catalogue

Expert Spectrum Platform Operation Manual

I. Service population and content

The expert Spectrum Platform is a scientific, popular science and teaching support service system integrating spectrum data management and spectrum visualization analysis. The platform mainly provides services for astronomers, astronomy educators, graduate students in the direction of astronomy, undergraduate students in astrophysics, and middle school astronomy enthusiasts.

Using this system, astronomers and their followers will be able to quickly enter the visual analysis phase, search for special objects more efficiently; at the same time, combined with AI technology around low SNR spectra, machines can dig up as much valuable information as possible, and the difficulty of manual spectrum recognition will be significantly reduced.

Using this system, astronomical educators and their followers will be able to carry out research activities such as artificial spectrum recognition and special celestial body search in a team collaboration way in the teaching process, so as to realize research-oriented quality education with astronomical characteristics.

Using this system, schools and planetariums will be able to mobilize the public to process astronomical spectroscopy data that requires a lot of human intervention, gradually digesting the unknown spectra produced by large astronomical survey equipment such as LAMOST.

Throughout the life cycle of the system, algorithms invented by scientists will be continuously integrated to improve and perfect related services.

2. Usage process for ordinary users

1、 After getting a basic understanding of the platform services from various channels, register as a user of the platform.

2、 Browse the spectral classification on the platform, observe various spectral templates, emission lines and absorption lines, and summarize the spectral template characteristics of different celestial bodies.

3. Browse public data resources (PUBLIC DB) on the platform, observe stellar catalog data, and examine the visualization effects of spectral data; make an initial AI classification; call up the corresponding spectral template for shape comparison; refer to emission and absorption lines, adjust the redshift value (proper motion velocity) to achieve precise matching. If precise matching is not possible, use other templates.

4 I will improve my personal information, be invited to participate in the working group, and contribute to the astronomical cause.

5. Browse the data resources of the Working Group (GROUP DB), observe the star table data, observe the spectral data, and search for special objects through visual analysis.

6. Check whether there are astronomers and astronomy educators in the same group who have issued tasks (visible only if you are a participant), receive tasks, and carry out research work or research-based learning work.

7 Mark the spectral properties on the task processing interface of the working group and submit the research results.

8. Check the audit results of the task publisher after a few days. If there are spectral labels that fail to pass the audit, resume work, re-label the spectral properties, and submit the research results. Failure to pass the audit indicates obvious errors.

9. Check the review results of the task publisher after a few days until all the results are approved. Approval does not mean that the results are correct.

After one to two years of training, I was fully recognized by the astronomers and astronomy educators in the same group, became a senior user of the system, and was authorized as the administrator of the working group by the leader of the group to assist the leader of the group in carrying out his work.

11. Senior users can become group leaders after being recommended by the system administrator, create working groups, add members, publish tasks in the group, and invite members of the same group to complete tasks together.

3. User registration and login

3.1 register

Use cases: The R&D team directly invites astronomers to register; the R&D team directly invites astronomy educators to register; astronomers invite their colleagues to register; astronomy educators invite their students to register. Invited individuals confirm that they have not yet registered on the platform and prepare to register.

1. Enter the platform URL "https://nadc.china-vo.org /speczoo" in the PC browser to enter the login page of the Expert Spectrum Recognition Platform. You can also log in through NADC.

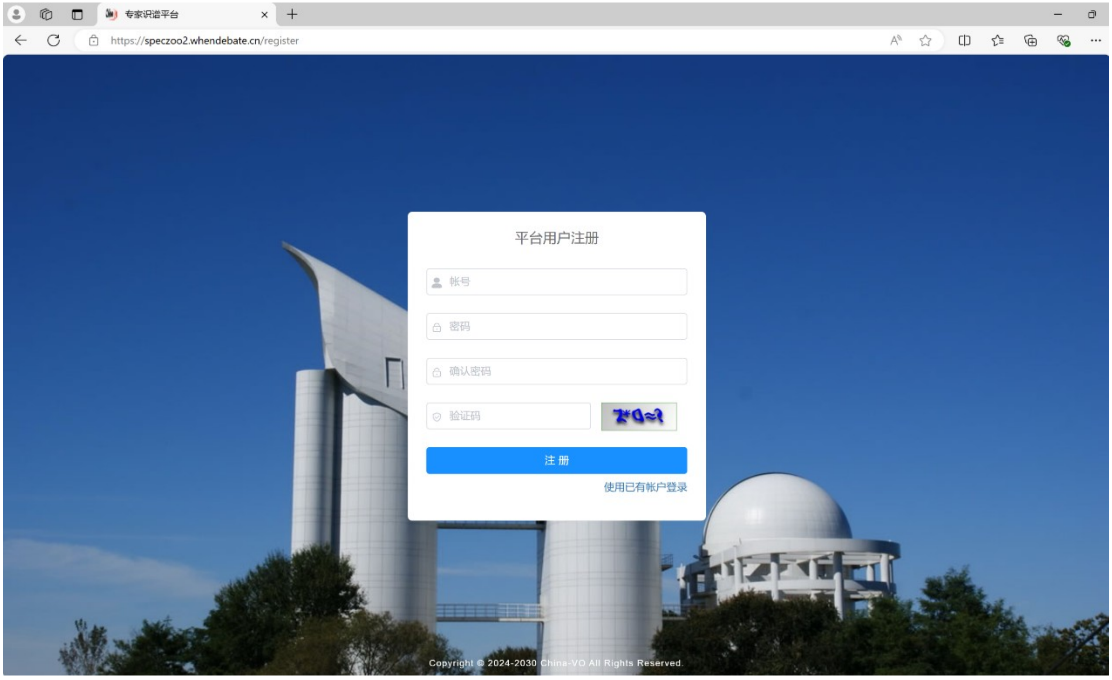
The default language used in the initial interface is English. Domestic users can click the single button "Simplified Chinese" below the dialog box title area in the middle of the interface to switch the language to Simplified Chinese.

2. Find and click "Register Now" in the lower right corner of the dialog box. The interface will then switch to the "Platform User Registration" dialog box. Users need to enter their login account and password in this dialog box.

For account security, the login password is not visible. To ensure that no one enters the wrong password, the interface requires entering the login password twice. The second input prompt is "Confirm Password." To prevent malicious hackers from using automated programs to attack the system, the fourth line of the interface requires entering a "CAPTCHA" to verify that it is not an automated program simulating manual login. The CAPTCHA must be the correct result of simple arithmetic expressions entered in the input box.

The login account consists of 5-20 characters, with no space in the middle; the login password consists of 6-20 characters

No special characters such as English greater than sign, less than sign, single quotation mark, double quotation mark, positive slash, reverse slash and so on are allowed in the space.



3 After the input is completed, click the "Register" button at the bottom of the dialog box. If the registration is successful, a small window "Congratulations, your account has been successfully registered!" will pop up. Click OK and the interface returns to the login page.

Registration may fail, and the interface will display error messages. For example, "Save login 'username' failed, account already exists", which indicates that someone else has used this username to register, and the current user needs to change another username to re-register.

3.2 entry

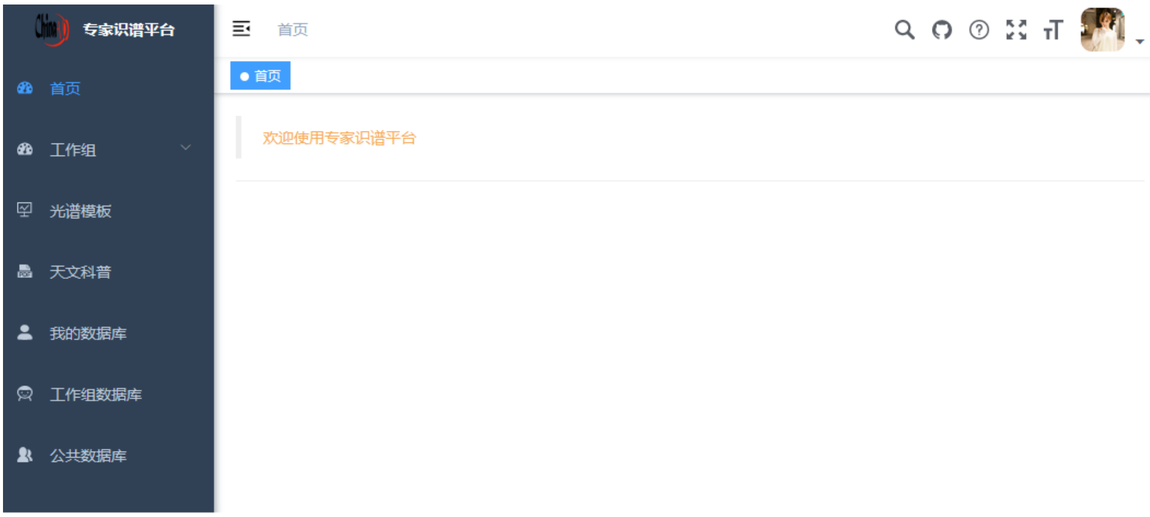
Application scenario: Registered users of the platform log in to the system and prepare to carry out work.

1、 Enter the platform URL in the PC browser and enter the login page of the expert Spectrum recognition platform.

The default language used in the initial interface is English. Domestic users can click the single button "Simplified Chinese" below the dialog box title area in the middle of the interface to switch the language to Simplified Chinese.

If you previously checked "Remember Password", the browser supports saving the login account name and password used for the last login. See the previous page for an explanation of the CAPTCHA.

2. Enter the login account and password correctly, then click the "Login" button at the bottom of the dialog box. If the login is successful, the interface will switch to the working environment; otherwise, it will prompt that the login account or password is incorrect and ask you to re-enter.

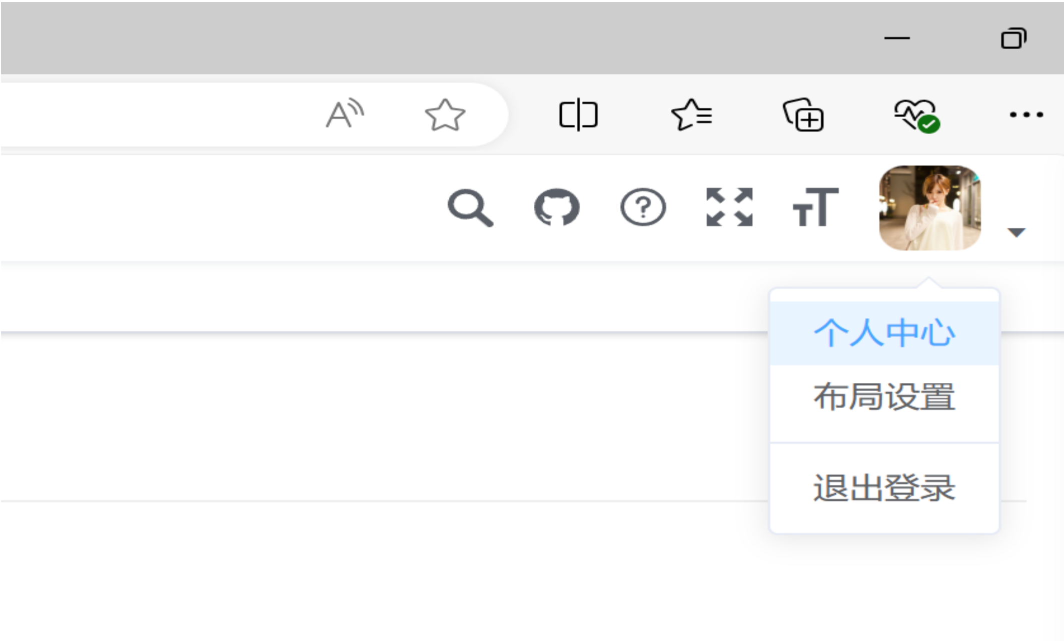


4. Personal information viewing and change

Application scenario: After new registered users try out the system, they are ready to become loyal users of the system and join a working group to collaborate with other users on research-based learning or practical research work. This makes it easier for astronomers and astronomy educators in the same group to identify them. Therefore, they need to supplement and improve their personal information while checking and verifying whether the information is accurate and confirming their own working group situation.

4.1 View personal information

1、 Log in to the platform, click on the avatar in the upper right corner of the work environment interface, and click "Personal Center" after a small window pops up.



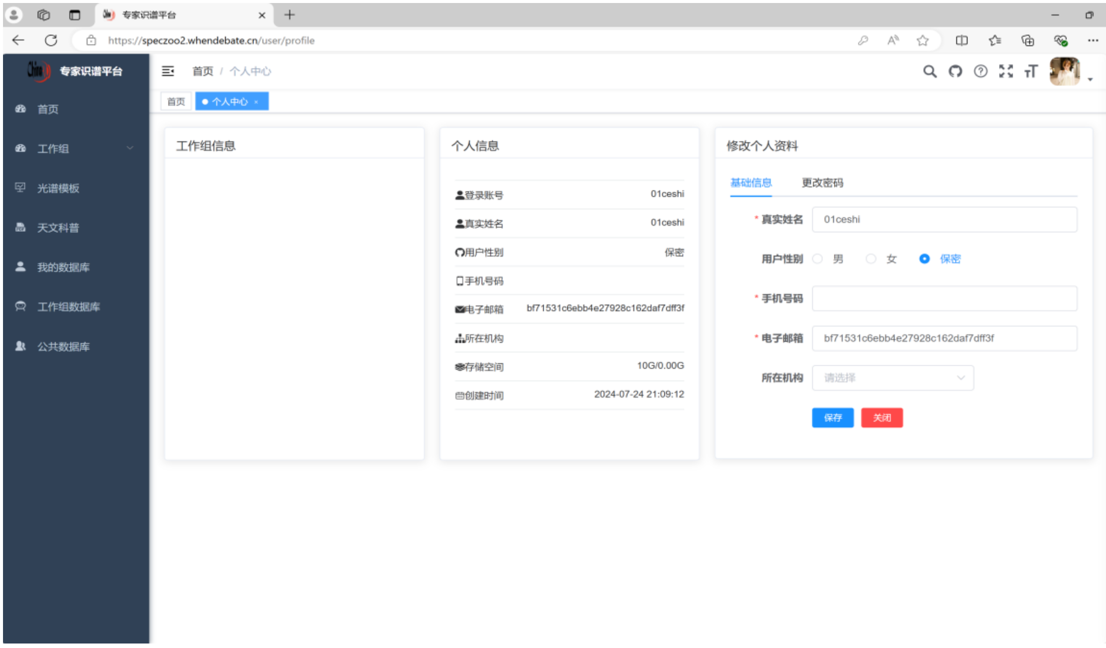
2. Enter the personal center, where three cards are displayed on the page: "Work Group" on the left, "Personal Information" in the center, and "Modify Personal Data" on the right. Users can check and verify their account and user information, including "Login Account," "Real Name," "User Gender," "Phone Number," "Email," "Institution," "Storage Space," and "Creation Time."

