

# How to add a spectrum in AOTS

## 1 Login

When navigating to <http://a15.astro.physik.uni-potsdam.de>, you will end on the landing page where the publicly available projects are displayed. From there you can login by clicking on “LOG IN” in the top right corner.



Figure 1: Landing page

This will bring you to the login page where you can log in with the user name and password you received.

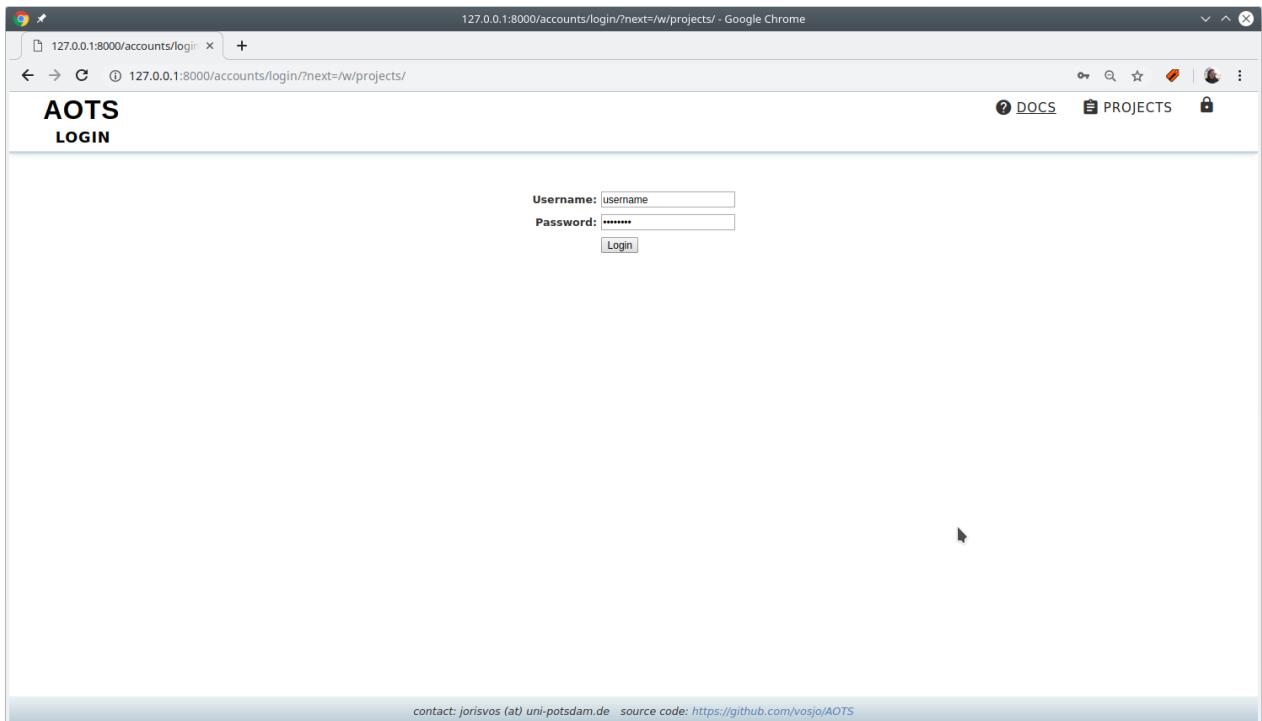


Figure 2: Login page

Note: By hovering over “LOG IN” you also can reset or change your password by selecting ”RESET PASSWORD” or ”CHANGE PASSWORD”, respectively.

## 2 Uploading spectra

After login you will be redirected to the AOTS landing page. Here you can now select the project that you want to work on by clicking on the name of the project. For example we want to add a spectrum to the “The hot subdwarf catalog”.

