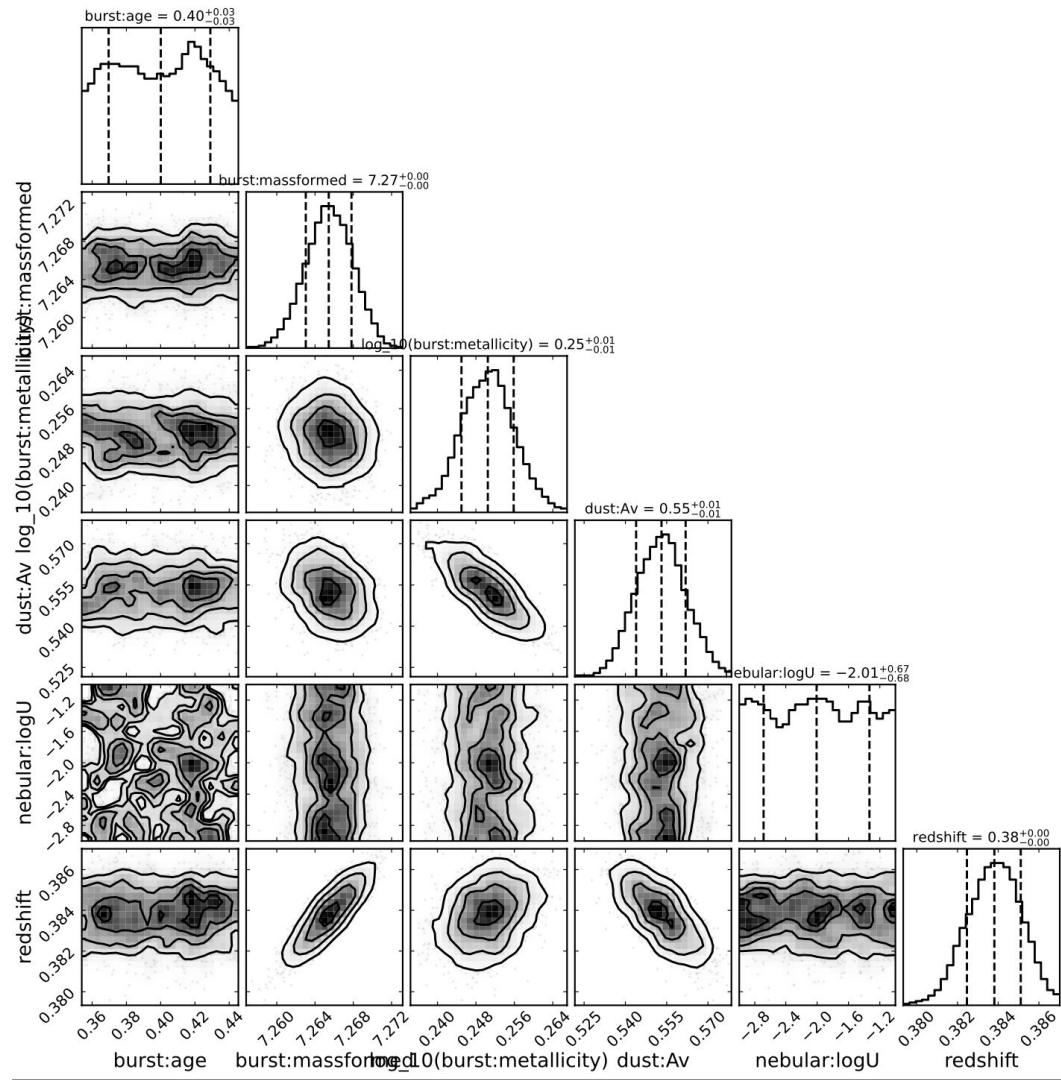
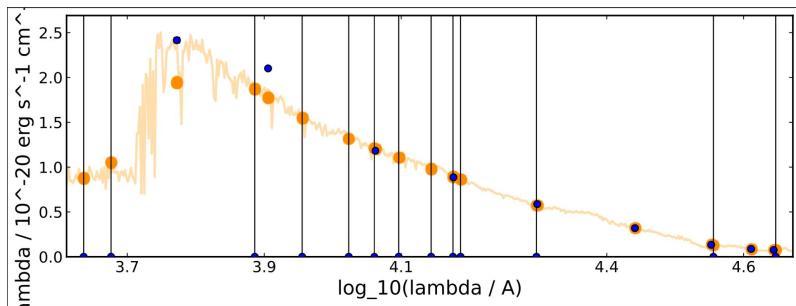
- creates a catalogue

if you use `pipes.fit_catalogue()`

Δ	Index	Visible	Name	\$ID	Class	Description	Format
0		<input type="checkbox"/>	Index	\$0	Long	Table row index	
1	1	<input checked="" type="checkbox"/>	#ID	\$1	Character		1A
2	2	<input checked="" type="checkbox"/>	burst:age_16	\$2	Double		D
3	3	<input checked="" type="checkbox"/>	burst:age_50	\$3	Double		D
4	4	<input checked="" type="checkbox"/>	burst:age_84	\$4	Double		D
5	5	<input checked="" type="checkbox"/>	burst:massformed_16	\$5	Double		D
6	6	<input checked="" type="checkbox"/>	burst:massformed_50	\$6	Double		D
7	7	<input checked="" type="checkbox"/>	burst:massformed_84	\$7	Double		D
8	8	<input checked="" type="checkbox"/>	burst:metallicity_16	\$8	Double		D
9	9	<input checked="" type="checkbox"/>	burst:metallicity_50	\$9	Double		D
10	10	<input checked="" type="checkbox"/>	burst:metallicity_84	\$10	Double		D
11	11	<input checked="" type="checkbox"/>	dust:Av_16	\$11	Double		D
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13	13	<input checked="" type="checkbox"/>	dust:Av_84	\$13	Double		D
14	14	<input checked="" type="checkbox"/>	nebular:logU_16	\$14	Double		D
15	15	<input checked="" type="checkbox"/>	nebular:logU_50	\$15	Double		D
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24	24	<input checked="" type="checkbox"/>	formed_mass_50	\$24	Double		D
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26	26	<input checked="" type="checkbox"/>	sfr_16	\$26	Double		D
27	27	<input checked="" type="checkbox"/>	sfr_50	\$27	Double		D
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43	43	<input checked="" type="checkbox"/>	tquench_84	\$43	Double		D
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48	48	<input checked="" type="checkbox"/>	VJ_colour_50	\$48	Double		D
49	49	<input checked="" type="checkbox"/>	VJ_colour_84	\$49	Double		D
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51	51	<input checked="" type="checkbox"/>	log_evidence	\$51	Double		D
52	52	<input checked="" type="checkbox"/>	log_evidence_err	\$52	Double		D
53	53	<input checked="" type="checkbox"/>	chisq_phot	\$53	Double		D
54	54	<input checked="" type="checkbox"/>	n_bands	\$54	Double		D

# Outputs

- creates a catalogue
- makes default plots  
(corner plot, posterior dist, fit, sfh)
- latex!



# Outputs

- creates a catalogue
- makes default plots (corner plot, posterior distributions, fit)
  - bagpipes uses latex, so it looks best when it finds a latex distribution
- saves posterior distributions in .h5 file
  - bagpipes returns & saves the median of the distribution and errors around that
  - can extract the max likelihood parameters & model
  - see on [`github.com bagpipes/examples/`](https://github.com/bagpipes/examples/) Further Examples 1 - `Extracting_the_maximum_likelihood_model.ipynb`