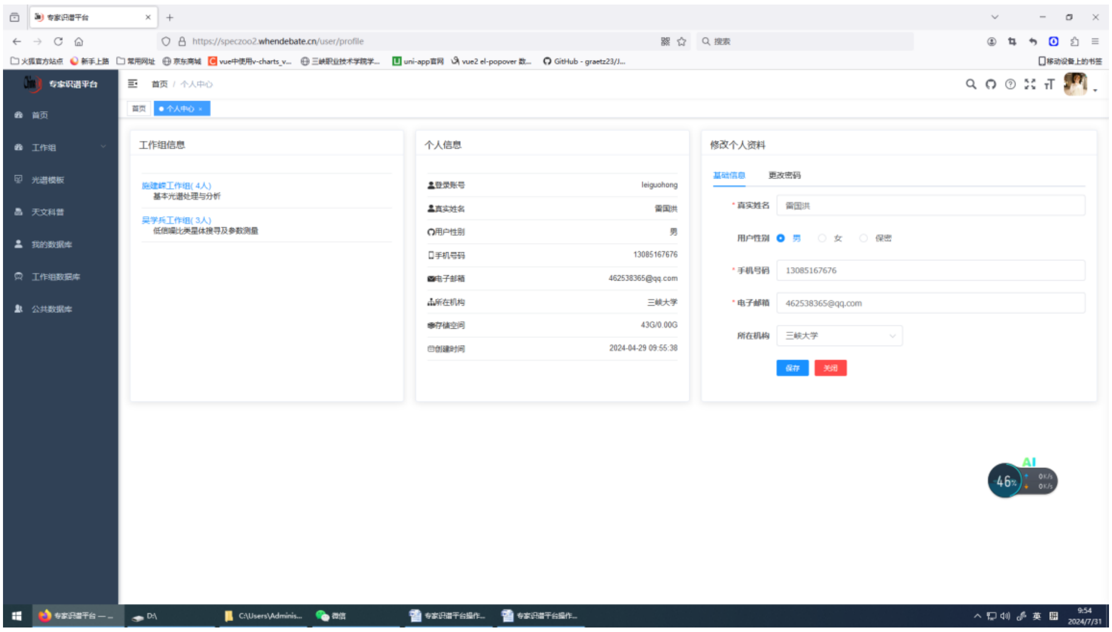
The incomplete "real name" field for personal information defaults to the same as the "login account," "user gender" is set to confidential by default, and "email address" is a random code generated by the system consisting of Arabic numerals and English letters. The fields for "institution" and "mobile phone number" are left blank. Users should complete these details in the "Modify Personal Information" card area on the right, see section 4.2.

If personal information has been perfected, the above items will be displayed normally.

The default storage space is 10G. Senior users can apply to the system administrator for additional storage space. The main purpose of limiting the storage space is to restrict some irrational users from uploading invalid large files at will.

Click the red "Close" button below, and the personal center page will no longer be displayed. Go back to the initial home page.





4.2 Change personal information

Application scenarios: The user views his/her personal information and finds that it is incomplete or incorrect; real name, telephone number, email address and organization are changed; the owner of the user account changes or the right to use it is transferred.

1、 Click on your profile picture, go to "Personal Center", and find the "Modify Profile" dialog box on the right.

2、 Select "Basic Information," and correctly enter your real name, mobile phone number, and email address in the dialog box. Choose your gender and affiliated institution. After making all necessary changes, click "Save." If any information is entered incorrectly, follow the prompts to correct it and save again (for example, if there are spaces between names, the phone number does not consist of 11 digits, or the email format is invalid).

3、 If your organization is not listed among the candidates, please contact the platform system administrator. See Section 6.

4、 If you need to change your password, select "Change Password", enter the "original password" in the dialog box to complete the identity confirmat-ion, fill in the "new password", and fill in the "confirmation password" (make sure that the new password and confirmation password are exactly the same to prevent input errors). After confirming that the input is correct, click "Save " to complete the password change.

5、 The password change operation may fail, and the interface will display error messages. For example, "the new password cannot be the same as the old password." The user can choose to change the password again or give up changing the password.

6、 When preparing to change the password, if you have forgotten the old password, you need to contact the platform system administrator. The system administrator will reset the password. The default password is "123456". See the next section for the specific operation of the system administrator.

4.3 View the working group information

The new registered user has not joined any working groups, so clicking on the profile picture to enter "Personal Center" leaves the "Working Group Information" card on the left blank.

If you have joined some working groups, the "Working Group Information" card on the left will list all the group names, current numbers and research objectives of the working groups you have joined.

Click on the name of the working group (hyperlink) and a small window will pop up to display the list of personnel in that working group.

工作组成员名单

×

工作组：施建嵘工作组

登录账号	真实姓名	用户性别	手机号码
admin	超级管理员	保密	15888888888
leiguohong	雷国洪	男	13085167676
hjtian	hjtian	男	13618692803
13476864374	闵子磊	男	15571768261

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5. Role authorization and user management

According to the division of work responsibilities, the platform defines four different types of user positions and roles, namely system administrator, working group leader, working group administrator, and spectrum expert (ordinary user).

A specific job role can operate multiple menu items, and the relationship between job roles and menu items is also many-to-many. An actual user can assume multiple job roles, and the relationship between users and job roles is also many-to-many.

The system administrator is mainly responsible for configuring the operating parameters of the system, ensuring the safe and stable operation of the system; allocating and adjusting user role permissions, ensuring users' reasonable use of system resources; providing technical support for users, assisting users to solve problems.

The group leader is mainly responsible for establishing and managing the working group; inviting users to enter the working group, reviewing user entry applications; authorizing users in the same group to become group administrators; assigning mapping tasks and reviewing mapping results.

The group administrator mainly assists the group leader to carry out the work, is responsible for managing the working group; invites users to enter the working group, reviews the application of users to join the working group; reviews the results of identification.

The expert is mainly responsible for identifying the spectrum by viewing and comparing the template data, labeling the spectrum classification and related measurement parameters, and submitting the results to the working group.

The newly registered user is a regular user (music expert) by default. The regular user can be authorized by the system administrator to become a group leader; the regular user can be authorized by the system administrator to become a system administrator; the regular user can be authorized by the group leader to become a group administrator.

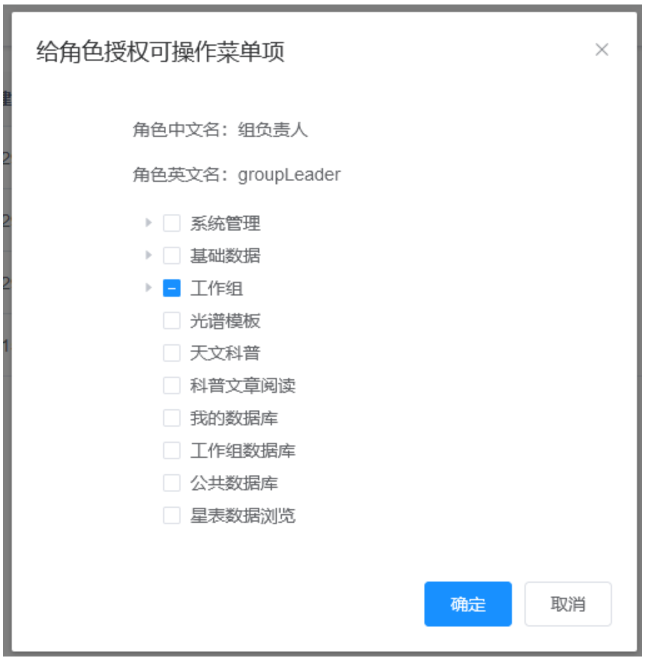
When the system goes live, an initial "super administrator" (admin) has been defined. Registered maintenance personnel (ordinary users) use this account to authorize themselves as new system administrators and/or group leaders.

5.1 Character rights

Application Scenario: During the platform construction phase, the development team needs to clarify role functions. System administrators should grant relevant permissions to roles, ensuring that operational permissions align with role responsibilities; throughout the system's lifecycle, new algorithms are continuously integrated, and related services are improved and perfected. System administrators add new menu items and assign the corresponding operational permissions to these roles; if issues arise during the use and operation of the platform, it is necessary to modify the role's operational permissions.

The system administrator finds the operation bar on the right side of the corresponding role under the menu "Home/ System Management/ Role Permissions ", clicks the "Authorize operable menu item" to open the hyperlink;

角色ID	角色中文名	角色英文名	显示顺序	创建时间	操作
1	系统管理员	admin	1	2024-04-29 09:55:38	授权可操作菜单项
2	组负责人	groupLeader	2	2024-04-29 09:55:38	授权可操作菜单项
3	识谱专家	expert	3	2024-04-29 09:55:38	授权可操作菜单项
4	组管理员	groupManager	4	2024-08-15 08:19:19	授权可操作菜单项



In the pop-up window, select the menu item and submenu items that need to be granted to the role, and then click the "OK" button. Click the triangle arrow on the left to expand the "Working Group", and you can see the submenu items.

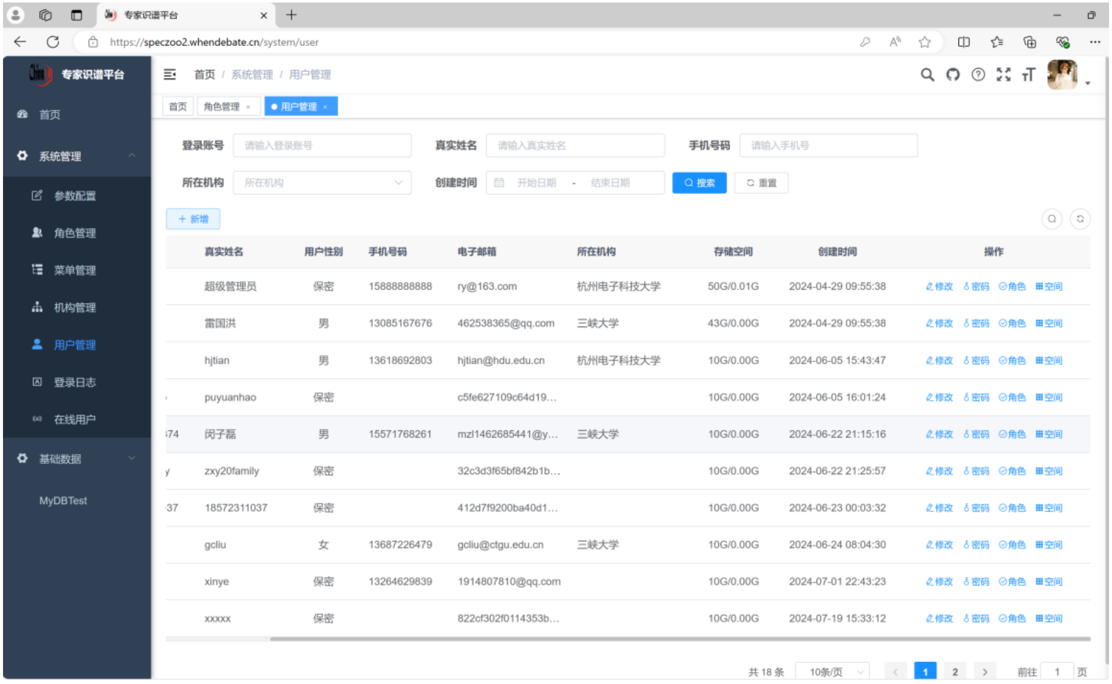
A message "Registration of the operable menu item for the role is complete " appears at the top of the page, indicating that the menu authorization was successful.

Then, if a user with the appropriate role logs in, the corresponding menu item is displayed on the left side of the interface. If a user has four roles, he or she can see and operate almost all menu items.

5.2 Grant the user a role

Application Scenario: New users register as regular users and can try out some basic features of the platform. Some users (such as astronomers or astronomy educators) need to become group leaders, which requires authorization from the system administrator. Other users (such as system maintenance specialists) need to become system administrators, which requires using the initial super administrator account to authorize themselves as new system administrators. If a user would never typically work as a spectroscopy expert, they might cancel their "Spectroscopy Expert" role.

1、 The system administrator finds the corresponding user's rightmost operation bar under the menu "Home/ System Management/ User Management", clicks on "Role" to open the hyperlink;



2、 After the "Grant role to user" small window is displayed, select one or more roles that need to be granted to the user and click "OK". Click "Cancel" to exit the small window and abandon the role authorization change.

When you need to select all character types, click the small square at the top to select all four character permissions at once.

3、 "Granting role operation to the role was successful" is displayed at the top of the page, indicating that the role authorization was successful.

4、 Then, if a user with the appropriate role logs in, the corresponding menu item for that role is displayed on the left side of the interface. If a user has four roles, he or she can see and operate almost all of the menu items.

5.3 Reset the login password for the user

Application scenario: The user forgets the password for some reason and contacts the familiar system administrator to reset the password. The system administrator knows the user and operates this menu item to reset the password to "123456". Then the user can immediately log in with this password and then change it into a suitable new password by himself.

After the system is officially launched, the email address of the National Virtual Observatory will be configured to support users to reset their passwords independently by sending email verification codes.

1、 The system administrator finds the corresponding user's rightmost operation bar under the menu of "Home/ System Management/ User Management", clicks "Password" to open the hyperlink;

2、 After the "Reset user login password" small window is popped up, click the "OK" button to complete the reset operation. Click the "Cancel" button to exit the small window and give up the reset operation.

5.4 Modify your profile for users

Application scenario: The user is not convenient to modify his/her personal data for some reason, so he/she contacts the familiar system administrator to do it. The system administrator knows the user and operates this menu item to modify his/her personal data.

1、 The system administrator finds the corresponding user's rightmost operation bar under the menu of "Home/ System Management/ User Management", clicks "Modify" to open the hyperlink;

2、 After the "Modify user Information" small window is popped up, you can modify your name, select gender, modify your mobile phone number, modify your email address, and select your organization. Click the "OK" button to complete the user information update operation. Click the "Cancel" button to exit the small window and give up the user information update operation.

6. The user's organization

Astronomers, astronomy educators, and students who join the platform need to identify, contact, and communicate with each other. The system should store information about their affiliated institutions. To unify institution names and facilitate smooth operations later on, the system needs functions such as adding new institutions and updating institutional information. This way, when users register or update their personal information, they can choose their affiliated institution.

6.1 New agencies

Application scenario: One day, an astronomer or an astronomy educator registered as a user and found that his/her work unit was not registered in the system. Therefore, he/she contacted the system administrator and hoped that he/she could add it.

1、 The system administrator enters the "Home/ System Management / Organization Management" menu and clicks the "Add" button in the upper left corner.