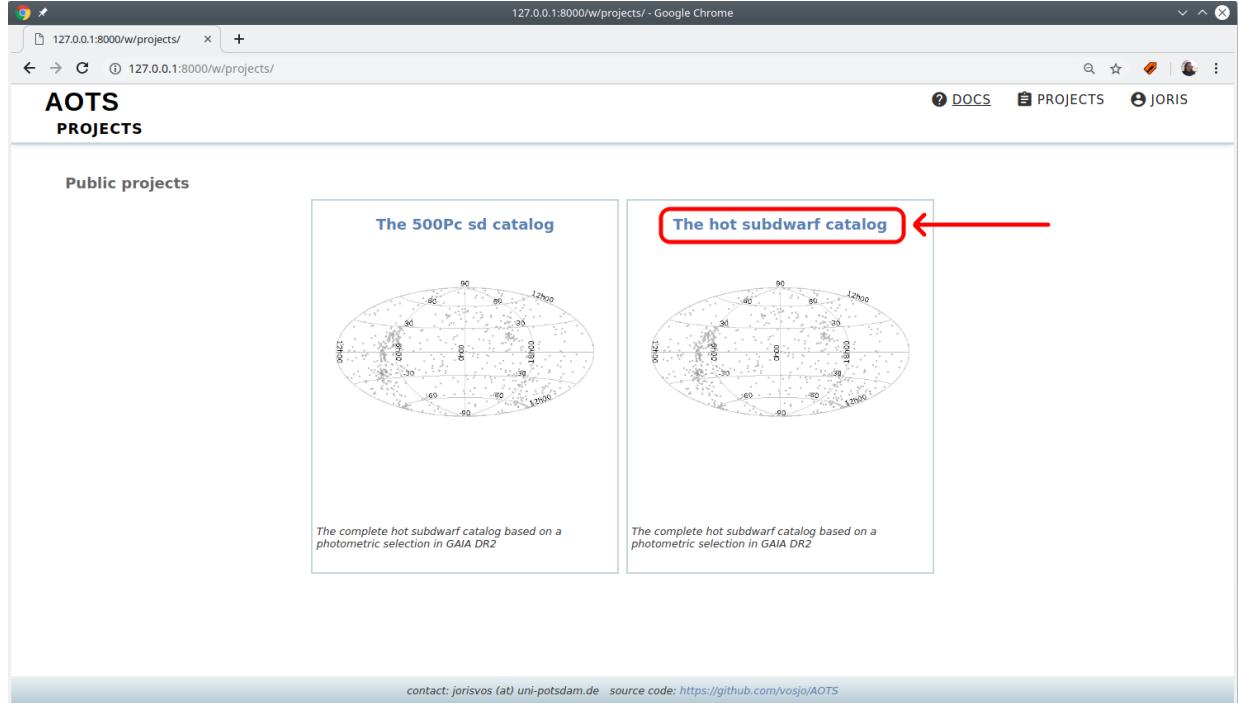


Figure 3: Landing page after login

### 2.1 Uploading reduced spectra

You will end up on the systems index page that lists all systems that are part of this project. To add a spectrum, navigate to “OBSERVATIONS” → “SPECTRA” → “UPLOAD” in the top navigation bar:

AOTS: The hot subdwarf catalog								SYSTEMS: INDEX (THE HOT SUBDWARF CATALOG)		OBSERVATIONS		ANALYSIS		LOG IN		
										SPECTRA	LIGHT CURVES	OBSERVATORIES	OVERVIEW	FILE LIST	RAW FILES	
										UPLOAD NEW						
Name	RA	Dec	Class	G-mag	Nobs	Datasets	Tags									
SB937	00:00:04.03	-33:35:19.16		14.23	17 / 0 / 0		<a href="#">GAIA catalog</a>									
PHL615	00:00:05.19	-17:08:51.45	sdO	16.8	4 / 0 / 0		<a href="#">GAIA catalog</a>	<a href="#">SPEC catalog</a>								
PG2357+174	00:00:15.76	+17:38:52.96	sdB	16.55	18 / 0 / 0		<a href="#">GAIA catalog</a>	<a href="#">SPEC catalog</a>								
UVEXJ000016.27+603246.3	00:00:16.27	+60:32:46.32		16.57	7 / 0 / 0		<a href="#">GAIA catalog</a>									
HS2357+2201	00:00:18.40	+22:18:02.96	sdB	14.24	22 / 1 / 0		<a href="#">GAIA catalog</a>	<a href="#">SPEC catalog</a>								
MCT2357-3331	00:00:20.09	-33:14:59.49	sdB	16.5	9 / 0 / 0		<a href="#">GAIA catalog</a>	<a href="#">SPEC catalog</a>								
SDSSJ000028.22+322727.1	00:00:28.22	+32:27:27.22		15.87	20 / 0 / 0		<a href="#">GAIA catalog</a>									
J000042.3+362809	00:00:42.31	+36:28:09.43		18.8	5 / 0 / 0		<a href="#">GAIA catalog</a>									
J000043.8+802855	00:00:43.80	+80:28:55.48		18.51	3 / 0 / 0		<a href="#">GAIA catalog</a>									
J000053.4+465337	00:00:53.37	+46:53:37.08		16.95	4 / 0 / 0		<a href="#">GAIA catalog</a>									
PG2358+107	00:01:06.73	+11:00:36.32	sdB	13.61	22 / 1 / 0		<a href="#">GAIA catalog</a>	<a href="#">SPEC catalog</a>								
SDSSJ000111.65+000342.6	00:01:11.65	+00:03:42.69	sdOB	19.27	10 / 0 / 0		<a href="#">SPEC catalog</a>									
SDSSJ000112.66+325701.0	00:01:12.66	+32:57:01.14		16.78	13 / 0 / 0		<a href="#">GAIA catalog</a>									
BPSCS22957-23	00:01:32.25	-05:19:17.77	sdB	13.51	22 / 0 / 0		<a href="#">SPEC catalog</a>									
MCT2359-3556	00:01:37.64	-35:39:53.46	sdB	14.48	17 / 0 / 1		<a href="#">GAIA catalog</a>	<a href="#">SPEC catalog</a>								

