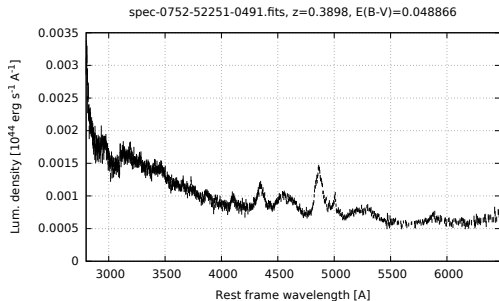


The challenge: automatic spectral analysis of $\sim 10^5$ sources



Quantities to estimate:

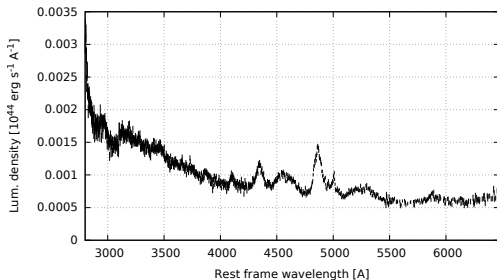
- continuum luminosity and slope (shape?);
- host galaxy contribution;
- iron luminosity and width;
- Emission lines:
 - luminosity;
 - width (profile?);
 - velocity offset;

QSFit: automatic Automatic analysis of optical AGN spectra

- quick (~ 8 s per spectrum);
- standardized recipe;
- ensure replicability and shareability;
- written in IDL;
- based on MPFIT;
- released as free software (GPL).

The challenge: automatic spectral analysis of $\sim 10^5$ sources

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$



Quantities to estimate:

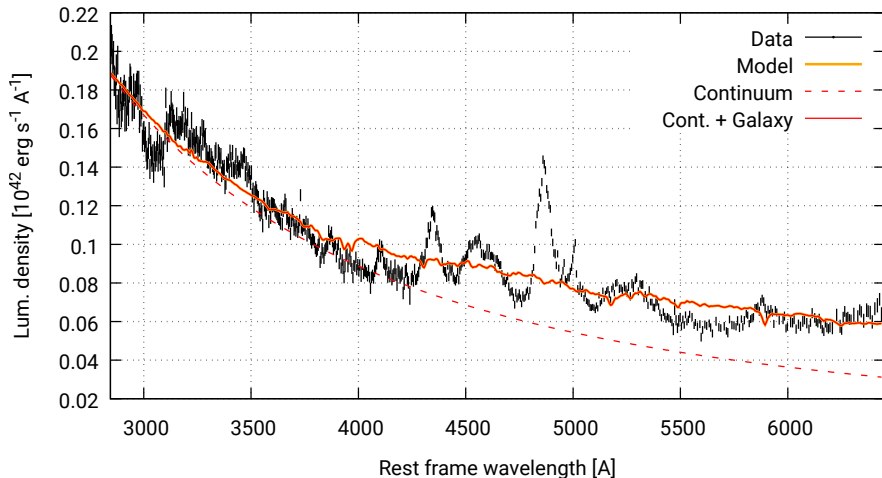
- continuum luminosity and slope (shape?);
- host galaxy contribution;
- iron luminosity and width;
- Emission lines:
 - luminosity;
 - width (profile?);
 - velocity offset;

QSFit: automatic Automatic analysis of optical AGN spectra

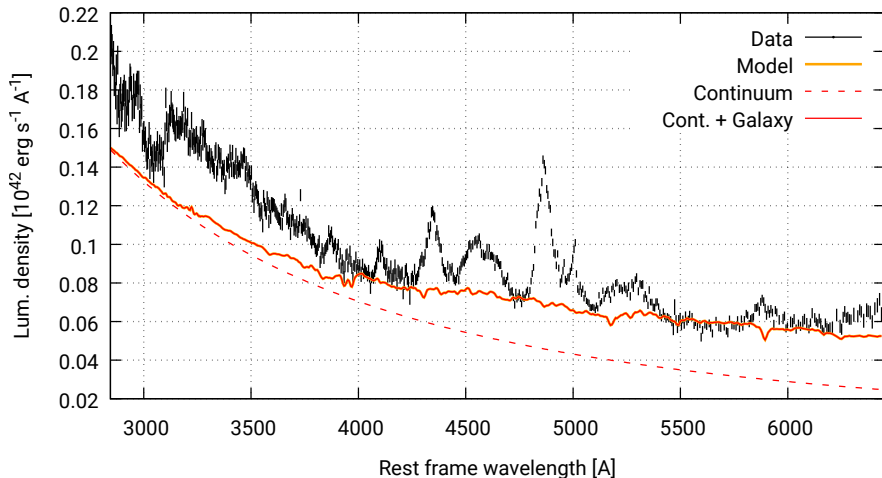
- quick (~ 8 s per spectrum);
- standardized recipe;
- ensure replicability and shareability;
- written in IDL;
- based on MPFIT;
- released as free software (GPL).