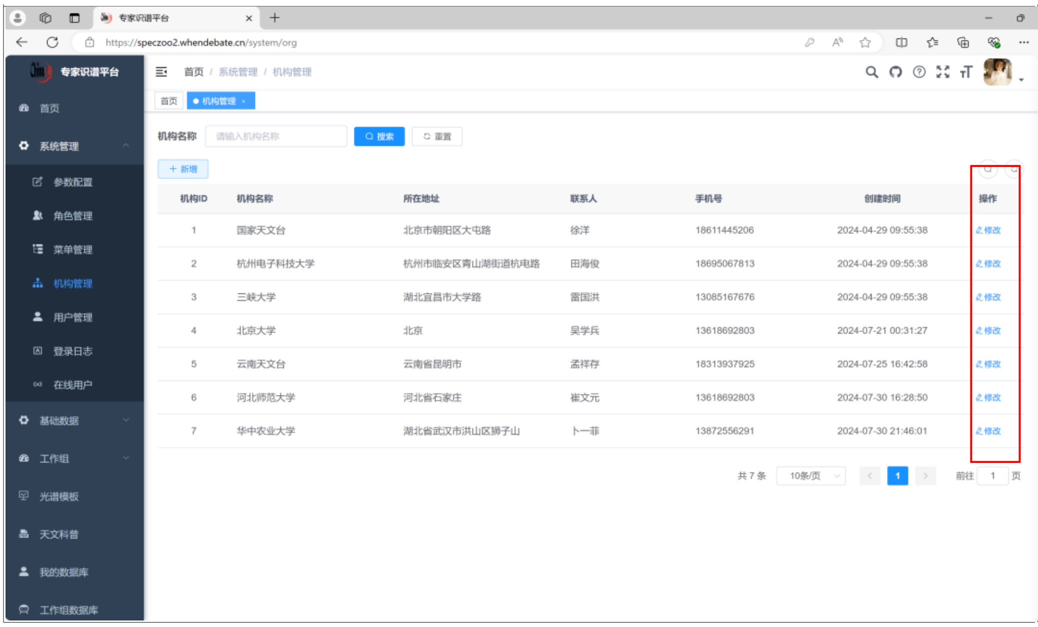
2、 In the "Add New Organization" dialog box, enter the correct organization name, address, contact person, and phone number, then click the "OK" button. If there are any input errors, follow the prompts to correct them and then click the "OK" button again (for example, if there are spaces between the organization name or contact person's name, or if the phone number does not consist of 11 digits).

3、 If the prompt "New organization operation successful" pops up at the top, the new organization has been successfully added. However, adding an organization may fail. If clicking the "OK" button and then a message "The new organization name already exists" appears, you need to enter the keyword "search" to view information about organizations with the same name and confirm whether the organization to be added is listed. If it exists, there is no need to add another one; if not, pay attention to distinguishing organizations with similar names.

6.2 Modify the organization information

Application scenarios: Changes in institutional information; or previous input errors.

1、 The system administrator enters the "Home Page/System Management/ Institution Management" menu, finds the row of the institution to be modified in the list, and clicks "Modify" on the operation bar on the right.



2、 After the hyperlink pops up a dialog box of "Modify Organization Information", modify in the corresponding column and click "OK" to save.

3、 After clicking "OK" to save, if the prompt "The operation of modifying organization information is successful" pops up above, the modification of organization information is successful.

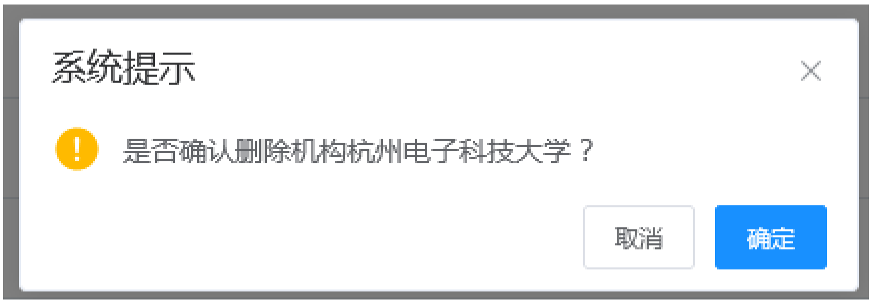
4、 The modification of the organization information may fail. If a message such as "A new organization name already exists" is displayed, you need to go back and enter the keyword to search and check.

6.3 Delete the institution

Application scenario: The system administrator added an invalid organization.

1、 The system administrator enters the "Home page/System Management/ Institution Management" menu, finds the row of the institution to be deleted in the list, and clicks "Delete" on the operation bar on the right.

2、 In the dialog box that appears, click the "OK" button.



3 If the organization has registered users, an error message will pop up on the interface indicating that the operation failed.

6.4 Users fill in their affiliated institutions

Application scenario: When a user registers, his/her organization is empty because it is not listed. After the system administrator adds a new user, the user can fill in the organization by modifying personal information.

See section 4.2 for details of the operation.

6.5 The system administrator fills in the user's organization

Application scenario: When a user registers, his/her organization is empty because it is not listed. After the system administrator adds a new organization, he/she directly helps the user to fill in the information on his/her behalf.

See section 5.4 for details of the operation.

7. User's work group

In most cases, after a period of time (or at that time), the user will be invited to participate in a working group, followed by scientific research or research-based learning in that group.

A user can join multiple working groups.

In very rare cases, someone completes registration, takes a look at the system, and then leaves permanently without joining any working group.

The creation, maintenance, addition and reduction of group members, task release and result review are all operated by the current group leader. The group leader can also hire two group administrators to assist him (authorization group administrator). The group administrator is responsible for adding and reducing group members, reviewing and marking results, etc.

Initially, the super administrator can authorize certain users to be group leader roles (see Section 5.2), and then the user can create a working group and directly add other users to the working group.

Regular users can also apply for entry into the working group themselves and then be reviewed and approved by the group leader or administrator.

7.1 Creation of new working groups

Application scenario: An astronomer or an astronomy educator has previously registered as a system user and has been assigned the role of group leader. In order to set up a new team for research work or research-based learning, a new working group is prepared to distinguish between work objectives, participants, and division of labor among each other, so that ordinary users can complete tasks within the group.

1、 The group leader enters the "Home Page / Working Group / The Group I am responsible for" menu and clicks the "Add" button in the upper left corner.

2、 In the "Add New Working Group" dialog box, enter the group identification code, working group name and research objective in sequence, and select the affiliated organization. The working group identification code must be 4 to 10 letters or numbers (after entering lowercase letters, the system will automatically correct it to

Capital letters), to facilitate the user's search for the working group. The name of the working group should be 4-50 characters long, with no space between characters, such as "a certain working group". The main purpose of setting the "group identification code" is to facilitate the application for ordinary users to join the group, see section 7.7.

3、 After correctly entering all the information, click OK. If a message "New working group operation is successful" pops up at the top of the interface, it indicates that the new working group has been successfully added, and the new working group information will be displayed in the list refreshed later.

7.2 Update the working group information

Application scenario: The team leader believes that the previous input of work group information is incorrect; or the research objectives need to be adjusted.

1、 The group leader enters the "Home/Working Group/The Group I am responsible for" menu, finds the working group that needs to modify information in the list of working groups, and clicks the "Modify" hyperlink on the right operation bar.

2、 In the dialog box "Modify Working Group Information", correctly input the new group identification code, working group name and research objective in turn, and select the institution. If there is a format error, please modify according to the interface prompt.

3、 Click the "OK" button. If a message "The operation to modify the working group information is completed" pops up at the top of the page, it indicates that the modification of the working group information is successful and the updated working group information will be displayed in the list refreshed later.

7.3 The group leader or administrator can directly add members to the group

Application scenario: The group leader and the group administrator have completed offline communication in the preparatory stage of organizing users to carry out research work or research-based learning work, and are ready to directly add major members into the newly established working group. Members may also be added in the later stage of work.

1、 The group leader enters the "Home / Work Groups / Groups I Manage" menu, finds the work group to which members need to be invited in the list of work groups, and clicks the "Members" hyperlink on the right side of the operation bar. Alternatively, the group administrator enters the "Home / Work Groups / Groups I Supervise" menu, finds the work group to which members need to be invited in the list of work groups, and clicks the "Members" hyperlink on the right side of the operation bar.

2、 A new "Group Members" tab is created on the interface, which displays all members of the current group in a paginated manner. Click the "Add" button at the top left to add a user as a member of the current group.

Any user of any role type can be added as a member of the current working group. The range of menu items that the user can operate does not change, but the range of data that can be seen on the submenus under the "Working Group" menu will increase.

3、 In the "Add Work Group Members" dialog box, enter the login account of the member you want to invite into the group. The system will automatically display the user's real name, gender and mobile phone number and other basic information. After confirming that the user is a member to be added to the work group, click the "OK" button.

4、 If the addition of a group member is successful, the login account number, real name, time of entry into the group, and the system automatically generated member ID will be displayed in the subsequent list of group members.

7.4 Regular members apply to join the group

Application Scenario: After an astronomer or astronomy educator creates a working group as the team leader, they usually just add the main members directly and verbally notify other regular members (usually students) to apply for joining. This way, only approval is needed, reducing the workload. Alternatively, the assistant of the team leader (a graduate student or group administrator) might verbally inform the students. In this case, it is necessary to inform the students of the "group identification code."

1、 The ordinary user (music expert) enters the "Home Page/Working Group/Group Application" menu and clicks the "Add" button in the upper left corner. Note: If you are not the group leader or group administrator, you cannot see the "Group I am responsible for" and "Group I co-manage" menus mentioned in the previous section.

2、 In the "New Group Application" dialog box that pops up, enter the identification code of the working group you wish to join. The system will automatically display information such as the name and research objectives of the working group. After reading the information and confirming that this is the working group you want to join, click the "OK" button. When you submit the application normally, a "Group Application Submitted Successfully" message will appear at the top of the page. Subsequently, the list will show the newly added group application information.

7.5 Group administrators review group entry requests

Application scenario: After the group leader creates the group, he or she verbally notifies other ordinary members (usually students) to apply for joining the group. After a few days, the group leader or administrator reviews and approves the students' applications in batches. Sometimes, some accidental applications (such as students confusing the group identification code) need to be rejected.

1、 The group leader or group administrator enters the "Home Page / Working Group / Application Review" menu to check the list of unreviewed application for group membership from time to time and review the application for group membership.

2、 The group leader or group administrator checks the group identification code, the name of the working group, the login account and the real name to confirm whether the user is suitable to join the corresponding working group.

If appropriate, click the "Agree to Application" hyperlink in the operation bar on the right, and click "OK" at the bottom right corner of the pop-up window. A message "Group application review agreement operation successful" will appear at the top of the page.

If not, click the "Reject Application" hyperlink in the operation bar on the right, and click "OK" in the lower right corner of the pop-up window. A message "Group application review rejection operation is successful" will appear at the top of the page.

7.6. General members check the current status of their application for entry into the group

After regular group members submit their application to join the group, they can periodically enter the "Home Page / Work Group / Application for Joining" menu to check the current status of their application in the list. The "Current Status" column shows "Pending Review" as the initial state after submission, indicating that the group leader or administrator has not yet reviewed it. "Rejected" indicates that the group leader or administrator has rejected the user's application to join. "Approved" indicates that the group leader or administrator has approved the user's application, and the current user has successfully joined the target group.

7.7. Removal of members of the Working Group

Application scenario: The group leader or administrator removes members who are not performing tasks in the working group or members who have withdrawn from the working status as required.

1、 The group leader enters the "Home/Work Group/Group I am in charge of" menu; the group administrator enters the "Home/Work Group/Group I co-manage" menu; find the work group that needs to be removed from the list of work groups, and click the "Member" hyperlink on the right side of the operation bar. (See Section 7.3)

2. A new "Working Group Members" tab is generated on the interface, which displays all member information of the current group in a paginated manner. Find the row of the member to be removed, and click the red "Delete" hyperlink on the right operation bar.

3、 In the "System prompt" that pops up, verify the account number and real name of the group member, confirm the identity, and click the "OK" button to complete the operation of removing the group member. If the operation is successful, a prompt "The operation of deleting the removed group member is completed" will pop up at the top of the page.

7.8 Group administrator authorization and identity cancellation

Application Scenario: The team leader can authorize other members within the group to become administrators of the group. A workgroup, in addition to the leader, can also have two group administrators; when a user has previously been granted the role of group administrator but is no longer suitable for the responsibilities due to certain reasons, or if the previous authorization was an operational error, the user's status as a group administrator should be revoked.

1、 The group leader enters the "Home/Working Group/Group I am responsible for" menu, finds the working group whose administrator needs to be adjusted in the list of working groups, and clicks the "Member" hyperlink in the operation bar on the right. (See Section 7.3)

2、 A new "Group Members" tab is generated on the interface, displaying all member information of the current group in a paginated manner. Find the row containing the member who needs to be authorized or de-authorized as a group administrator, and check if the "Group Administrator" column is marked with a "?". Those marked with a "?" are group administrators; those not marked are not group administrators. Click the "Authorize" hyperlink in the operation bar on the right. Depending on the information in the "Group Administrator" column, different tasks will pop up in the small window.

To "grant the current group member as a group administrator", verify the corresponding working group, login account, real name and other information in the pop-up small window, and click the "OK" button. If the current user does not have the role of group administrator before, it will be automatically granted the role of group administrator at this time.

If you want to "remove the current group member's administrator status," verify the corresponding workgroup, login account, real name, and other information in the pop-up window, then click the "OK" button. Removing the current group member's administrator status does not revoke their administrator role. Even if a member has an administrator role, they cannot function without being "appointed" by the group leader, so it is harmless. In extreme cases, you can notify the system administrator to remove the status.

If the operation is successful, a message "Group administrator authorization change operation is successful" will pop up at the top of the page.

Spectral classification

Observing celestial bodies and distinguishing between types of celestial bodies, especially those with low brightness, can be done only with ordinary telescopes and the naked eye.

Astronomers can split the electromagnetic radiation from celestial bodies into a spectrum using prisms or diffraction gratings. The spectrum typically appears as a continuous rainbow-like spectrum (a set of light waves with wavelengths that are essentially continuous; visible light of different colors is just a small part of this spectrum), interspersed with black lines. Each line indicates a specific chemical element or molecule, and the intensity of the line indicates the presence of that element or molecule

The abundance of molecules.

This is accompanied by large telescopes (optical and radio) that receive electromagnetic radiation from celestial bodies, which are expensive and require a team (technicians working closely with astronomers) to maintain, maintain and improve them over the years.

The spectrum of celestial bodies provides us with a wealth of information about their various characteristics, such as surface temperature, luminosity, chemical composition, mass, diameter, magnetic field, rotation, and even the pressure and motion of surface gases. Therefore, spectra are often likened to the "fingerprint" or "DNA" of celestial bodies. Through systematic study of celestial spectra, we can determine their type (planets, stars, binary systems, galaxies, galaxy pairs, quasars, etc.), and in particular, we can understand the evolutionary process of a star throughout its lifetime.

In this sense, the spectral classification here is the analysis of the observed spectral data of celestial bodies to determine what type of celestial body it is.

While existing AI technology can give astronomers recommendations for classification, the conclusions are not always correct; in addition, low SNR spectra have to be identified manually.

The main purpose of designing this system is to help students in the direction of astronomy quickly enter the practical stage and learn the conventional means of spectral classification; and to help astronomers improve the efficiency of special celestial body search.

The primary method for spectral classification is "template matching," which involves overlaying the continuous spectra of unknown celestial bodies with those of known types to see if the spectral lines of known types appear at the same positions in the continuous spectrum of unknown celestial bodies. If they match closely, it can be used to determine the type of the unknown celestial body. It is necessary to select templates from known celestial bodies in advance for individual comparisons, requiring varying degrees of knowledge and experience.

The spectrum received is not the same as the continuous light waves emitted by a stationary source, and the spectrum needs to be processed to eliminate these effects before it can be stacked together for comparison. So "template matching" is not as simple as it might seem.