Figure 4: System page

At the top of this page is an upload form where you can select one or more spectra in fits format or as simple txt files to upload them to the database.

## AOTS: The hot subdwarf catalog

[ADD A NEW SPECTRUM](#)

[DOCS](#) [PROJECTS](#) [SYSTEMS](#) [OBSERVATIONS](#) [ANALYSIS](#) [ADMIN](#)

**File selection**  
(required)

File(s), .txt or .fits: [Browse...](#) No files selected.

**Header information**  
(the underlined quantities are required for .text files or if they are not included in the Header)

Add to/Modify Header data:

<b>Target</b>	<b>Instrument and setup</b>	<b>Weather and conditions</b>
Target: <input type="text"/> Ra: <input type="text"/> h:m:s or d:d° Dec: <input type="text"/> °:':": or dd° Create new: <input checked="" type="checkbox"/> Spectral type: <input type="text"/> Classification type: Photometric	HJD-MID: <input type="text"/> Telescope: <input type="text"/> Instrument: <input type="text"/> Exptime (s): <input type="text"/> Resolution: <input type="text"/> SNR: <input type="text"/> Flux calibrated: <input type="checkbox"/> Flux units: <input type="text"/>	Wind direction (deg): <input type="text"/> Wind speed (m/s): <input type="text"/> Seeing ("'): <input type="text"/> Airmass: <input type="text"/>
<b>Observer</b>		<b>Spectrum infos</b>
Observer name: <input type="text"/>		Barycentric corrected: <input checked="" type="checkbox"/> Normalized: <input type="checkbox"/> File label: <input type="text"/>
<b>Observatory</b>	<b>Note</b>	
Observatory: <input type="text"/> Name: <input type="text"/> Is spacecraft: <input type="checkbox"/> Latitude (deg): <input type="text"/> Longitude (deg): <input type="text"/> Altitude (m): <input type="text"/>		

Upload

Figure 5: Spectrum upload page

AOTS tries to extract all necessary data automatically from the fits headers. See Sect. 2.2 for a list of all fully supported file types and the recognized keywords.

The extracted header information can be completed or overwritten by the form in the “Header information” section. To activate this form select “Add to/Modify Header data”. Most of the parameters are optional. The underlined quantities: “Target”, “Ra”, “Dec”, “HJD-MID” are required, if they are not included in the fits header. In addition, an “Observatory” must be selected or the necessary information (“Name”, “Is spacecraft”, “Latitude (deg)”, “Longitude (deg)”, “Altitude (m)”) to create a new observatory must be provided. However, in most cases the observatory can be identified or newly created based on the fits header information.

## AOTS: The hot subdwarf catalog

[ADD A NEW SPECTRUM](#)

[DOCS](#) [PROJECTS](#) [SYSTEMS](#) [OBSERVATIONS](#) [ANALYSIS](#) [ADMIN](#)

**File selection**  
(required)

File(s), .txt or .fits: [Browse...](#) No files selected.

**Header information**  
(the underlined quantities are required for .text files or if they are not included in the Header)

Add to/Modify Header data:

<b>Target</b>	<b>Instrument and setup</b>	<b>Weather and conditions</b>
Target: <input type="text"/> Ra: <input type="text"/> h:m:s or d:d° Dec: <input type="text"/> °:':": or dd° Create new: <input checked="" type="checkbox"/> Spectral type: <input type="text"/> Classification type: Photometric	HJD-MID: <input type="text"/> Telescope: <input type="text"/> Instrument: <input type="text"/> Exptime (s): <input type="text"/> Resolution: <input type="text"/> SNR: <input type="text"/> Flux calibrated: <input type="checkbox"/> Flux units: <input type="text"/>	Wind direction (deg): <input type="text"/> Wind speed (m/s): <input type="text"/> Seeing ("'): <input type="text"/> Airmass: <input type="text"/>
<b>Observer</b>		<b>Spectrum infos</b>
Observer name: <input type="text"/>		Barycentric corrected: <input checked="" type="checkbox"/> Normalized: <input type="checkbox"/> File label: <input type="text"/>
<b>Observatory</b>	<b>Note</b>	
Observatory: <input type="text"/> Name: <input type="text"/> Is spacecraft: <input type="checkbox"/> Latitude (deg): <input type="text"/> Longitude (deg): <input type="text"/> Altitude (m): <input type="text"/>		