Example: low-Z

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$

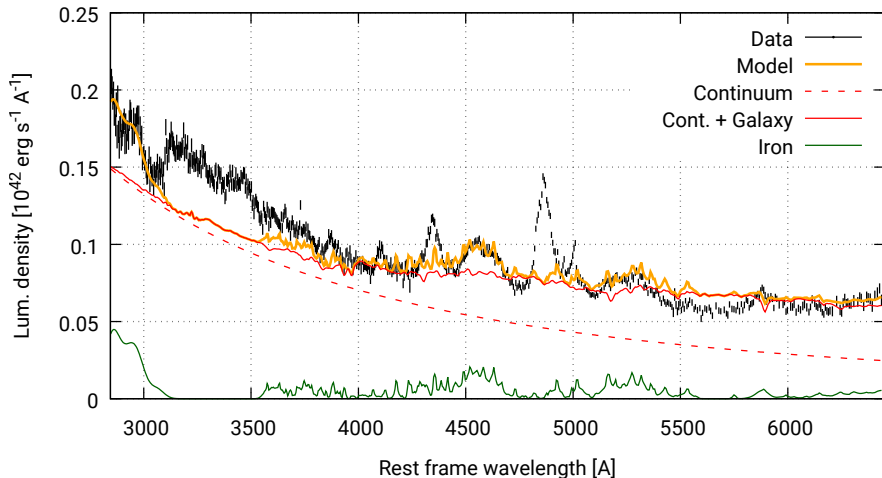


spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$



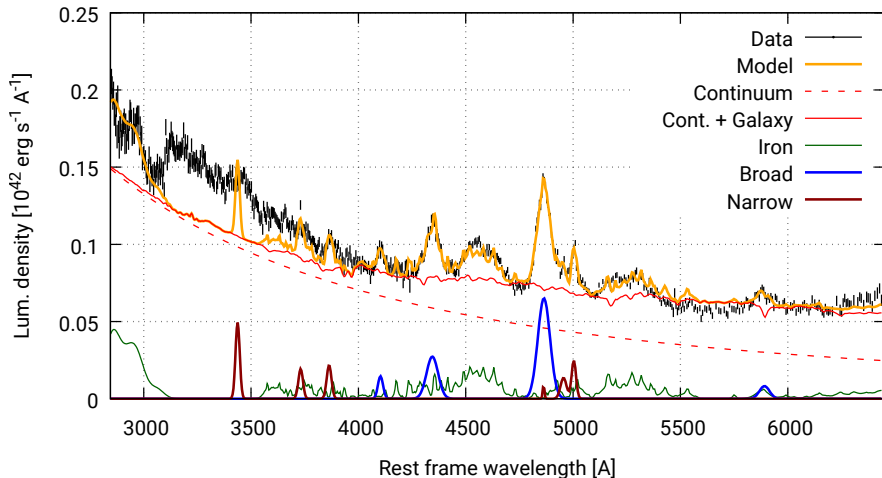
Example: low-Z

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$



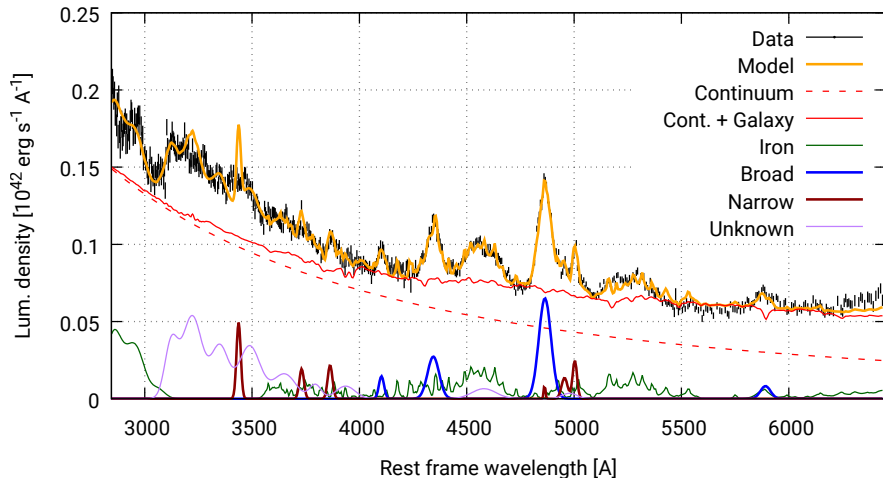
Example: low-Z

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$



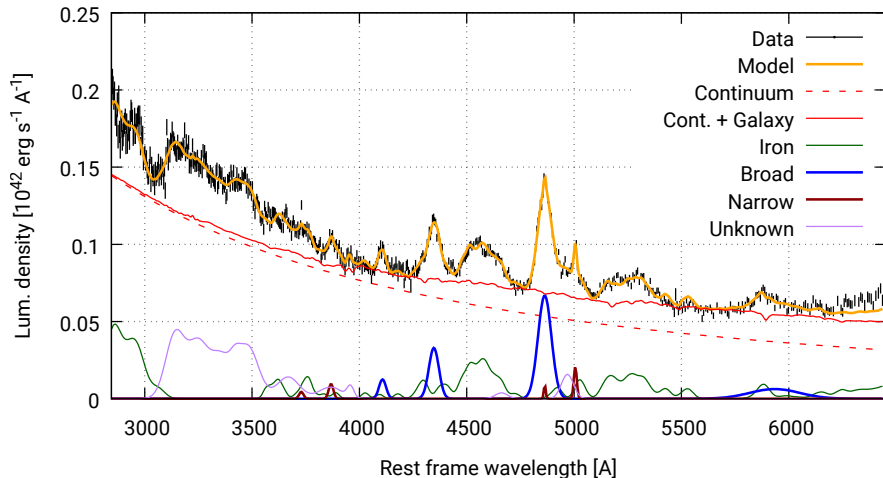
Example: low-Z

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$



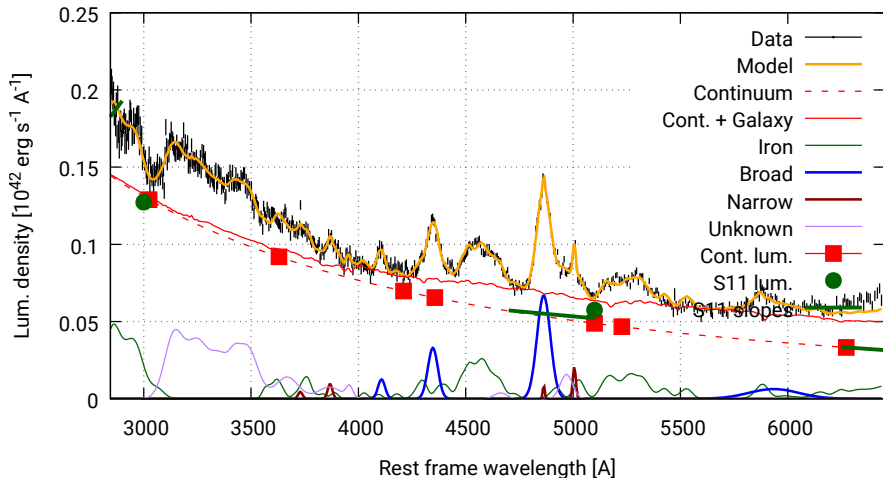
Example: low-Z

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$



Example: low-Z

spec-0752-52251-0491.fits, $z=0.3898$, $E(B-V)=0.048866$





QSFit - Quasar Spectral FITting package

QSFit is a software package to automatically perform spectral analysis of Active Galactic Nuclei (AGN) optical/UV spectra. It provides estimates of:

- AGN continuum luminosities and slopes at several rest frame wavelengths;
- host galaxy luminosities (for sources with $z < 0.8$);
- luminosities, widths and velocity offsets of 20 emission lines (H α , H β , MgII, [OIII], CIV, etc.);
- luminosities of iron blended lines at optical and UV wavelengths;
- several "quality flags" to assess the reliability of the results.