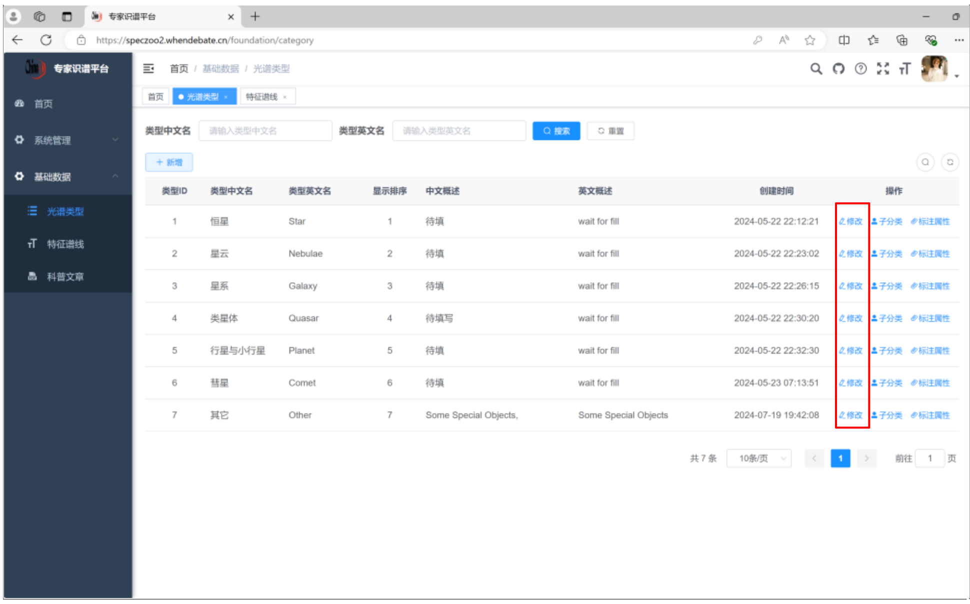
The continuous spectrum here can be imagined as a curve composed of a set of discrete points in a Cartesian coordinate system. The x-axis represents wavelength (the speed of light = wavelength * frequency). For visible light, the wavelength of blue light is shorter than that of red light. The y-axis represents flux, which is the quantified result of electromagnetic radiation received by the telescope at a given wavelength over the same time interval. For the same star and the same period, the flux received at different wavelengths varies in magnitude but remains relatively constant.

In order to perform "template matching", the system needs to pre-register template data for various types of objects, and users need to be familiar with the "shape" (what the continuous spectral curve looks like, the spectral visualization) and typical features (characteristic spectral lines) of the templates of the objects they are interested in.

Template data are organized by coarse and fine classifications of objects. In the system, these coarse and fine classifications are also referred to as "spectral types" and "spectral fine classifications".

8.1 Basic spectral types

Before the launch of the astronomical system, basic spectral types (coarse classification of celestial bodies) have been registered. They roughly include stars (Star), nebulae (Nebulae), galaxies (Galaxy), quasars (Quasar), planets and asteroids (Planet), comets (Comet), and others (Other, special celestial bodies).



8.2 Modify the spectral type information

Application scenario: An astronomer or an astronomy educator thinks that the previously input spectral type information needs to be improved, so he contacts the system administrator and proposes suggestions for modification.

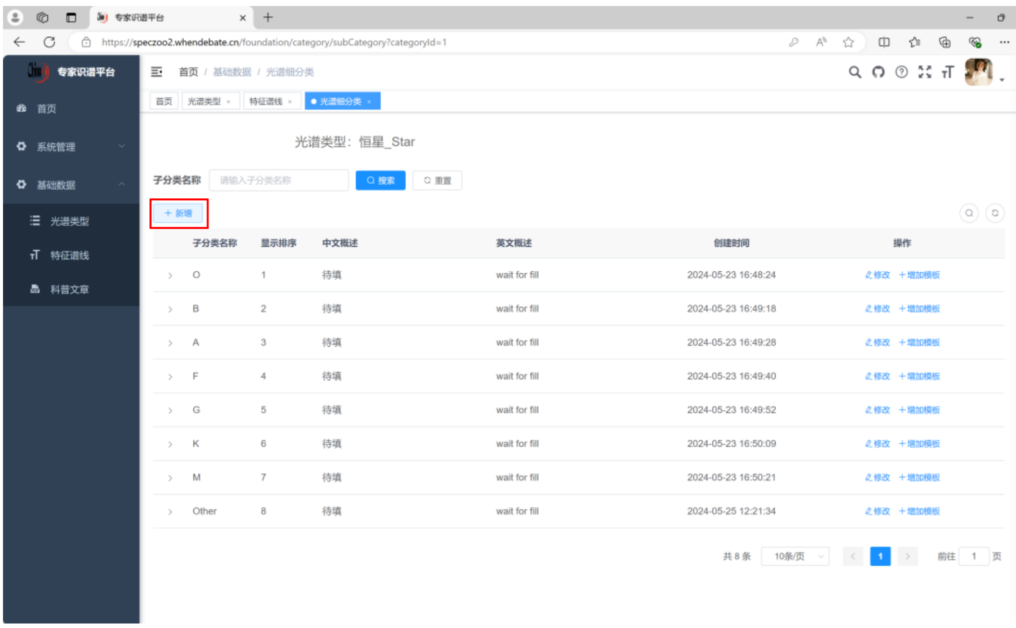
1、 The system administrator enters the "Home page/Basic Data/Spectral type" menu in the working environment, finds the spectral type to be modified among the existing spectral types, and clicks the "Modify" hyperlink in the operation bar on the right side of the same row (see the figure above).

8.3 Add a new spectral type subcategory

Application scenario: One day, an astronomer or an astronomy educator was conducting research work or research teaching work on the platform when he found that a certain subcategory of spectral type in the basic data of the system was not perfect enough. Therefore, he contacted the system administrator to inform him of the name of the subcategory of spectral type, Chinese summary, English summary, and suggested display order, hoping that he could add it.

1、 The system administrator enters the "Home page/Basic Data/Spectral type" menu in the working environment, finds the spectral type to be added in the list, and clicks the "Subcategory" hyperlink in the operation bar on the right side of the same row.

2、 Under the newly generated "Spectral Subclassification" tab, click the "Add" button in the upper left corner.



3、 In the dialog box "Add a new subcategory", input the subcategory name, display order, Chinese summary and English summary of the new spectral subcategory in turn (the subcategory name should not have space, the display order is usually a number above 1, but can also be set to 0). After confirming that there is no error, click "OK".

4、 If the operation is successful, a prompt "New subcategory added successfully" will appear at the top of the page, and the new subcategory will be listed in the table; if the operation fails, an error message "Failed to add subcategory ×××, this subcategory name already exists" will pop up at the top of the page. You need to follow the prompt and either abandon the new addition or modify it before clicking "OK" again.

Stellar classification, the general Harvard one-dimensional classification based on temperature, spectral type in alphabetical order O, B, A, F, G

Naming by order of K and M. Because only certain spectral lines are absorbed within a given temperature range, the temperature of a star can be determined by examining the absorption lines in its spectrum. (The Sun is a G2-type star)

20 In the 1940s, American astronomers Morgan and Keenan proposed another binary star classification system based on temperature and luminosity, known as the MK classification system. This method builds upon the Harvard classif-ication system, adding Roman numerals after the Harvard classification marks to indicate luminosity types: 0 for supergiants, I for giants, II for luminous giants, III for ordinary giants, IV for subgiants, V for main-sequence stars, VI for subdwarfs, and VII for white dwarfs (the Sun belongs to the G2V type of stars).

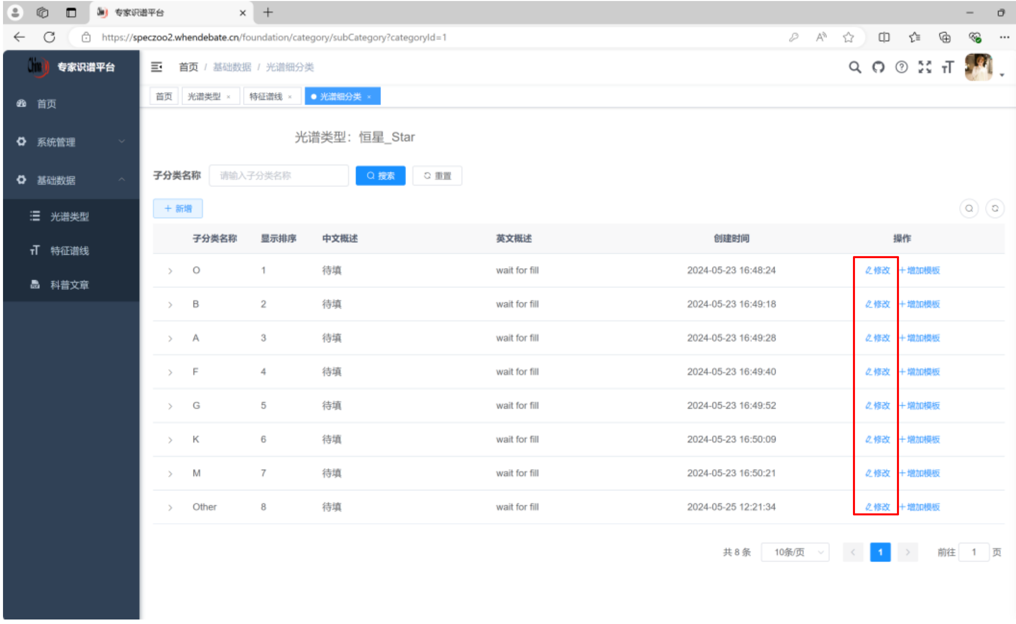
Referring to the "Hertuo", analyzing an unknown spectrum from both temper-ature and luminosity, and then determining its classification is more reliable than considering only temperature.

8.4 Modify the subcategory information of the spectrum type

Application scenario: An astronomer or an astronomy educator thinks that the previously registered subcategory information of spectral type is wrong and contacts the system administrator to help modify it.

1、 The system administrator enters the "Home Page/Basic Data/Spectral Type" menu in the working environment, finds the spectral type to be modified in the subcategory in the list, and clicks the "Subcategory" hyperlink in the operation bar on the right side of the same row to enter the "Spectral Subcategory" tab (see section 8.3 for details).

2、 Under the newly generated "Spectral Subclassification" tab, find the spectral type subclassification that needs to be modified and click the "Modify" hyperlink in the operation bar on the right side of the same row.



3、 In the dialog box "Modify Subcategory Information" that pops up, adjust the attribute value, confirm that it is correct, and click "OK".

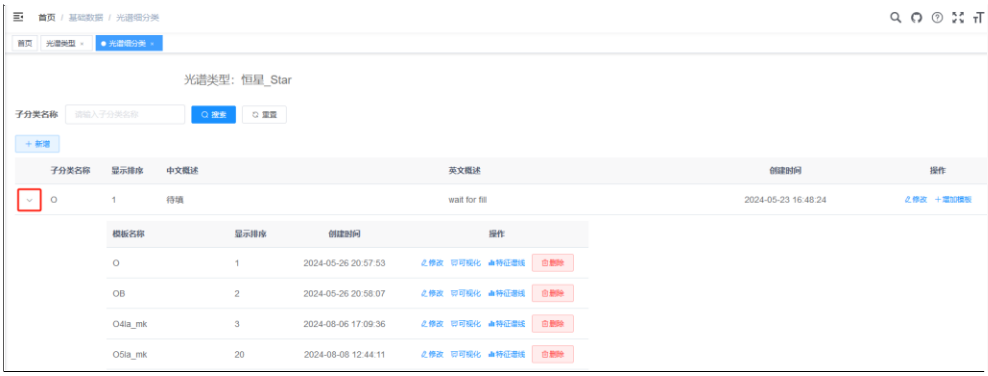
4. If the modification is successful, a message "Modification of subcategory information is completed" will pop up at the top of the page. If the modification fails, an error message (such as the subcategory name is repeated with the existing name) will pop up at the top of the page.

8.7 Add a new spectral template

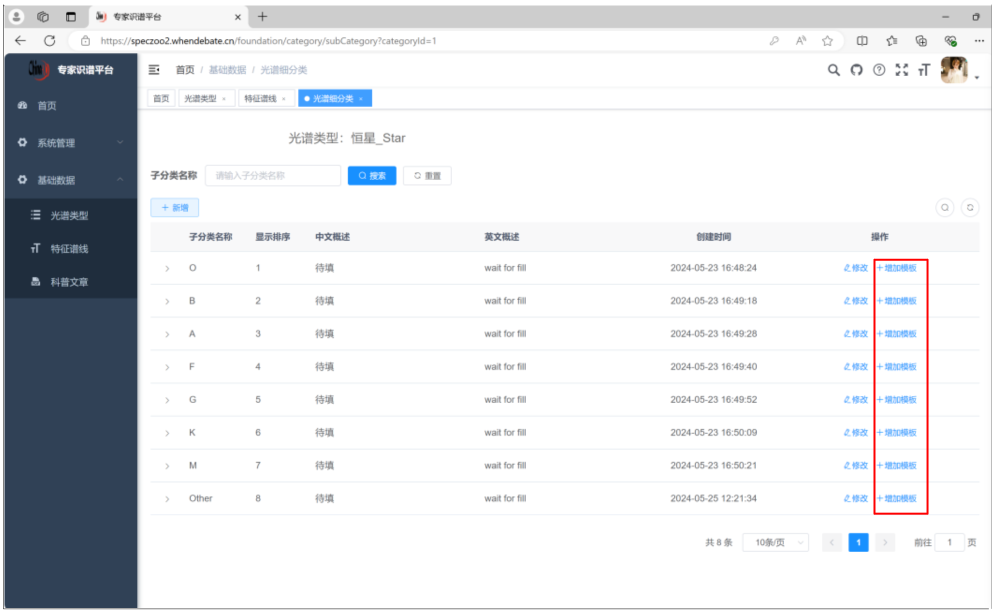
Application Scenario: One day, an astronomer or astronomy educator, while conducting research or educational activities on the platform, discovered that the spectral template for a certain subcategory of spectral types in the system's basic data was incomplete. Therefore, they contacted the system administrator to inform them of the name of the spectral type subcategory and the name of the spectral template, and sent the csv file containing the spectral template, hoping the administrator would add it. The csv file size should not exceed 1M, and there are two data formats. One format has two fields per row: wavelength and flux, separated by commas; the other format has only one piece of data per row, with the first three rows being the starting value of the wavelength (in logarithmic form), the wavelength step, and the number of flux data points, respectively, followed by multiple sets of flux data.

1、 The system administrator enters the "Home page/Basic Data/Spectral type" menu in the working environment, finds the spectral type of the spectral template to be added in the list, and clicks the "Subcategory" hyperlink in the operation bar on the right side of the same row to enter the "Spectral Subcategory" tab (see section 8.3 for details).

2、 Under the newly generated "Spectral Subclassification" tab, find the spectral type subclassification that needs to be added to the template, click the ">" symbol on the left of the same line subclassification name, and expand to view all the template information under the current subclassification. Check whether the template with the same name already exists.