Upload

Figure 6: Spectrum upload page with activated form

txt files are expected to be a simple two-column table with the wavelength in the first column and the flux in the

second column. For txt files, filling in the header information form is mandatory. Required are, as described above, the underlined quantities. However, as many fields as possible should be filled in.

After pressing the upload button the spectra will be processed by AOTS and you will be redirected to the spectrum files page, which can also be reached from the top navigation bar via “OBSERVATIONS” → “SPECTRA” → “FILE LIST”. A confirmation notice for the upload is displayed at the top of this page to confirm that everything went well. The newly uploaded spectrum will be added to the list of “Uploaded files”. (You might have to sort on “Added on” to find the spectrum).

**AOTS: The hot subdwarf catalog**  
SPECTRUM FILES

Specfile added to new Spectrum OES@ZEISS-2m - 2459489.39878472 (Target: BD+11 78), and added to new System BD+11 78: 10.05 12.01

Upload new Spectra

**Uploaded files**  
(multiple files might be combined into a single spectrum)

HJD	Instrument	Filetype	Filename	Added on	System	Processed	Action
2457541.20972222	LRS	LAMOST_DR5_NAOC-LAMOST_462005158	spec-57541-HD173133N504043M01_sp05-158.fits	2019-02-07 12:11:34	PG1729+500	Yes	
2457541.28958333	LRS	LAMOST_DR5_NAOC-LAMOST_462109242	spec-57541-HD200108N143123B01_sp09-242.fits	2019-02-07 12:13:54	J200654.9+144254	Yes	
2457542.11458333	LRS	LAMOST_DR5_NAOC-LAMOST_462202202	spec-57542-HD152630N280739B02_sp02-202.fits	2019-02-07 12:13:39	Ton228	Yes	
2457542.11458333	LRS	LAMOST_DR5_NAOC-LAMOST_462211151	spec-57542-HD152630N280739B02_sp11-151.fits	2019-02-07 12:13:46	Ton231	Yes	
2458577.88804791	Goodman Spectro	UK	calF_J1648-0447.ms.fits	2019-10-01 15:07:38	J164806.3-044725	Yes	
2459489.39878472	OES	UK	BD1178_20211001.fits	2022-01-07 23:17:31	BD+11 78	Yes	

Figure 7: Spectral file list - after upload - In this example a OES spectrum (taken with the ZEISS 2m telescope in Ondrejov) of BD+11 78 was uploaded

To add further spectra files click on the large button below “Upload new Spectra”, which will take you again to the spectrum upload page.

**AOTS: The hot subdwarf catalog**  
SPECTRUM FILES

Specfile added to new Spectrum OES@ZEISS-2m - 2459489.39878472 (Target: BD+11 78), and added to new System BD+11 78: 10.05 12.01

Upload new Spectra

**Uploaded files**  
(multiple files might be combined into a single spectrum)

HJD	Instrument	Filetype	Filename	Added on	System	Processed	Action
2418024.5	UK	UK	113840-003531_sdss_c_org_Gc29GPE.fits	2020-03-11 14:58:54	TYC 178-2608-1	Yes	
2451609.90121852	SDSS spectrograph	SDSS_final	spec-0292-51609-0013.fits	2019-02-04 15:22:16	SDSSJ125410.86-010408.3	Yes	
2451633.64341076	SDSS spectrograph	SDSS_final	spec-0268-51633-0008.fits	2019-02-04 15:24:26	SDSSJ100019.98-003413.3	Yes	
2451637.89862766	SDSS spectrograph	SDSS_final	spec-0306-51637-0194.fits	2019-02-04 15:21:27	LBQS1429-0015	Yes	
2451662.84851852	SDSS	SDSS_final	spec-0308-51662-0436.fits	2019-02-15 08:21:25	SDSSJ14514.93+000248.9	Yes	
2451665.89720289	SDSS spectrograph	SDSS_final	spec-0311-51665-0575.fits	2019-02-04 15:23:29	SDSSJ151231.28+005317.7	Yes	
2451666.78490475	SDSS	SDSS_final	spec-0300-51666-0081.fits	2019-02-15 08:20:02	SDSSJ135025.81-011035.6	Yes	
2451671.76853368	SDSS	SDSS_final	spec-0299-51671-0592.fits	2019-02-15 08:20:27	SDSSJ134545.22-000641.6	Yes	
2451671.89448472	SDSS spectrograph	SDSS_final	spec-0348-51671-0074.fits	2019-02-04 15:21:57	SDSSJ163815.97-001919.1	Yes	
2451671.89448472	SDSS spectrograph	SDSS_final	spec-0348-51671-0043.fits	2019-02-04 15:24:47	SDSSJ163702.79-011351.7	Yes	