The main purpose of QSFit is to allow anyone to perform AGN spectral analysis in a simple, replicable and shareable way. The code is available on Github and can be easily customized for specific purposes.

Reference Paper

The paper has been submitted to MNRAS. You can download a draft from arXiv.

Cite as: Calderone et al., 2016, arXiv:1612.01580

Source Code (Github)

The source code can be downloaded from Github. The software is written in IDL and released under the GPL license. The prerequisites to run QSFit are IDL (ver. ≥ 8.1) and Gnuplot (ver. ≥ 5.0).

To run QSFit you should download and unzip the package from Github, then change to the directory where you unpacked the source code and start an IDL session. There is no need to change the IDL PATH system variable, QSFit provide a simple way to compile all the required procedures: simply call `compile` at the IDL prompt.

The QSFit package already comes with a SDSS DR-10 FITS file to test the code. The commands to run the analysis and plot the results are:

```
res = qsfit('data/spec-0752-52251-0323.fits', z=0.3806, ebnv=0.06846)
qsfit_plot, res
```

Further informations may be found in Appendix B of the reference paper (arXiv)

Catalog of spectral properties (ver. 1.0)

NOTE: a modern browser is required to navigate the catalog website.

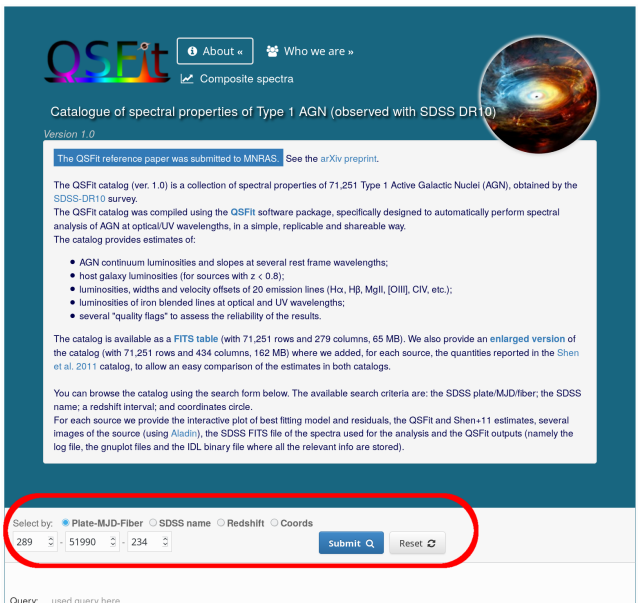
We used QSFit to analyze 71,251 optical spectra (from SDSS-DR10) of Type 1 AGN at $z < 2$, and compiled a catalog of spectral properties. The reference paper can be found here.

The catalog can be explored online or downloaded as a FITS file.

The complete data analysis can be easily replicated by running QSFit (as shown in the example above) on all the spectra in the sample.

Contacts

Giorgio Calderone (calderone@oats.inaf.it)



QSFit [About «](#) [Who we are »](#)
[Composite spectra](#)

Catalogue of spectral properties of Type 1 AGN (observed with SDSS DR10)
Version 1.0

The QSFit reference paper was submitted to MNRAS. [See the arXiv preprint.](#)

The QSFit catalog (ver. 1.0) is a collection of spectral properties of 71,251 Type 1 Active Galactic Nuclei (AGN), obtained by the SDSS-DR10 survey.

The QSFit catalog was compiled using the QSFit software package, specifically designed to automatically perform spectral analysis of AGN at optical/UV wavelengths, in a simple, replicable and shareable way.

The catalog provides estimates of:

- AGN continuum luminosities and slopes at several rest frame wavelengths;
- host galaxy luminosities (for sources with $z < 0.8$);
- luminosities, widths and velocity offsets of 20 emission lines (H α , H β , MgII, [OIII], CIV, etc.);
- luminosities of iron blended lines at optical and UV wavelengths;
- several "quality flags" to assess the reliability of the results.

The catalog is available as a FITS table (with 71,251 rows and 279 columns, 65 MB). We also provide an [enlarged version](#) of the catalog (with 71,251 rows and 434 columns, 162 MB) where we added, for each source, the quantities reported in the Shen et al. 2011 catalog, to allow an easy comparison of the estimates in both catalogs.