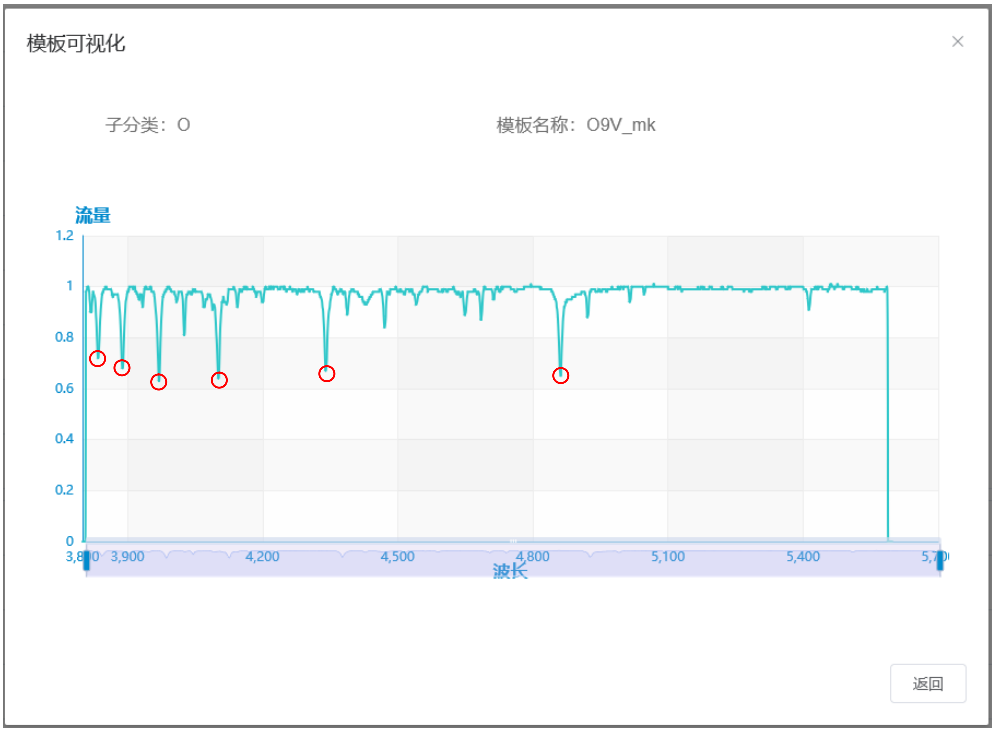
3、 Make sure there is no template with the same name, and click the "Add Template" hyperlink in the operation bar on the right side of the same line.



4、 In the dialog box "Add New Template", fill in the template name and display order, select and import the template data csv file. Click "OK" after confirming that there is no error.

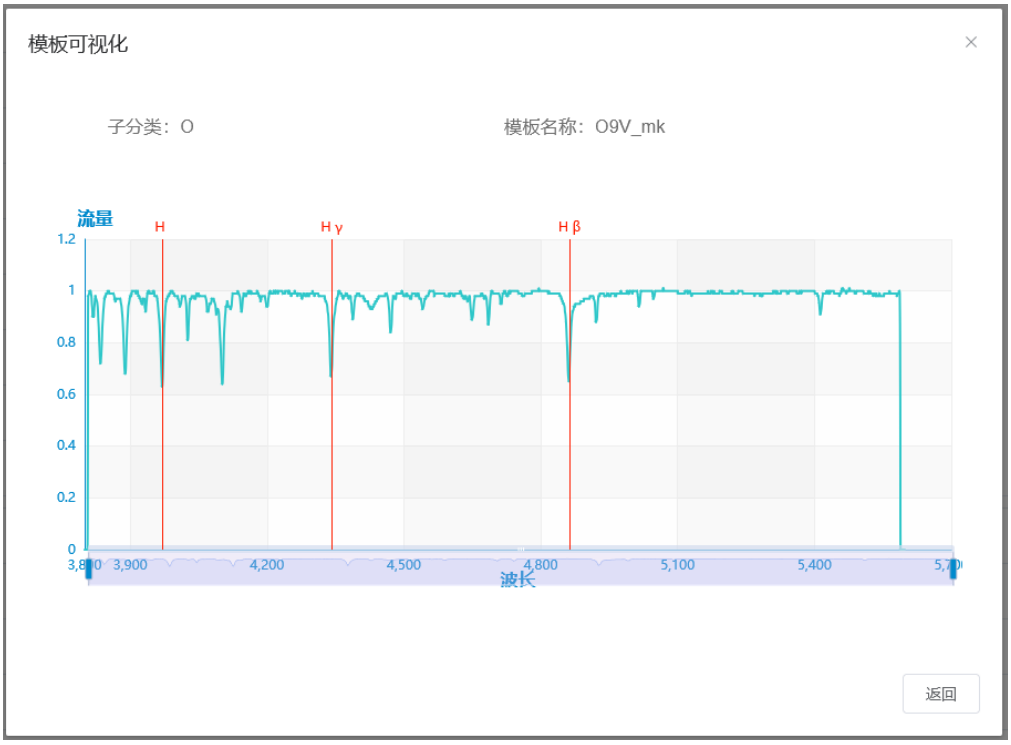
5、 If the prompt "Add new template operation is successful" appears at the top of the page, click the ">" symbol on the left side of the same row subcategory name again, and you should see that the information related to the newly added template appears in the refreshed spectrum template list (see 8.8). If the operation fails, an error message will pop up at the top of the page (most likely because the data does not conform to specifications).

6、 Find the corresponding row of the newly added template in the spectrum template list, click the "visualize" hyperlink, and confirm the shape of the continuous spectrum and the wavelength where the main emission or absorption lines are located. In the figure below, there are at least 6 obvious absorption lines.



7、 Click the "Return" button to close the template visualization dialog box, click the "Feature Spectrum" hyperlink, and prepare to check the main feature spectrum lines of the current template in the pop-up dialog box (see section 9.1 for registration of spectrum lines). The following figure has selected 3 lines (at least 6 should have been checked).

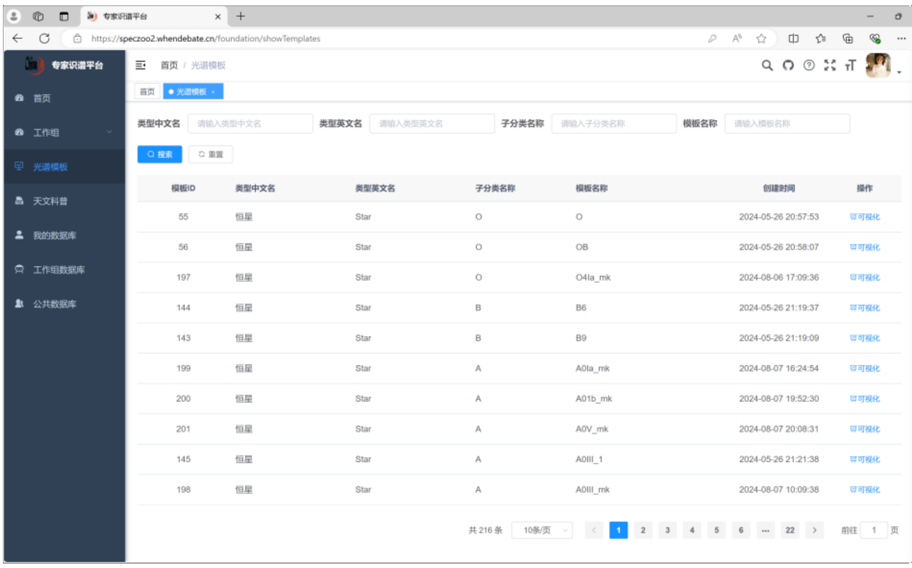
8、 Click the "Return" button to open the template visualization dialog box again, and you can see the identified spectral lines.



8.8 Spectral template retrieval and visualization

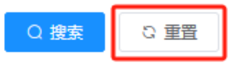
Application Scenario: When ordinary users (specimen experts) use the system, they need to browse spectral classifications on the platform, observe various spectral templates and their emission or absorption lines, and summarize the spectral template characteristics of different celestial bodies. During the process of completing specimen identification tasks or conducting independent research, they need to find the corresponding spectral templates to achieve functions such as overlaying and comparing spectral templates with spectra to be identified.

1、 In the working environment, ordinary users (spectrum experts) enter the "Home Page/Spectral Template" menu, and the interface list displays the spectral templates of various types of celestial bodies registered.

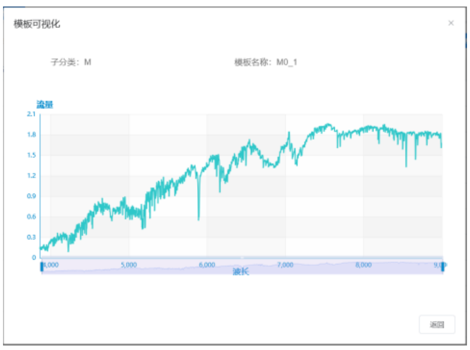


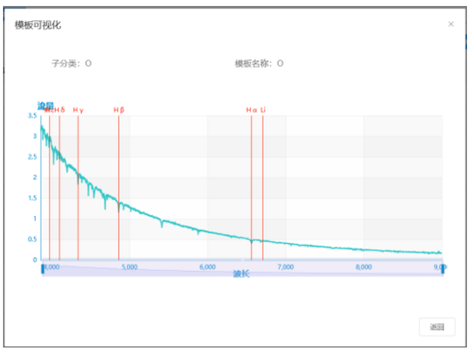
2、 Users can set matching search conditions above the list, that is, enter Chinese name keywords, or English name keywords, or subcategory name keywords, or template name keywords. The four keywords can be freely combined. Click the "search" button, and the template that meets the search conditions will be automatically displayed in the list below.

If you need to change the conditions and search again, click the "reset" button to clear the search conditions and repeat the above operation again.



3、 After finding the desired spectral template, click on the "Visualization" hyperlink in the toolbar to the right of the same row. A "Template Visualization" dialog box will pop up on the page. At the top, you will see subcategories and names of templates. Below is a spectral visualization chart with the x-axis representing spectral wavelength and the y-axis reflecting flow rate. Some spectral templates have characteristic spectral lines marked (similar to section 8.7).





IX. Characteristic spectral lines

The energy state of electrons outside the atomic nucleus changes, with the lowest energy state called the ground state and higher states known as excited states. When light shines on a ground-state atom, it absorbs certain characteristic wavelengths of light, causing outer electrons to transition from the ground state to the corresponding excited state. This is reflected in the continuous spectrum image as several dark lines, which are called absorption lines. Conversely, when an atom in an excited state (such as one heated) transitions back to a lower energy state, it emits electromagnetic waves with specific wavelengths. These emissions form discontinuous bright lines, known as emission lines.

Different substances produce absorption or emission lines at specific wavelengths. By observing the spectrum of celestial bodies, scientists can identify these absorption or emission lines to determine the chemical elements within them. Celestial bodies of the same type have similar compositions and abundance of chemical elements, so identifying celestial body categories through characteristic spectral lines is one of the key methods astronomers use for spectral analysis.

In order to facilitate the observation and browsing of the characteristic spectral line wavelength values of various elements by platform users, and then use them in template matching, system administrators need to fill in and correct the common characteristic spectral line information in the basic data, and timely add missing items according to work needs (the data volume is too large, so it is not necessary to fill in all).

9.1 Add new spectral lines

Application scenario: One day, an astronomer or an astronomy educator is conducting research work or research teaching work on the platform and finds that the basic data of the system lacks the characteristic spectral lines of a certain target celestial body. Therefore, he contacts the system administrator to inform him of the name and wavelength of the spectral line and hopes that he can add it.

1、 The system administrator enters the "Home Page/Basic Data/Spectral

Lines" menu in the working environment. All registered spectral lines are arranged from top to bottom according to the increasing wavelength.

谱线ID	谱线名称	化学元素	波长	创建时间	操作
1	OVI	O氧(养)/Oxygen	1033.80	2024-05-25 12:00:00	修改
2	Liα	Li/锂(里)/Lithium	1215.70	2024-05-25 12:00:00	修改
3	N V	N/氮(淡)/Nitrogen	1240.80	2024-05-25 12:00:00	修改
4	O I①	O氧(养)/Oxygen	1305.50	2024-05-25 12:00:00	修改
5	C II①	C/碳(炭)/Carbon	1335.30	2024-05-25 12:00:00	修改
6	SiIV	Si/硅(归)/Silicon	1397.60	2024-05-25 12:00:00	修改

2、 Click the "Add" button in the upper left corner to open the "Add New Spectrum" dialog box, select the chemical element, enter the spectrum name and wavelength.

Each element typically has multiple characteristic spectral lines. Conventionally, Greek letters (such as α, β) or Roman numerals (I, II) followed by a number (①, ②) are added after the element name to distinguish them. Commonly used names and numbers include (for example, Hα, Hβ, Hγ in the hydrogen atom spectrum). The unit of wavelength is Angstrom, and when entering numerical data into the system, it should be rounded to two decimal places (if fewer digits are entered after the decimal point, the system will automatically add zeros; if more digits are entered, the system will round off). (The number increment/decrement buttons on the right side of the wavelength dialog box perform increments/decrements in units of "1".)

3、 If the new spectral line is successfully added, a prompt "Add New Spectral Line Successfully" will pop up at the top of the page. After refreshing the list of spectral lines, you can find the new spectral line. If the addition fails, modify according to the error prompt at the top of the page (it is most likely that the name or wavelength is repeated).

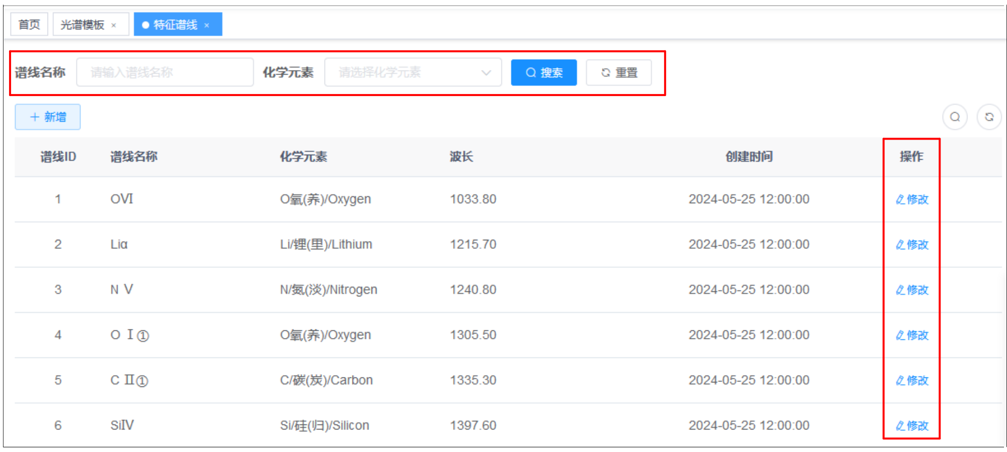
9.2 Modify the spectrum line information

Application scenario: An astronomer or an astronomy educator thinks that the previously input spectral line information is wrong, and contacts the system administrator to revise it.

1. The system administrator enters the "Home page/Basic Data/Spectral lines" menu in the working environment. All registered spectral lines are

arranged from top to bottom according to the increasing wavelength.

2、 In the search bar at the top of the "Characteristic Spectral Lines" tab, enter the name of the spectral line you wish to modify. Click "Search" to find the characteristic spectral line that meets your search criteria. On the same row to the right of the target spectral line, click the "Modify" hyperlink. If the page displays "No Data Available," it indicates that the keyword in the spectral line name does not match. In this case, you need to reset and search again. Alternatively, if you need to add a new target spectral line (for specific operations on adding spectral lines, see Section 9.1).