Figure 8: Spectral file list - Upload button

Multiple uploaded files might be automatically combined into a single spectrum, if they belong to the same system (measured based on the right ascension and declination) and are taken at approximately the same time with the same instrument. If you click on “spectrum” be taken to the main spectrum page, which you can also access from the top

navigation bar by clicking on “OBSERVATIONS” → “SPECTRA” → “OVERVIEW”.

HJD	Instrument	Filetype	Filename	Added on	System	Processed	Action
2418024.5	UK	UK	113840-003531_sdss_c_org_Gcz9GPE.fits	2020-03-11 14:58:54	TYC 178-2608-1	Yes	
2451609.90121852	SDSS spectrograph	SDSS_final	spec-0292-51609-0013.fits	2019-02-04 15:22:16	SDSSJ125410.86-010408.3	Yes	
2451633.64341076	SDSS spectrograph	SDSS_final	spec-0268-51633-0008.fits	2019-02-04 15:24:26	SDSSJ100019.98-003413.3	Yes	
2451637.89862766	SDSS spectrograph	SDSS_final	spec-0306-51637-0194.fits	2019-02-04 15:21:27	LBQS1429-0015	Yes	
2451662.84851852	SDSS	SDSS_final	spec-0308-51662-0436.fits	2019-02-15 08:21:25	SDSSJ144514.93+000248.9	Yes	
2451665.89720289	SDSS spectrograph	SDSS_final	spec-0311-51665-0575.fits	2019-02-04 15:23:29	SDSSJ151231.28+005317.7	Yes	
2451666.78490475	SDSS	SDSS_final	spec-0300-51666-0081.fits	2019-02-15 08:20:02	SDSSJ135025.81-011035.6	Yes	
2451671.76853368	SDSS	SDSS_final	spec-0299-51671-0592.fits	2019-02-15 08:20:27	SDSSJ134545.22-000641.6	Yes	
2451671.89448472	SDSS spectrograph	SDSS_final	spec-0348-51671-0074.fits	2019-02-04 15:21:57	SDSSJ163815.97-001919.1	Yes	
2451671.89448472	SDSS spectrograph	SDSS_final	spec-0348-51671-0043.fits	2019-02-04 15:24:47	SDSSJ163702.79-011351.7	Yes	

Figure 9: Spectral file list - Link to spectra overview page

If you click on the “Yes” in the “Processed” column, you will be taken to the spectrum details page where you can check the added spectrum. You can check the associated system by clicking on the system name in the “System” column.

Figure 10: Spectrum detail page

## 2.2 Recognized header keywords (reduced spectra)

Multiple types of fits files are recognized by AOTS:

- ESO phase 3
- ESO Reflex fits files

- FEROS fits files from the CERES pipeline
- HERMES fits files
- SDSS fits files
- LAMOST fits files
- MODS fits files

For all other spectra in fits format the following header keywords are recognized:

Keyword	explanation
HJD, BJD, MJD, DATE-OBS	time at mid observation
OBJECT	object name
RA	right ascension in decimal degrees or in hours (hexadecimal)
DEC	declination in degrees, decimal of hexadecimal
INSTRUME	instrument
TELESCOP	telescope
EXPTIME	exposure time in seconds
OBSERVER	name of the observer
SPEC.RES	spectral resolution
SNR	signal to noise ratio
SEEING	seeing during the observation

## 2.3 Uploading raw data

To add raw data to reduced spectrum files, navigate to “OBSERVATIONS” → “SPECTRA” → “RAW FILES” in the top navigation bar:

The screenshot shows the AOTS system interface with the following details:

- Navigation Bar:** Includes links for DOCS, PROJECTS, SYSTEMS, OBSERVATIONS (selected), SPECTRA, ANALYSIS, and ADMIN.
- Sub-navigation:** Under OBSERVATIONS, it shows LIGHT CURVES and OBSERVATORIES.
- Content Area:** A table listing 41,239 entries. The columns are: Name, RA, Dec, Class, G-mag, Nobs, Datasets, Tags, and Status.
- Table Headers:** The first row of the table has a light blue background.
- Table Data:** Each entry includes a checkbox, coordinates, class, magnitude, number of observations, datasets, and a row of buttons for catalog tags.
- Pagination:** At the bottom, it shows "Showing 1 to 50 of 41,239 entries" and a page navigation bar with buttons for 1, 2, 3, 4, 5, ..., 825, Next.