You can browse the catalog using the search form below. The available search criteria are: the SDSS plate/MJD/fiber; the SDSS name; a redshift interval; and coordinates circle.

For each source we provide the interactive plot of best fitting model and residuals, the QSFit and Shen+11 estimates, several images of the source (using [Aladin](#)), the SDSS FITS file of the spectra used for the analysis and the QSFit outputs (namely the log file, the gnuplot files and the IDL binary file where all the relevant info are stored).

Select by: Plate-MJD-Fiber SDSS name Redshift Coords

289 - 51990 - 234


Query: used query here



[About »](#)
 [Who we are »](#)
 [Composite spectra](#)

Catalogue of spectral properties of Type 1 AGN (observed with SDSS DR10)

Version 1.0



Select by: Plate-MJD-Fiber SDSS name Redshift Coords

0.4 +/- 0.001 Submit Reset

Show 10 entries Search:

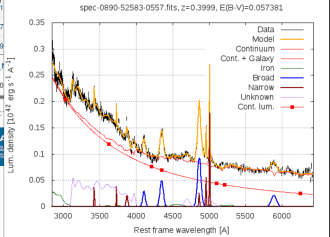
SDSS_NAME	RA *	DEC	REDSHIFT	PLATE	MJD	FIBER	GALAXY_LUM	CONT1450_LUM	CONT3000_LUM	CONTS100
003719.84+011114.6	9.332694	1.187396	0.4004	1494	52937	570	0	--	--	46
005205.56+003538.1	13.023187	0.593939	0.3993	1132	52903	510	0	--	--	26
013418.19+001536.6	23.575802	0.260191	0.4	400	51820	512	86.219	--	--	13
072840.59+391043.8	112.169151	39.178844	0.3991	1733	53047	482	44.0384	--	--	25
074528.93+294824.4	116.370552	29.806799	0.4003	889	52663	179	104.096	--	--	19
075502.11+220346.8	118.75882	22.063013	0.3997	1264	52707	204	85.1139	--	--	14
075651.50+321007.6	119.2146	32.168797	0.3999	890	52583	557	189.36	--	--	22
080700.92+310000.0							25.8042	--	--	3
082057.50+170000.0							28.5498	--	--	21
082439.10+090000.0							30.089	--	--	30

SDSS_I

Showing 1 to 10

Query: SELECT

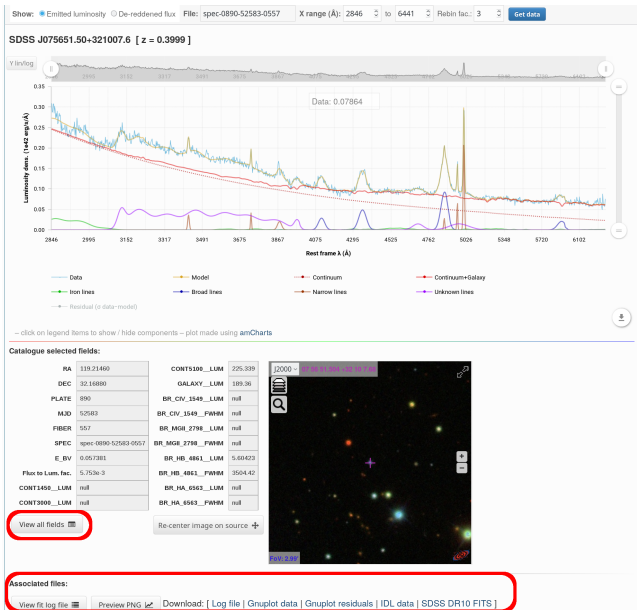
spec-0890-52583-0557.fits, z=0.3999, E(B-V)=0.057381



Y_LUM CONT1450_LUM CONT3000_LUM CONTS100

Previous 1 2 3 4 5 6 7 Next

qsfit.inaf.it/cat_1.0/chart.php?tabname=spec-0890-52583-0557





The catalog:

- 71250 sources from SDSS-DR7 Type 1 QSO catalog;
- display each source on the website;
- download the whole catalog as a FITS file;

Applications:

- black hole mass estimates through AD modeling;
- comparison of different galaxy templates;
- comparison of emission line models;
- analysis of new data;