3、 In the dialog box that pops up, "Modify Spectrum Line Information," enter the correct spectrum line name and wavelength in sequence, then click the "OK" button to complete the modification. If a message saying "Operation to modify spectrum line information successful" appears at the top of the page, it indicates that the modified content has been saved normally. If error messages such as "Spectrum line name already exists" appear, check for any input errors according to the prompts, make corrections, and then click the "OK" button again.

X. Star table data upload and spectrum visualization

In most cases, star table data comes from the data centers of large telescopes such as LAMOST and SDSS. Astronomers or astronomy educators screen and download data from these data center websites, then use it themselves or provide it to working groups. In rare instances, astronomers or astronomy educators need to preprocess the data before using it, for example, when searching for galaxy pairs, they need to extract appropriate fields from two separate datasets and then merge them into one dataset.

Before uploading each set of star table data, the user needs to save the data as a standard csv file. The first line is the title line, which is the name of each field and is separated by commas; each row is the specific data line, which is the value of each field and is also separated by commas.

10.1 Create star table data description and upload data file

Application scenario: One day, an astronomer user or an astronomy educator user has a new research goal or teaching goal, and has selected and downloaded part of the data from the data center of a large telescope, and is ready to upload it to the spectrum recognition platform and then start work.

1、 The user enters the "Home/My Database" menu in the working environm-ent. The interface list displays all the star table data records previously registered by the user.

2. Click the "Add" button in the top left corner to open the "Add New Data Table" dialog box. Enter the table name, purpose and usage, field descriptio-ns, select the data source and the csv file to upload, then click the "OK" button. If the csv file is large (6M to 300M), a progress bar will appear on the interface; you will need to wait a few minutes before you can click the "OK" button.

3. If the new data table record is successfully added, a prompt "Add a new data table record successfully" will pop up at the top of the page. After refreshing the list, you can find the new data table record (usually at the end of the list). If the new data table record fails to be added, a prompt

will pop up at the top of the page

The error message is modified (most likely due to duplicate names).

Note that only one "data table record" is generated at this time. The actual data table has not yet been created in the database, and the system still

There is no analysis of each piece of data imported from the csv file (see section 10.3 for details). In the list, for the column "Create Table No", the new data table record corresponds to "not created".

10.2 Modify the description of star table data and data retransmission

Application scenario: The user has added a new data table record, but has not yet performed the "create table into database" operation. Suddenly, he finds that the newly added record has errors in the input table name, purpose and purpose, data source or field description, or the wrong csv file is selected, which needs to be modified.

1、 In the working environment, users enter the "Home Page/my Database" menu. Find the newly added record in the list of data table records displayed on the interface, and click the "Modify" hyperlink in the operation bar on the right side of the same row.

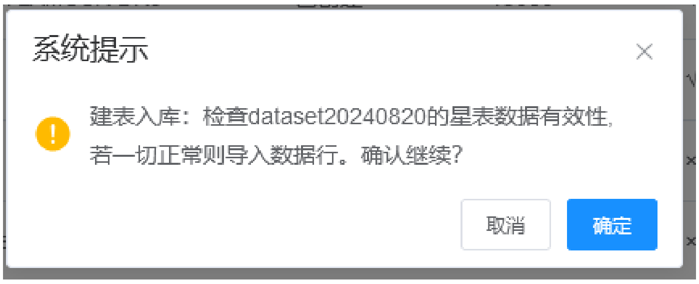
2、 Complete the modification in the dialog box "Modify Data Table Information". If you need to upload the CSV file again, click the "Select File " button. If you do not need to upload the CSV file again, you can skip this operation.

3、 Click the "OK" button. If a message indicating that the operation to modify the data table information is successful appears at the top of the page, it indicates that the modified content has been saved normally. If an error message such as "The table name already exists" appears, you should confirm whether there is any input error according to the prompt, correct it and click the "OK" button again.

10.3. Build tables and store them

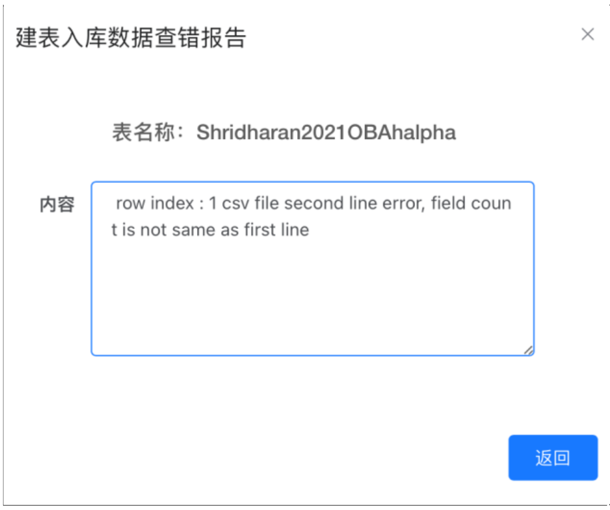
Application scenario: The user has added a data table record and is ready to actually create the data table by importing all the data rows from the uploaded CSV file.

1、 In the working environment, users enter the "Home Page / My Database" menu. Find the newly added record in the list of data table records displayed on the interface, click the "Create Table into Warehouse" hyperlink in the operation bar on the right side of the same row, and select the "OK" button in the dialog box that appears.



2、 The system background program begins to execute data checks, create data tables, and import data. If the csv file is large, this operation may take several minutes. Therefore, the interaction process is designed as asynchronous, meaning that after the user initiates the "Create Table and Import" operation, the interface immediately returns to the list of data tables without waiting for the background program to complete its execution.

3、 The user can periodically click the "Search" button to refresh the list. If the status of the "Table Creation Status" column in the current record changes from "In Progress" to "Created," it indicates that the data has been successfully stored, and the "Create Table Storage" hyperlink on the right side will no longer appear; instead, a "Data" hyperlink will be displayed. If the backend program detects an error during execution, it will terminate the process, and the "Table Creation Status" column for the current record will revert to "Not Created." In this case, clicking the "Create Table Storage" hyperlink again will result in an error report dialog box.



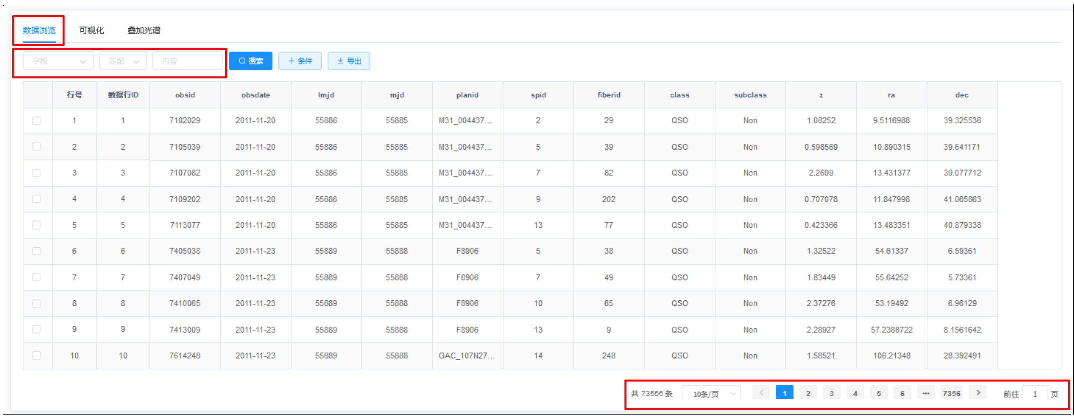
10.4 Browse star table data and remote spectrum visualization

Application scenario: Users carry out spectrum recognition based on the data tables they create.

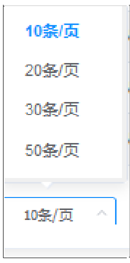
1、 In the working environment, users enter the "Home/My Database" menu.

Find the target table in the list of data table records displayed on the interface, and click the "Data" hyperlink in the operation bar on the right side of the same row.

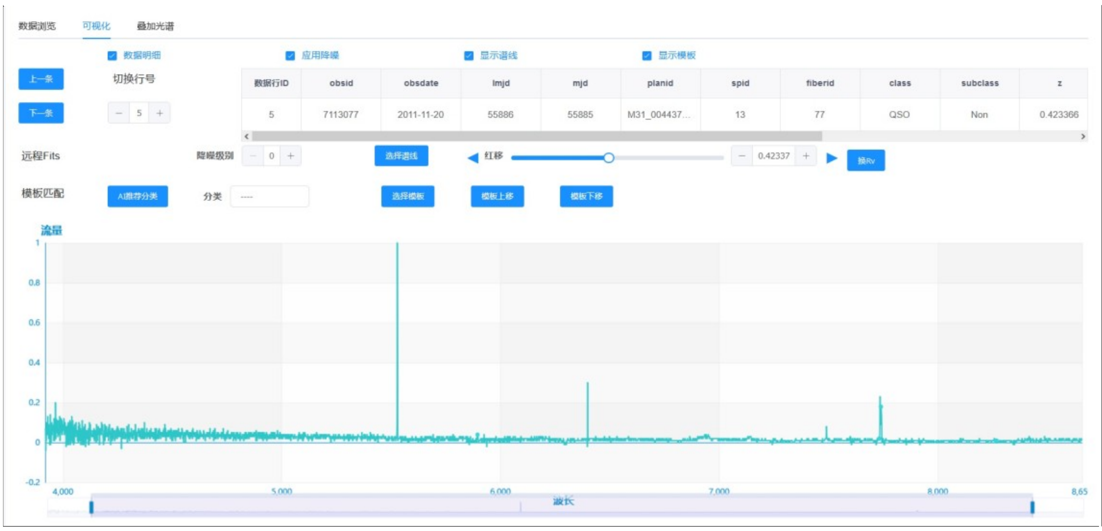
2、 A new "Star Table Data Browse" page is added to the screen. This page has three tabs: "Data Browse", "Visualization", and "Overlay Spectrum". The "Data Browse" tab is displayed by default, which displays all data rows of the target table in pages.



3、 Below the label of the top-left tab is a set of search condition input fields where users can click "Add Conditions" to add multiple sets of search filters. In the footer at the bottom-right, the pagination information area shows the number of data rows, how many records are displayed per page, and the page number buttons. Clicking on the dropdown list "10 entries/page" allows you to adjust the number of records that can be displayed per page.



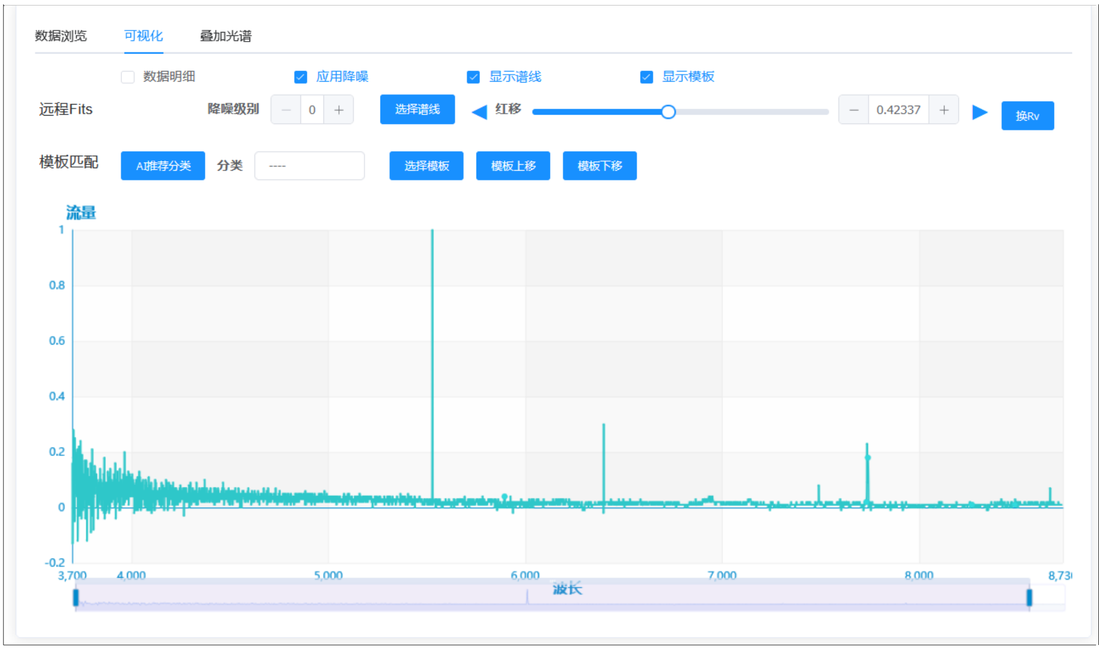
4. The system displays the details of the first record and its spectral visualization effect by default in the "Visualization" tab. Users can switch between records by clicking "Previous" or "Next" in the "Visualization" tab, or by entering a row number; they can also switch by clicking on a specific row of data in the "Data Browse" tab.



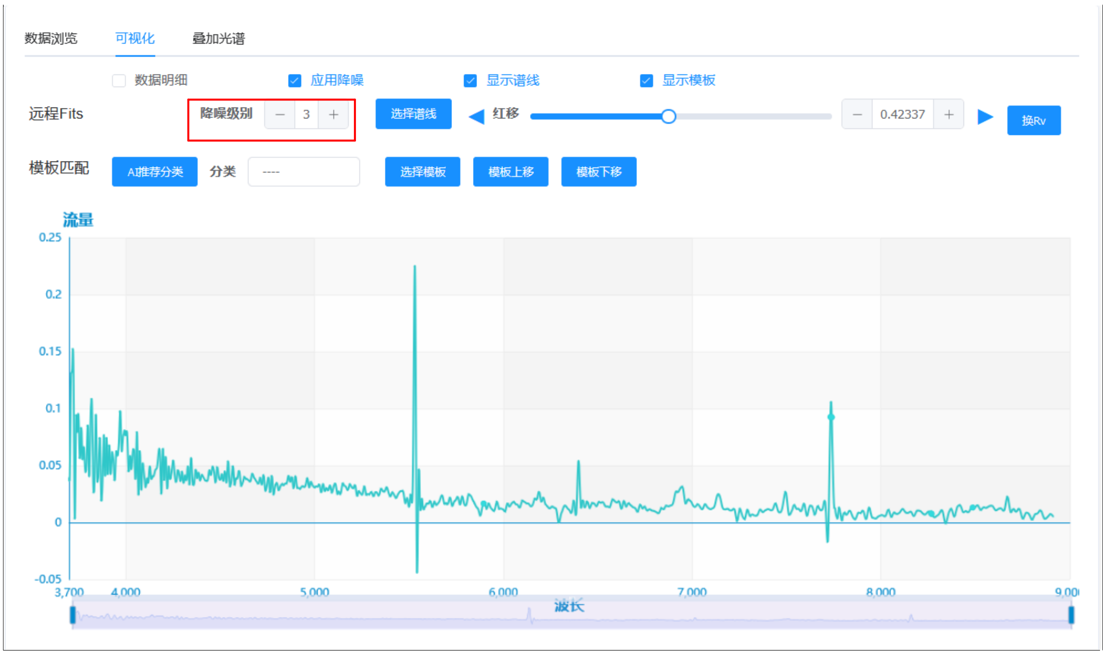
5. On the "Visualization" tab interface, the top row consists of several checkboxes that control whether to display data details, apply noise reduction to the data, show spectral lines, and display templates for comparison. Below

this are the data detail area, noise reduction parameters and redshift (proper motion) parameter control areas, template control area, and the spectral wavelength flow curve chart area.