Figure 11: System page

The page that opens shows a table with the already existing raw datasets. In the toolbar of this table the button “Add Raw spectra” has to be clicked next.

<input type="checkbox"/>	Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
<input type="checkbox"/>	2021-04-22	OES	Dark	0	e202104220006.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220012.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220028.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220025.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220017.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220015.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Science	3600	e202104220032.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220029.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220026.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Dark	1	e202104220008.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220019.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220018.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Dark	1	e202104220005.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220016.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Science	3600	e202104220034.fit	2022-01-08 20:09:39	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Science	3600	e202104220033.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107

Figure 12: Raw file page

A popup opens, which shows the systems and reduced spectra available in the database in the middle area. If one or more reduced spectra already exist for the raw data to be uploaded, the raw data must be assigned to these spectra. For this purpose, these spectra must be selected in “Reduced spectra”.

If the raw data are not yet reduced, they can be assigned to the systems for which they were acquired. Hence, the respective systems must be marked in this case. If the systems do not exist in the database yet, they have to be created beforehand via the system page.

<input type="checkbox"/>	Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
<input type="checkbox"/>	2021-04-22	OES	Dark	0	e202104220006.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220012.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220028.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220025.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220017.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220015.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Science	3600	e202104220032.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220029.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Wavelength	5	e202104220026.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Dark	1	e202104220008.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220019.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220018.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Dark	1	e202104220005.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Flat	25	e202104220016.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Science	3600	e202104220034.fit	2022-01-08 20:09:39	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22	OES	Science	3600	e202104220033.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107

Add raw data

Filter systems and spectra  
System name (main id):  Observation date:

Allocate raw data either to system(s) (if data are not reduced yet) or to reduced spectra

Systems:	<input type="checkbox"/> J004601.3-410636	<input type="checkbox"/> J071838.0-835750
	<input type="checkbox"/> J071842.7-811247	<input type="checkbox"/> 2015-10-31 11:34:00 - LRS
	<input type="checkbox"/> J071843.3+250844	<input type="checkbox"/> 2015-09-14 12:43:00 - LRS
	<input type="checkbox"/> (Reset field by double click)	<input type="checkbox"/> 2012-01-01 00:00:00 - SDSS
	<input type="checkbox"/> (Reset field by double click)	<input type="checkbox"/> 2001-12-22 21:02:31 - SDSS spectra

Select raw data  
 No files selected.

Figure 13: Raw file page with upload popup

To simplify the selection of the correct spectra or systems, the “System name” and “Observation date” fields can be used to filter the “Systems” and “Reduced spectra”. Simply enter the name of the system and/or the observation date in the corresponding field.

Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
2021-04-22	OES	Dark	0	e202104220006.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220012.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220019.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220018.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
2021-04-22	OES	Dark	1	e202104220005.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220016.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES	Science	3600	e202104220034.fit	2022-01-08 20:09:39	✓	PG2359+197, PG2358+107
2021-04-22	OES	Science	3600	e202104220033.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107

Figure 14: Raw file page with “System name” and “Observation date” filter applied

In addition, by selecting one or more systems in the “Systems” field, it is possible to limit the selection of displayed spectra to those belonging to the selected systems. Multiple selections are possible, so that e.g. flats, darks, and biases for all targets of a night can be uploaded at once.

Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
2021-04-22	OES	Dark	0	e202104220006.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220012.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES						PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220019.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220018.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107
2021-04-22	OES	Dark	1	e202104220005.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES	Flat	25	e202104220016.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
2021-04-22	OES	Science	3600	e202104220034.fit	2022-01-08 20:09:39	✓	PG2359+197, PG2358+107
2021-04-22	OES	Science	3600	e202104220033.fit	2022-01-08 20:09:40	✓	PG2359+197, PG2358+107

Figure 15: Raw file page with filtered spectra based on “System” selection

Finally, the files to be uploaded must be selected. Multiple raw files can be uploaded at once. In the example below, the four files to be uploaded are not yet reduced. Therefore, a system (TCY763-281-1) was selected for which, as can be seen, no reduced spectrum exists in the database yet. Files to be uploaded must be in FITS format.