References:

- Paper (MNRAS submitted): <https://arxiv.org/abs/1612.01580>
- QSFit website: <http://qsfit.inaf.it/>
- Github repository: <https://github.com/gcalderone/qsfit/>
- Drop of ADASS2016: <https://www.youtube.com/watch?v=6SxO54ak7kA>



The catalog:

- 71250 sources from SDSS–DR7 Type 1 QSO catalog;
- display each source on the website;
- download the whole catalog as a FITS file;

Applications:

- black hole mass estimates through AD modeling;
- comparison of different galaxy templates;
- comparison of emission line models;
- analysis of new data;

References:

- Paper (MNRAS submitted): <https://arxiv.org/abs/1612.01580>
- QSFit website: <http://qsfit.inaf.it/>
- Github repository: <https://github.com/gcalderone/qsfit/>
- Drop of ADASS2016: <https://www.youtube.com/watch?v=6SxO54ak7kA>



The catalog:

- 71250 sources from SDSS-DR7 Type 1 QSO catalog;
- display each source on the website;
- download the whole catalog as a FITS file;

Applications:

- black hole mass estimates through AD modeling;
- comparison of different galaxy templates;
- comparison of emission line models;
- analysis of new data;

References:

- Paper (MNRAS submitted): <https://arxiv.org/abs/1612.01580>
- QSFit website: <http://qsfit.inaf.it/>
- Github repository: <https://github.com/gcalderone/qsfit/>
- Drop of ADASS2016: <https://www.youtube.com/watch?v=6SxO54ak7kA>

QSFIT
AUTOMATIC ANALYSIS OF OPTICAL AGN SPECTRA

G. Calderone¹, L. Tosi², S. D'Adda³

¹ INFN-OATs, Dipartimento di Astronomia, Università di Padova, Vicenza, Italy
² Dipartimento di Astronomia, Università di Padova, Vicenza, Italy
³ Dipartimento di Astronomia, Università di Padova, Vicenza, Italy

Abstract: We present QSFIT, a Python-based software for the automatic analysis of optical AGN spectra. The software is designed to be used in conjunction with the SDSS-DR7 Type 1 QSO catalog. It provides a complete pipeline for the analysis of the spectra, from the extraction of the data to the fitting of the models. The software is available as a GitHub repository and as a Docker container.

Key words: AGN, Spectroscopy, Software, Python, SDSS-DR7

Introduction: The study of the optical AGN spectra is a key component in the understanding of the physical processes that power these objects. The automatic analysis of these spectra is a challenging task, due to the large number of sources and the complexity of the models. QSFIT is designed to address this challenge by providing a complete pipeline for the analysis of the spectra, from the extraction of the data to the fitting of the models.

Method: QSFIT is implemented in Python and uses the SDSS-DR7 Type 1 QSO catalog as input. The software is designed to be used in conjunction with the SDSS-DR7 Type 1 QSO catalog. It provides a complete pipeline for the analysis of the spectra, from the extraction of the data to the fitting of the models.

Results: QSFIT has been applied to a sample of 71250 sources from the SDSS-DR7 Type 1 QSO catalog. The software has successfully analyzed all the spectra and provided a complete set of parameters for each source. The results are available as a FITS file.

Conclusions: QSFIT is a powerful tool for the automatic analysis of optical AGN spectra. It provides a complete pipeline for the analysis of the spectra, from the extraction of the data to the fitting of the models. The software is available as a GitHub repository and as a Docker container.

References: [1] Calderone et al. (2016), MNRAS, submitted. [2] Tosi et al. (2016), MNRAS, submitted. [3] D'Adda et al. (2016), MNRAS, submitted.

The catalog:

- 71250 sources from SDSS–DR7 Type 1 QSO catalog;
- display each source on the website;
- download the whole catalog as a FITS file;

Applications:

- black hole mass estimates through AD modeling;
- comparison of different galaxy templates;
- comparison of emission line models;
- analysis of new data;

References:

- Paper (MNRAS submitted): <https://arxiv.org/abs/1612.01580>
- QSFIT website: <http://qsfit.inaf.it/>
- Github repository: <https://github.com/gcalderone/qsfit/>
- Drop of ADASS2016: <https://www.youtube.com/watch?v=6SxO54ak7kA>