6. The following figure shows the effect of not checking "Data Details". Obviously, there is no "previous", "next", "switch row number", current data row detail table, etc. in the figure.

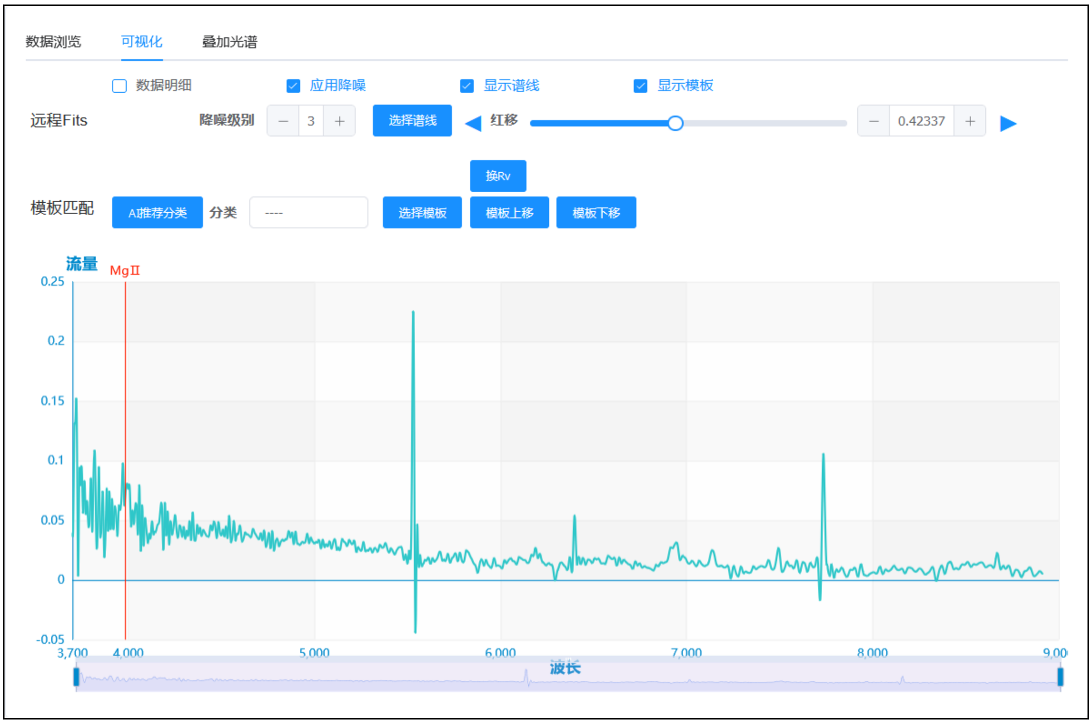


7 In the received observational signals, there is more or less noise, with some having higher SNR and others lower. To filter out the noise, astronomers use certain mathematical tools to "smooth" the spectral data curves, which is referred to as "noise reduction" in this system. However, if the curve is too smooth, useful signals can also be discarded as noise. Therefore, there are levels of noise reduction; the higher the level, the smoother the curve, and the more useful signals are discarded, resulting in fewer characteristic spectral lines being identified. The following figures show the results of processing the aforementioned spectra with noise reduction levels 3 and 6.



8. In the process of identifying spectra, users need to identify multiple peaks (emission lines) or valleys (absorption lines) on the spectral curve and determine their wavelengths. Based on possible redshift values (or radial velocity, star), they can reverse calculate the original characteristic spectral lines to obtain information about the chemical element abundance of celestial bodies. This process is relatively cumbersome, involves a large amount of computation, and heavily depends on selected redshift values. Generally, combining template matching with the characteristic spectral lines of the template allows for direct and intuitive comparisons, significantly reducing the workload. Sometimes, after comparing the characteristic spectral lines, one no longer wants to display them, so there are cases where the "display spectral lines" option is not selected. The following figure shows the selection of spectral lines and the results after selection.

It can be seen that the emission line wavelength of Mg II in the stationary state is 2799.10 A, and after redshift processing (0.4234), the wavelength at the position in the spectral curve is about 4000 A.

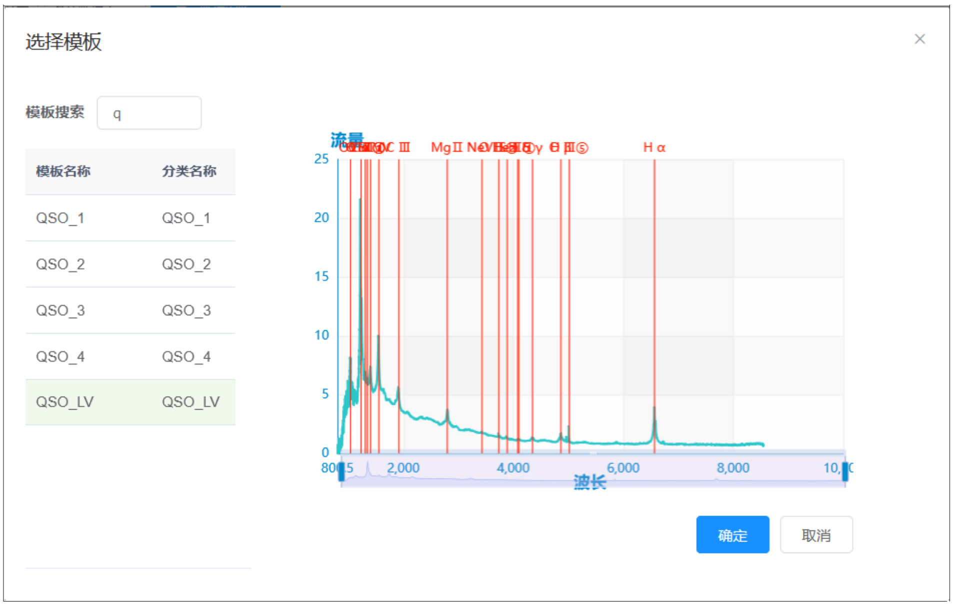


9. If the data row has a clear field name z or rv corresponding to the redshift value or radial velocity, the system will automatically extract and display it as the default value when completing the visualization. Users can manually adjust this value if needed. After all, sometimes there is no z or rv in the data row, and sometimes the machine's processing results are not entirely reliable; this value needs to be manually verified. (Redshift: The phenomenon where the electromagnetic radiation from celestial bodies appears as a longer wavelength and lower frequency due to their increasing distance from Earth. In the visible light spectrum, it manifests as a shift of spectral lines toward the red end; Radial velocity: For stars in the Milky Way, the relative motion speed between them and Earth is limited, so instead of using the redshift value, the radial velocity is used, which is calculated as radial velocity = redshift value * speed of light)

10. During the spectrum recognition process, users rely on AI classification to roughly determine the category of celestial bodies and call up similar spectral templates. The system then preprocesses the template data based on possible redshift values or radial velocities, displaying two curves in the chart area. If these two curves overlap, with several typical peaks or troughs aligning, it indicates that the selected template is correct, and the set redshift value or radial velocity is basically accurate. This unknown type of spectrum can now be largely identified.

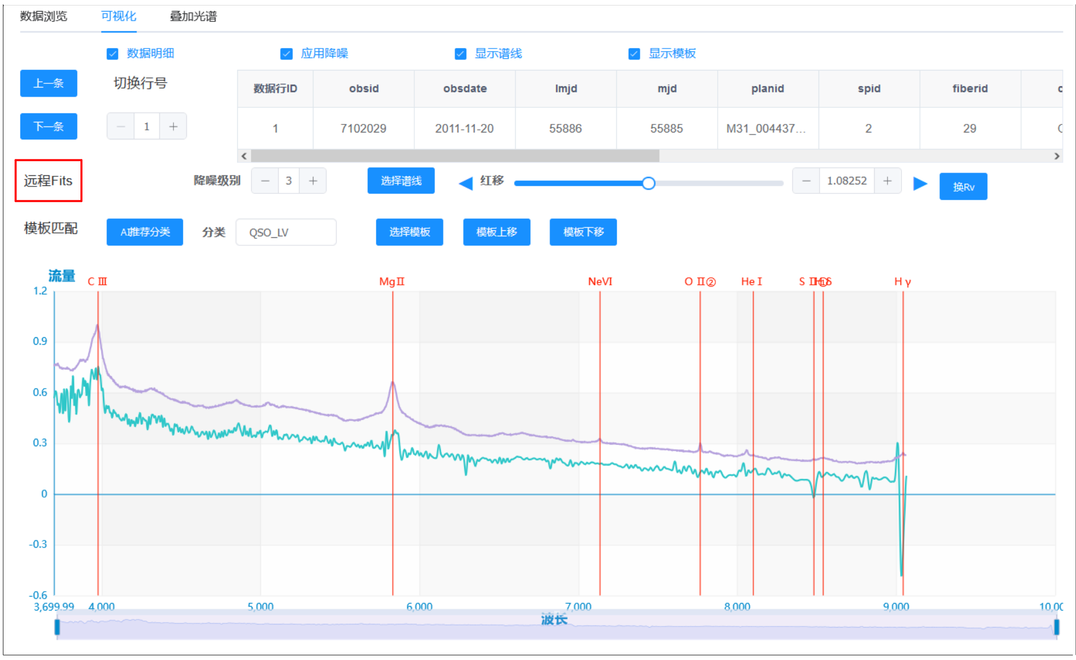
1) For the above spectrum, click the "AI Recommended Classification" button. The information box on the right side of the classification label shows "QSO"

2) The user clicks the "Select Template" button, finds the QSO series in the dialog box that pops up, selects "QSO_LV", and then clicks the "OK " button.



The template match for this spectrum is not very good.

The template match for the following spectrum is very good (with noise reduction).

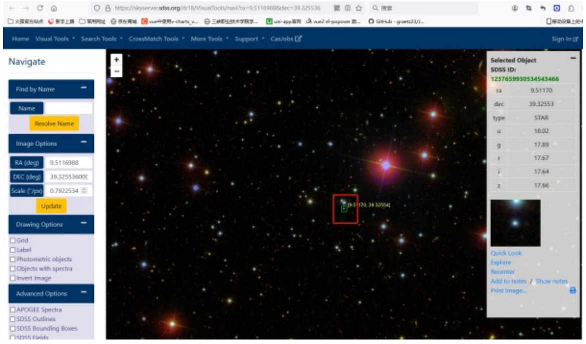


11. By default, when uploading star table data, one or several field names should meet the requirements of the remote data source, allowing the system to automatically construct a URL to access the remote data source and obtain the corresponding spectral fits files. After processing, it displays the wavelength flow curve chart. For example, LAMOST requires a obsid field. This type of data access is referred to as "remote Fits" in this system. If the uploaded star table data includes an fitsFileName field and fits files have already been uploaded to the system database, then the fits files in the system database can be accessed directly. This type of data access is referred to as "local Fits" (see Section 10.7).

12. In the upper right part of the "Visualization" tab, all the details of the current data row are displayed. If there are many fields, a horizontal scroll bar will appear at the bottom of the table. Note that there are several hyperlinks on the right side of this table.

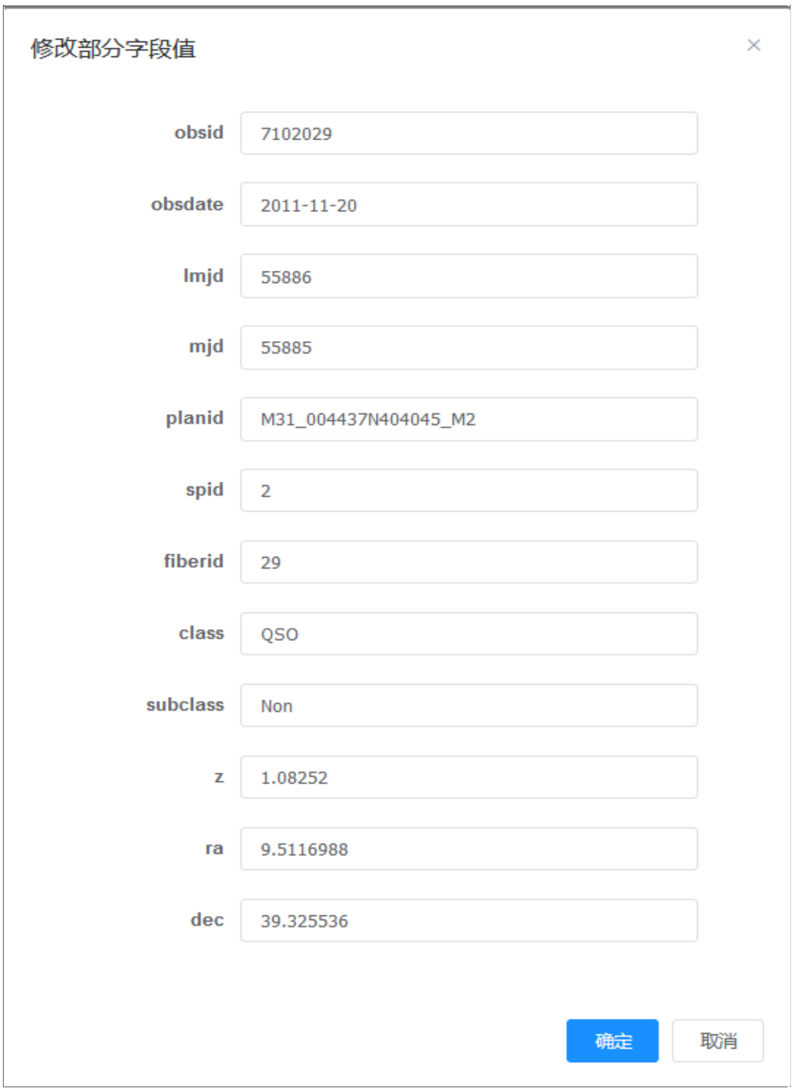
id	fiberid	class	subclass	z	ra	dec	操作
2	29	QSO	Non	1.08252	9.5116988	39.325536	SDSS图像 修改

13. If the data row contains "ra" and "dec" fields, the system will generate a hyperlink "SDSS Image" to the SDSS website. When the user clicks on it, the browser will create a new page to access the photo taken at the corresponding right ascension and declination.


Home
Visual Tools
Search Tools
CrossMatch Tools
More Tools
Support
CasJobs
Sign In
Navigate
Find by Name
Name
Resolve Name
Image Options
RA (deg)
9.5116988
DEC (deg)
Scale ("/px)
0.7922534
Update
Drawing Options
Grid
Label
Photometric objects
Objects with spectra
Invert Image
Advanced Options
APOGEE Spectra
SDSS Outlines
SDSS Bounding Boxes
Selected Object
SDSS ID:
1237659930534543466
ra 9.51170
dec 39.32553
type STAR
u 18.02
g 17.89
r 17.67
i 17.64
z 17.66
Quick Look
Explore
Recenter
Add to notes / Show notes
Print Image...