The screenshot shows the AOTS interface with the title "AOTS: The hot subdwarf catalog" and "SPECTRUM RAW FILES". At the top, there are navigation links: DOCS, PROJECTS, SYSTEMS, OBSERVATIONS, ANALYSIS, and ADMIN. Below the title, a table lists raw files with columns: Observation date, Instrument, File type, Exposure time, File name, Added on, Reduced, and Systems. An "Add Raw spectra" button is visible above the table. A modal dialog box titled "Add raw data" is open, containing fields for "System name (main id):" (set to "TYC763") and "Observation date:" (empty). It also contains a section for "Allocate raw data either to system(s) (if data are not reduced yet) or to reduced spectra" with three options: "TYC763-281-1", "TYC763-376-1", and "TYC763-1541-1". A "Reduced spectra:" field is also present. At the bottom of the dialog, there are "Select raw data" and "Browse..." buttons, and a red-bordered "Upload raw data" button. The main table shows 20 entries of raw files, all of which are currently not reduced (indicated by a green checkmark in the "Reduced" column).

Figure 16: Raw file page with files to be uploaded selected

After pressing the upload button, a progress bar is displayed to illustrate the progress of the upload. Since raw data is usually quite large, the upload process can take a considerable amount of time.

The screenshot shows the same AOTS interface as Figure 16, but with a progress bar visible in the "Add Raw spectra" button area, indicating that the upload process is in progress. The table of raw files remains the same, showing 20 entries. The "Reduced" column now contains several red "X" marks, indicating that the upload process has started for those specific files.

Figure 17: Raw file page with upload progress bar

AOTS will process the files and display a confirmation notice for the upload at the top of the page to confirm that everything went well. The newly uploaded spectrum will be added to the table. In this table, the “Reduced” column now also shows whether the raw data is already reduced or not. In accordance with our upload, four new unreduced spectra have now appeared in the table.

<input type="checkbox"/>	Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
<input type="checkbox"/>	2021-04-22 18:11:35	OES	Dark	1	e202104220001.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:12:19	OES	Dark	1	e202104220002.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:13:03	OES	Dark	0	e202104220003.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:13:46	OES	Dark	1	e202104220004.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:14:30	OES	Dark	1	e202104220005.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:15:14	OES	Dark	0	e202104220006.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:15:57	OES	Dark	1	e202104220007.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:16:41	OES	Dark	1	e202104220008.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:17:25	OES	Dark	0	e202104220009.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:18:08	OES	Dark	1	e202104220010.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:20:50	OES	Flat	25	e202104220011.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:21:58	OES	Flat	25	e202104220012.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:23:06	OES	Flat	25	e202104220013.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:24:14	OES	Flat	25	e202104220014.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:25:22	OES	Flat	25	e202104220015.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107

Figure 18: Raw file page - Upload complete

This table also lists the “File type” that is derived from the “IMAGETYP” fits header keyword. All recognized fits header keywords are listed in the Table in Sect. 2.4. You can check the systems associated with the raw data by clicking on the system name in the “Systems” column.

<input type="checkbox"/>	Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
<input type="checkbox"/>	2021-04-22 18:11:35	OES	Dark	1	e202104220001.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:12:19	OES	Dark	1	e202104220002.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:13:03	OES	Dark	0	e202104220003.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:13:46	OES	Dark	1	e202104220004.fits	2022-04-21 10:43:33	<span style="color:red;">X</span>	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:14:30	OES	Dark	1	e202104220005.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:15:14	OES	Dark	0	e202104220006.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:15:57	OES	Dark	1	e202104220007.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:16:41	OES	Dark	1	e202104220008.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:17:25	OES	Dark	0	e202104220009.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:18:08	OES	Dark	1	e202104220010.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:20:50	OES	Flat	25	e202104220011.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:21:58	OES	Flat	25	e202104220012.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:23:06	OES	Flat	25	e202104220013.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:24:14	OES	Flat	25	e202104220014.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:25:22	OES	Flat	25	e202104220015.fits	2022-01-08 20:09:41	<span style="color:green;">✓</span>	PG2359+197, PG2358+107

Figure 19: Raw file page - Popup

## 2.4 Recognized header keywords (raw data)

For all raw files the following header keywords are recognized:

Keyword	explanation
HJD, BJD, MJD, DATE-OBS	time at mid observation
OBJECT	object name
RA	right ascension in decimal degrees or in hours (hexadecimal)
DEC	declination in degrees, decimal of hexadecimal
INSTRUME	instrument
TELESCOP	telescope
EXPTIME	exposure time in seconds
OBSERVER	name of the observer
IMAGETYP	file type

## 2.5 Change file allocations

Besides the upload function, there is also the possibility to adjust the allocations between raw data and the respective reduced spectra. This may be necessary if a mistake was made during the raw data upload or if a reduced spectrum is now available in the database for previously unreduced data.

