Properties of AGN Host Galaxies

A. Wheaton

January 14, 2021

Project Aims

TDE	Host Galaxy	RA	Dec	Mag	z
AT2019qiz	WISEA J044637.88-101334.9	04:46:37.880	-10:13:34.90	15	0.01513
AT2019azh	KUG 0810+227	08:13:16.945	+22:38:54.03	15	0.022
AT2018hyz	WISEA J100650.83+014133.4	10:06:50.871	+01:41:34.08	17	0.04573
AT2019dsg	WISEA J205702.96+141216.2	20:57:02.974	+14:12:15.86	15	0.0512
iPTF16fnl	iPTF16fnl	00:29:57.010	+32:53:37.24	16	0.018
AT2019ahk	WISEA J070011.40-660224.7	07:00:11.546	-66:02:24.14	17	0.026211
ASASSN-15oi	ASASSN-15oi	20:39:09.18	-30:45:20.10	16	0.0484
AT2018fyk	LCRS B224721.6-450748	22:50:16.090	-44:51:53.50	17	0.06
ASASSN-14li	ASASSN-14li	12:48:15.23	+17:46:26.44	15	0.0206
ASASSN-14ae	ASASSN-14ae	11:08:40.12	+34:05:52.23	17	0.0436

Table: The XSHOOTER targets on tidal disruption events.

- Investigate the statistical behaviour of the star formation in the host galaxies of tidal disruption events and active galactic nuclei (AGN).

Active Galactic Nuclei (AGN)

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- Broad spectral energy distribution.
- Strong (and sometimes broad) emission lines.
- Variability over short timescales.

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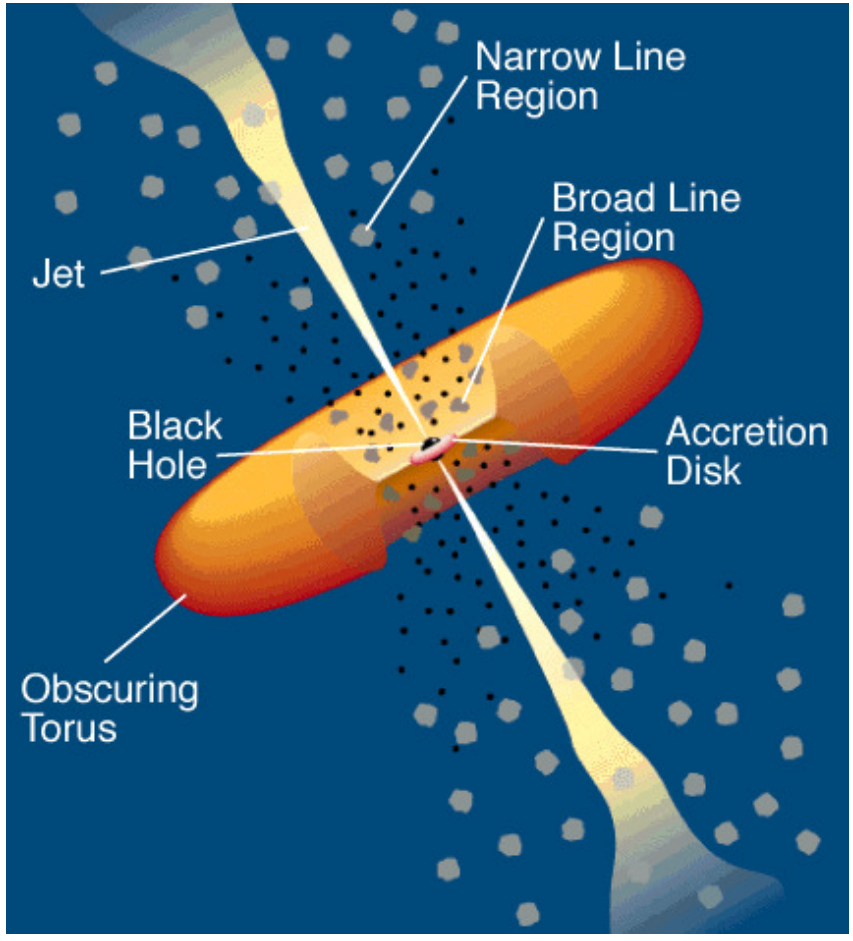