To achieve this, the raw data for which the allocation is to be changed must first be marked in the table. Then the corresponding menu can be opened via the button “Change file allocations”.

The screenshot shows a table titled "SPECTRUM RAW FILES". The columns are: Observation date, Instrument, File type, Exposure time, File name, Added on, Reduced, and Systems. Two rows are selected and highlighted with a red box. The first row has Observation date 2021-04-22 18:11:35, Instrument OES, File type Dark, Exposure time 1, File name e202104220001.fit, Added on 2022-04-21 10:43:33, Reduced X, and Systems TYC763-281-1. The second row has Observation date 2021-04-22 18:12:19, Instrument OES, File type Dark, Exposure time 1, File name e202104220002.fit, Added on 2022-04-21 10:43:33, Reduced X, and Systems TYC763-281-1. Other rows show various observations with different file types (Dark, Flat) and exposure times (0, 1, 25). The "Change file allocations" button is located at the top right of the table area.

Figure 20: Change file allocations - Open menu

The form fields in this popup are basically the same as in the raw data upload dialog we described above. The only thing missing here is the menu item that allows you to select new files and the “Upload” button is replaced by an “Update” button.

The screenshot shows a table of raw spectra with columns for Observation date, Instrument, File type, Exposure time, File name, Added on, Reduced, and Systems. An 'Adjust file allocations' dialog is overlaid on the table. The dialog has fields for 'System name (main id)' and 'Observation date'. Below these are two lists: 'Systems:' and 'Reduced spectra:'. The 'Systems:' list contains several entries, and the 'Reduced spectra:' list contains entries like '2015-10-31 11:34:00 - LRS' and '2015-09-14 12:43:00 - LRS'. A red box highlights the 'Adjust file allocations' dialog.

Figure 21: Change file allocations - Open menu

In our case here, we want to assign two of the files previously uploaded in Sect. 2.3 to another system or, more precisely, to the corresponding reduced spectrum. To do this, first filter the systems as described above and then select the corresponding system so that only the spectrum we are interested in is displayed under “Reduced Spectra”. After we have marked this spectrum, we can press the “Update” button.

The screenshot shows the same interface as Figure 21, but with specific filters applied. In the 'System name (main id)' field, 'PG2359' is entered. In the 'Reduced spectra:' list, the entry '2015-12-03 10:46:00 - LRS' is selected. A red box highlights the 'Update' button at the bottom right of the dialog. The rest of the table and interface are identical to Figure 21.

Figure 22: Change file allocations - Select the right spectrum

Subsequently, you can see in the table that, as you might expect, both the “Systems” and “Reduced” columns have changed. The raw data is now assigned to the new system and the status has changed to “reduced”.

<input type="checkbox"/>	Observation date	Instrument	File type	Exposure time	File name	Added on	Reduced	Systems
<input type="checkbox"/>	2021-04-22 18:11:35	OES	Dark	1	e202104220001.fit	2022-04-21 10:43:33	✓	PG2359+197, TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:12:19	OES	Dark	1	e202104220002.fit	2022-04-21 10:43:33	✓	PG2359+197, TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:13:03	OES	Dark	0	e202104220003.fit	2022-04-21 10:43:33	✗	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:13:46	OES	Dark	1	e202104220004.fit	2022-04-21 10:43:33	✗	TYC763-281-1
<input type="checkbox"/>	2021-04-22 18:14:30	OES	Dark	1	e202104220005.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:15:14	OES	Dark	0	e202104220006.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:15:57	OES	Dark	1	e202104220007.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:16:41	OES	Dark	1	e202104220008.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:17:25	OES	Dark	0	e202104220009.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:18:08	OES	Dark	1	e202104220010.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:20:50	OES	Flat	25	e202104220011.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:21:58	OES	Flat	25	e202104220012.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:23:06	OES	Flat	25	e202104220013.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:24:14	OES	Flat	25	e202104220014.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:25:22	OES	Flat	25	e202104220015.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107
<input type="checkbox"/>	2021-04-22 18:26:30	OES	Flat	25	e202104220016.fit	2022-01-08 20:09:41	✓	PG2359+197, PG2358+107

Figure 23: Change file allocations - Success