Figure: Accretion of matter onto surface of a black hole. Image adapted from Urry and Padovani 1995.[2]

The Starburst-AGN Connection

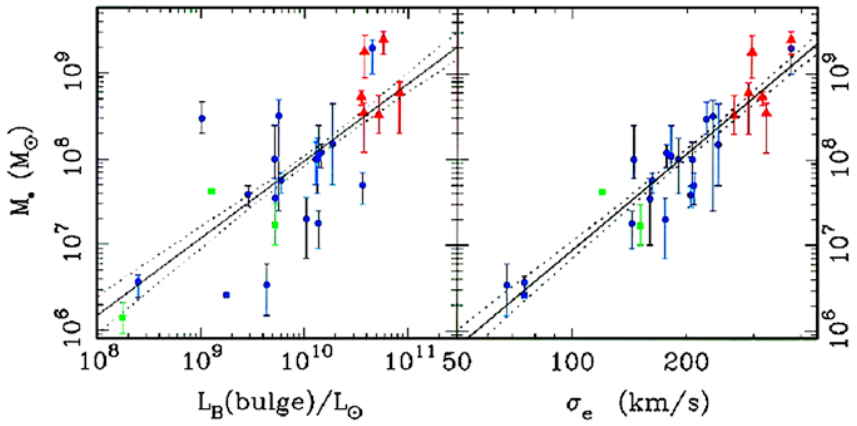

Figure: Strong relationship between star formation and black hole mass. Image adapted from Veilleux 2008.[3]

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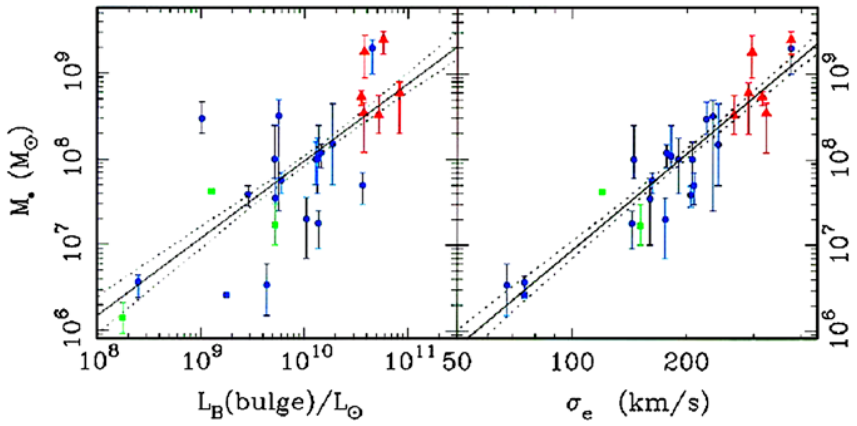

Figure: Strong relationship between star formation and black hole mass. Image adapted from Veilleux 2008.[3]

- Cosmologically important impact on galaxy formation and evolution.

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- Gas or radiation pressure from starbursts and/or AGN-drive wind shuts off black hole fuel supply.

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- Direction of causation unclear.
- AGN is a possible source of quenching.
- Need more information...

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- Bayesian Analysis of Galaxies for Physical Inference and Parameter EStimation.

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- Fit real spectra to plausible SFH.

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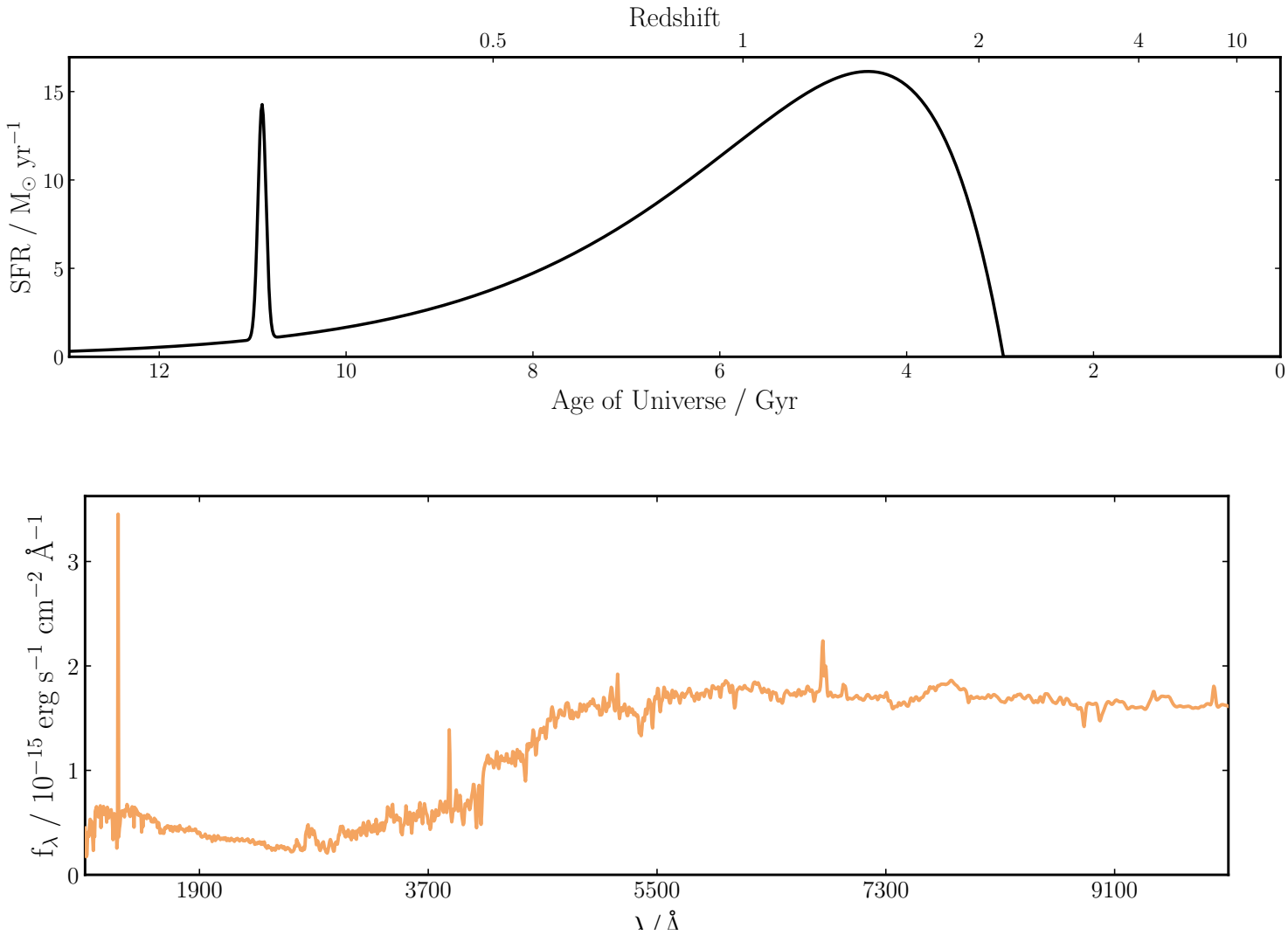

Figure: Simulated SFH and spectrum.

The BAGPIPEs Module

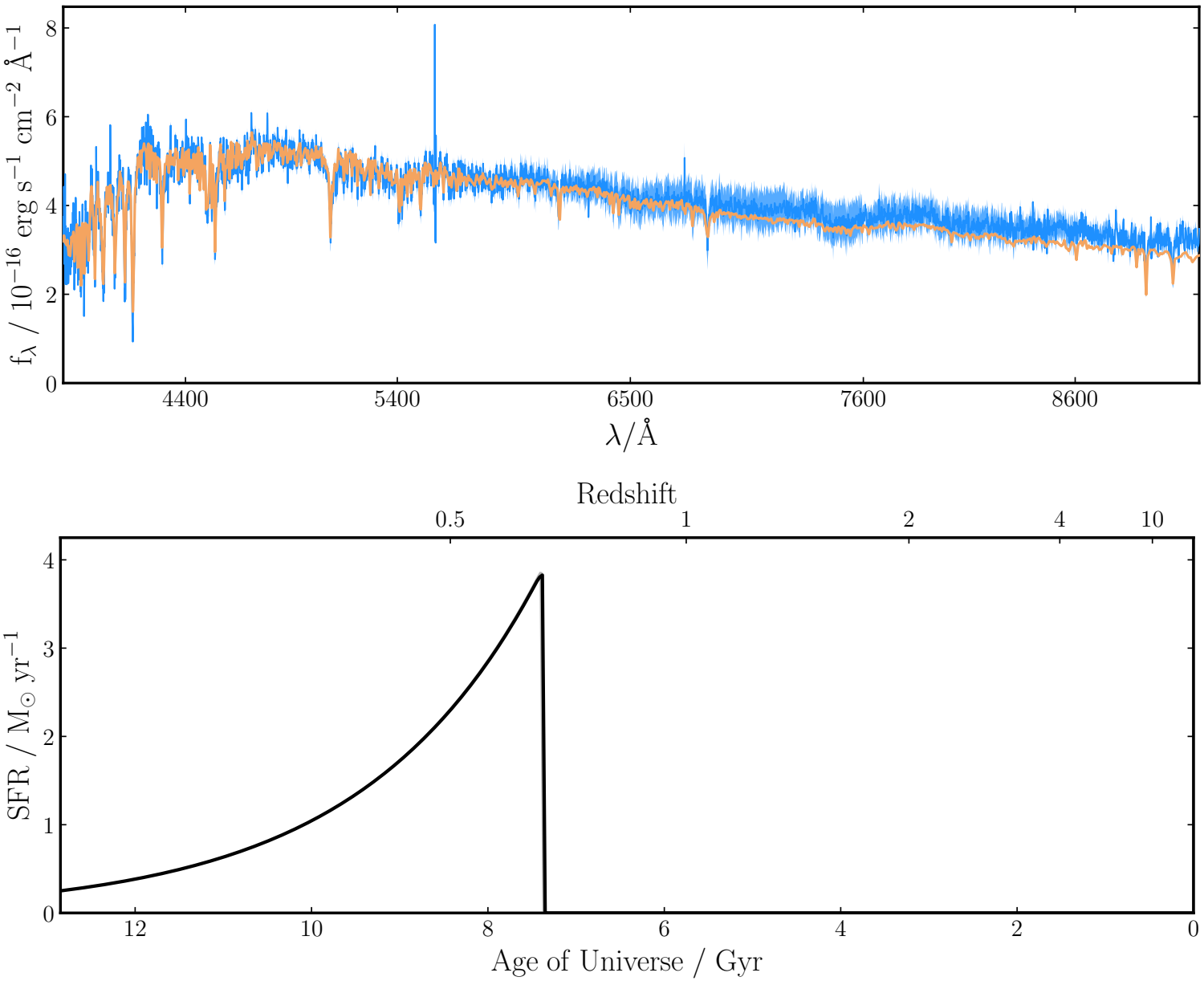

Figure: Observed and fitted spectrum, with inferred SFH.

Stellar Population Dating

Mass (solar masses)	Time (years)	Spectral type
60	3 million	O3
30	11 million	O7
10	32 million	B4
3	370 million	A5
1.5	3 billion	F5
1	10 billion	G2 (Sun)
0.1	1000s billions	M7

Figure: Stellar lifetimes and spectral type.

- Poor temporal resolution in SFR beyond 1 billion years.

Stellar Population Dating

TABLE 2
Number density in the solar neighbourhood brighter than absolute magnitude +16 by spectral type and class, per 10,000 pc^3

	Spectral type							
Class	O	B	A	F	G	K	M	Totals
Giants				0.5	1.6	4	0.25	6.3
Main sequence	0.00025	1	5	25	63	100	630	800
White dwarfs		63	100	50	50	25		250

Figure: Number density of spectral types. Table adapted from Glenn 2001.[1]

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- How do Lyman and Balmer series lines evolve with starburst age?
- What about other metal lines?

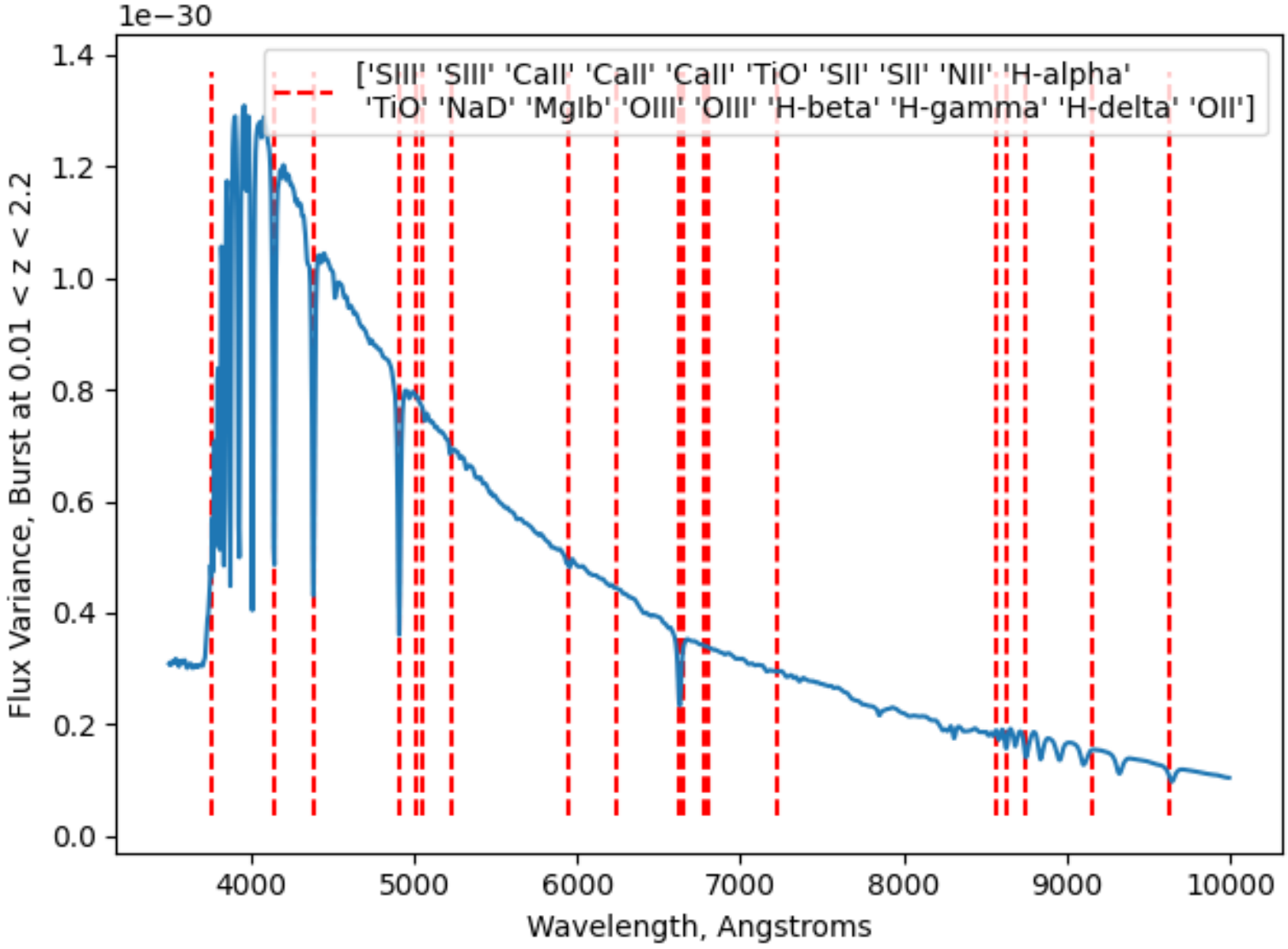
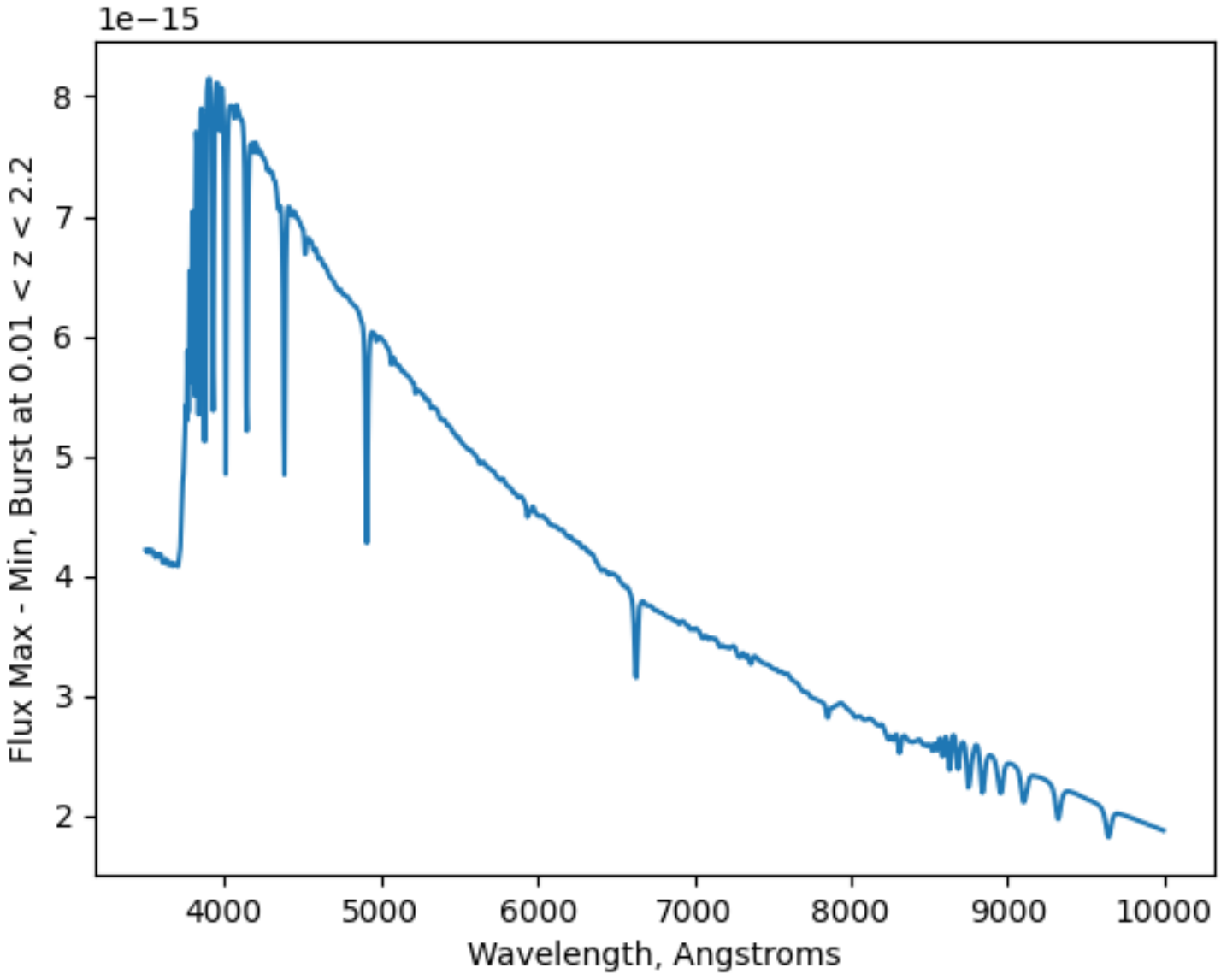


Figure: Variance in flux, over starburst evolved from z=2.2 to z=0.01.



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- Blind fitting of spectra with known priors.

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- Iterative fitting.

Future Plans

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- Compare SFH of TDE galaxies with Hubble analogues, and Seyferts.

References

G. Ledrew, "The Real Starry Sky", Journal of the Royal Astronomical Society of Canada **95**, 32 (2001).

C. M. Urry and P. Padovani, "Unified Schemes for Radio-Loud Active Galactic Nuclei", Publications of the Astronomical Society of the Pacific **107**, 803 (1995).

S. Veilleux, "Agn host galaxies", eng, New astronomy reviews **52**, 289–306 (2008).