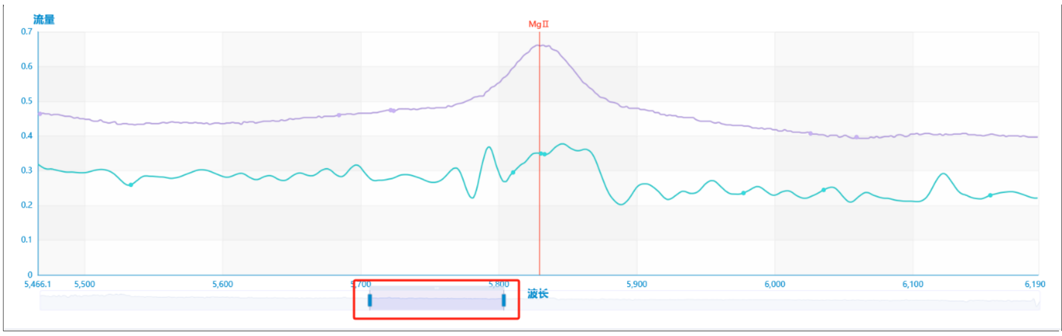
13. If the data row contains the "ra" and "dec" fields, the system will generate a hyperlink to the SDSS website called "SDSS Image". When the user clicks on it, the browser will create a new web page to access the photo taken at the corresponding right ascension and declination.

14. In the upper right corner of the "Visualization" tab, there is a table detailing the content of the current data row, and on the right side, there is also a "Modify" hyperlink. Sometimes, users find that some rows in previously uploaded data have minor errors, which can be corrected here without having to delete the data table and upload it again. Additionally, before uploading, if users anticipate making some scattered annotations, they can set a few empty fields in the csv file (only the header row has names, subsequent data rows have no content). This way, during subsequent work, they can annotate by modifying the data after recognizing the pattern.



15. In the chart area below, if you are interested in a specific section and need to zoom in, you can use the mouse wheel to achieve this. Initially,

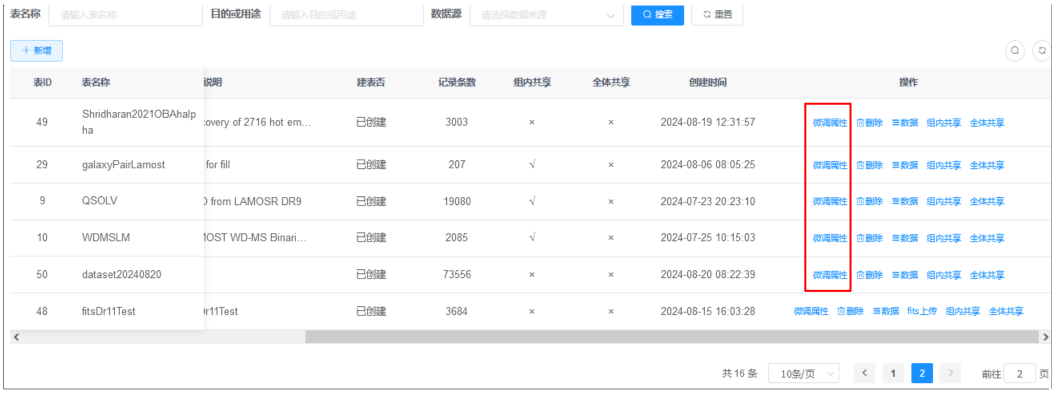
the bottom slider occupies 100% of the chart area width. When the mouse wheel moves forward, the chart area is partially enlarged, and the bottom slider shortens, showing the percentage of the visible part of the entire chart. Moving the slider left or right dynamically adjusts the visible area of the chart. When the mouse wheel moves backward, the chart area is partially reduced, eventually returning to its original state.



10.5 Fine-tune the data description attributes of the star table

Application scenario: The user has added a data table record and performed the "Create Table into Warehouse" operation (the "Modify" button will not appear again), but finds that the star table data description attribute filled in when the previous data table record was added is incorrect.

1、 In the working environment, users enter the "Home Page/my Database" menu. Find the corresponding record in the list of data table records displayed on the interface, and click the hyperlink "Fine-tune properties" in the operation bar on the right side of the same row.



表ID	表名称	说明	建表否	记录条数	组内共享	全体共享	创建时间	操作
49	Shridharan2021OBAhalpha	:overy of 2716 hot em...	已创建	3003	×	×	2024-08-19 12:31:57	微调属性 删除 数据 组内共享 全体共享
29	galaxyPairLamost	for fill	已创建	207	√	×	2024-08-06 08:05:25	微调属性 删除 数据 组内共享 全体共享
9	QSOLV	) from LAMOSR DR9	已创建	19080	√	×	2024-07-23 20:23:10	微调属性 删除 数据 组内共享 全体共享
10	WDMSLM	IOST WD-MS Binari...	已创建	2085	√	×	2024-07-25 10:15:03	微调属性 删除 数据 组内共享 全体共享
50	dataset20240820		已创建	73556	×	×	2024-08-20 08:22:39	微调属性 删除 数据 组内共享 全体共享
48	fitsDr11Test	ır11Test	已创建	3684	×	×	2024-08-15 16:03:28	微调属性 删除 数据 fits上传 组内共享 全体共享

2. The "Fine-tune properties" dialog box is displayed on the interface. Users can modify the purpose and use, display order, field description in the dialog box, and then click the "OK" button.

3、 If the operation is successful, a prompt "Fine-tuning properties operation is successful" will pop up at the top of the page, and the adjustment information will be listed in the list; if the operation fails, a relevant error prompt will pop up at the top of the page, and you need to choose to give up the fine-tuning operation or modify it again and click "OK" according to the prompt.

10.6 Upload the star table spectrum Fits file

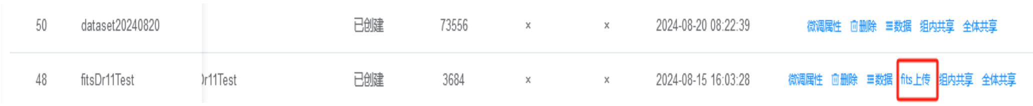
If you do not upload the star table spectrum Fits file, then every time the spectrum data is visualized, the system background program needs to access the remote data source to obtain the corresponding spectrum fits file. (See section 10.4, paragraph 11)

If the star table data has a fitsFileName field, users can upload fits files to the system database and then perform spectral data visualization operations. They can directly access the fits files in the system database without accessing remote data sources, and the response speed will be significantly improved.

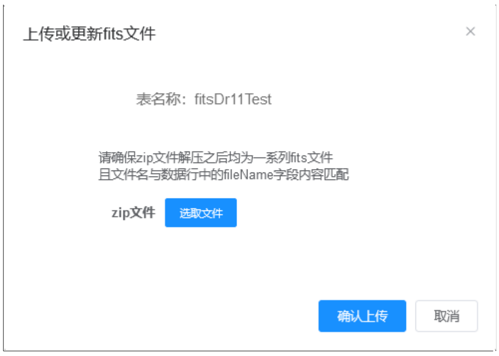
If the star table data has a fitsFileName field, there will be a "fits upload" hyperlink in the right operation bar of the data table record list displayed on the interface. When uploading fits files, if the data volume is large, it should be uploaded in batches; otherwise, the upload may fail (files larger than 400M might be delayed due to network latency, causing the browser to time out). Additionally, uploading large files all at once makes troubleshooting difficult.

Application scenario: The user has added data table records (including fitsFileName fields), and has performed the "table creation and storage" operation to prepare for batch uploading of fits files, which is convenient to improve the efficiency of spectrum recognition in the future.

1、 In the working environment, users enter the "Home Page/My Database" menu. Find the corresponding record in the list of data table records displayed on the interface, and click the "fits Upload" hyperlink in the operation bar on the right side of the same row.



2、 In the dialog box that pops up to "Upload or Update fits file", select the zip file and click the "Confirm Upload" button. Similar to uploading a CSV file, if the file size is large, there will be a progress bar; only when the progress bar reaches 100%, the "Confirm Upload" button will be valid.



3Click the "Confirm Upload" button, and the system's backend program will start to perform data checks and imports. If the fits file is large, this operation may take several minutes. Therefore, the interaction process is designed to be asynchronous. This means that after the user initiates the operation, the interface immediately returns to the data table list state without waiting for the backend program to complete its execution.

4. During the execution of the background program, there will be no "fits Upload" hyperlink on the right side of the data table record list, unless the process has been successfully completed.

10.7 Switch between local and remote spectrum visualization

Based on the field characteristics, if the star table data has a fitsFil-eName field and that field contains content, then the record has a local fits file; if the star table data has the relevant characteristic fields required by the remote data source, then the record can access the remote fits file.

If only one of these two conditions is met, the visual interface will either display the "Local fits" tag or the "Remote fits" tag.

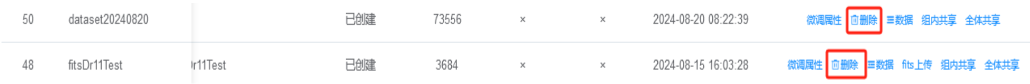
If neither of these conditions is met, the visual interface will only display data details without noise reduction, spectral lines, redshift, templates, curve charts and other content.

If both conditions are met, the visualization interface will display an additional toggle button. In fact, if everything is working properly, these two fits files should be identical, and there should be no difference in how the curve chart is displayed. Therefore, switching to local fits or remote fits has little value.

10.8 Delete personal star table data

Application Scenario: The user added a new data table record and feels there is an error, hoping to delete it before reprocessing; the user added a new data table record but no longer wants to create another table due to certain reasons; the user added a new data table record and has already built and stored it in the database. They have done some research and found the research topic promising, but the data volume is too small. They want to continue working on this table or even share it within the group, but they cannot find a suitable way to expand the data. The only option is to delete this data and create another table, uploading a larger csv file with more data.

1、 In the working environment, users enter the "Home Page / My Database" menu. Find the corresponding record in the list of data table records displayed on the interface, and click the "Delete" hyperlink in the operation bar on the right side of the same row. Note that if you are building a table into the database, the interface will not display the "Delete" hyperlink.



2 In the pop-up system prompt dialog box, click the "OK" button, and the background program will delete the data table, csv file slice data, fits file slice data, data table field information, and data table records.

10.9 Data on the binary star (system)

A binary star is a pair of stars orbiting each other around a common center. For one of them, the other is its "companion." It appears very close to other stars. Astronomers study binary stars by looking at their spectral properties simultaneously.

Galaxies in the universe exhibit remarkable diversity. In the grand scheme of cosmic layout, galaxies are merely fundamental building blocks. Under long-range gravitational interactions, galaxies form vast systems (galactic pairs, galaxy clusters, superclusters) with each other. Galaxy pairs represent the smallest and simplest system, much like binary star systems correspond to stellar systems. Spectral galaxy pairs refer to mixed galaxy spectra that include two independent redshift systems. Celestial bodies possessing such spectra may be overlapping galaxy pairs, bimodal AGNs, lens galaxies, and more. Astronomers studying galaxy pairs also need to observe their spectral characteristics simultaneously.

When studying the spectra of binary stars (galaxy pairs) based on the spectrum recognition platform, the following points should be noted:

1、 The star catalog data of binary stars (galaxy pairs) is somewhat special and requires two spectral signature fields. Assuming both stars (galaxy pairs) have observational data from LAMOST, the system requires that there should be lamost_obsid_1 and lamost_obsid_2 fields in the data. This way, when visualizing, the backend program can separately obtain two remote fits files. Assuming both stars (galaxy pairs) have observational data from SDSS, the system requires that there should be sdss_plate_1, sdss_plate_2, sdss_mjd_1, sdss_mjd_2, sdss_fiberid_1, and sdss_fiberid_2 fields in the data. If one star (galaxy pair) has observational data from LAMOST and the other from SDSS, then the system requires that there should be sdss_obsid1, sdss_plate_2, sdss_mjd_2, and sdss_fiberid_2 fields in the data. Additionally, similar requirements apply to right ascension, declination, and redshift (proper motion), meaning the field names should be ra1, ra2, dec1, dec2, z1, z2, rv1, and rv2.

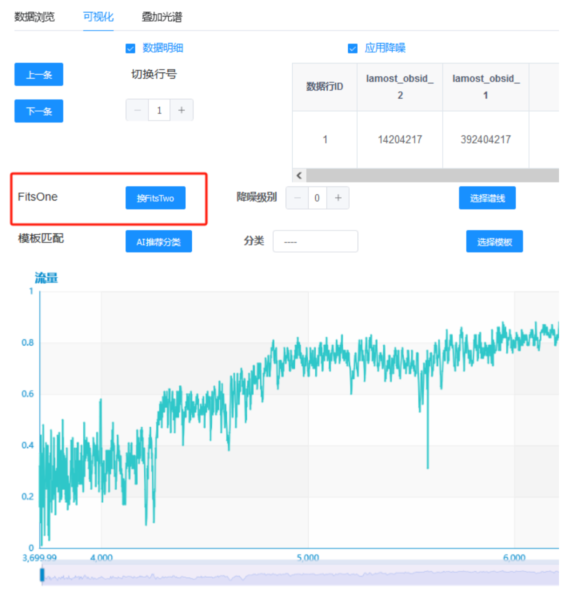
2、 The data source for the new binary star (galaxy pair) table should be selected as "binary star (pair)".

3. Uploading fits files is not supported, and only remote fits files can be obtained. That is to say, there is no local fits and remote fits switching in the visual interface.

4. The visual interface has the situation of switching between FitsOne and FitsTwo.

5 In the visual interface, templates can be selected at the same time to match two spectra respectively.

5. Spectral superposition display (see the next section) usually selects only one record (only two records can be selected at most).



10.10 Spectral overlay display

Sometimes it is necessary to display two or more spectra of the same type at the same time to compare differences.

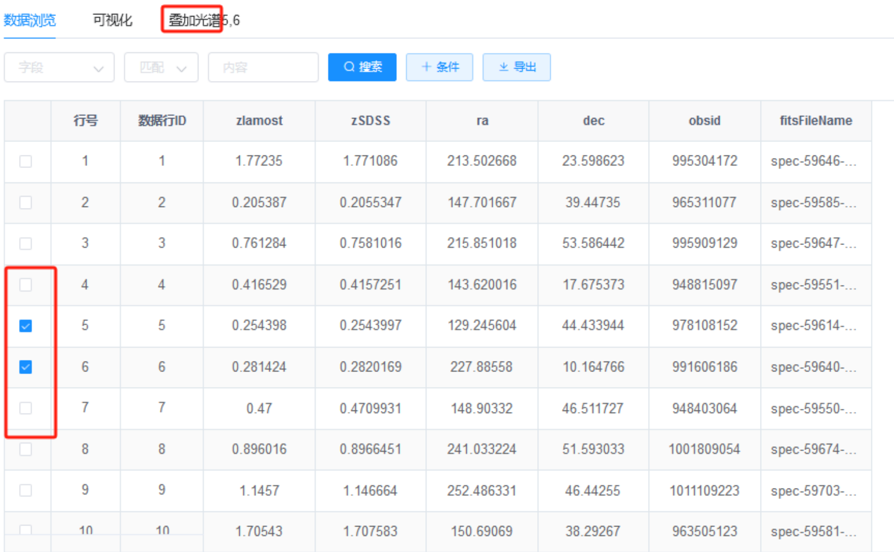
This system supports the selection of multiple spectral superposition display, no more than 4. For double star (galaxy pair) data, at most two data can be selected, and there will be 4 curves when displayed.

If there is no redshift or radial velocity in the data row, then the program cannot reverse calculate the stationary state, so such superposition display makes little sense.

The process of performing multiple spectral overlay display operations is as follows:

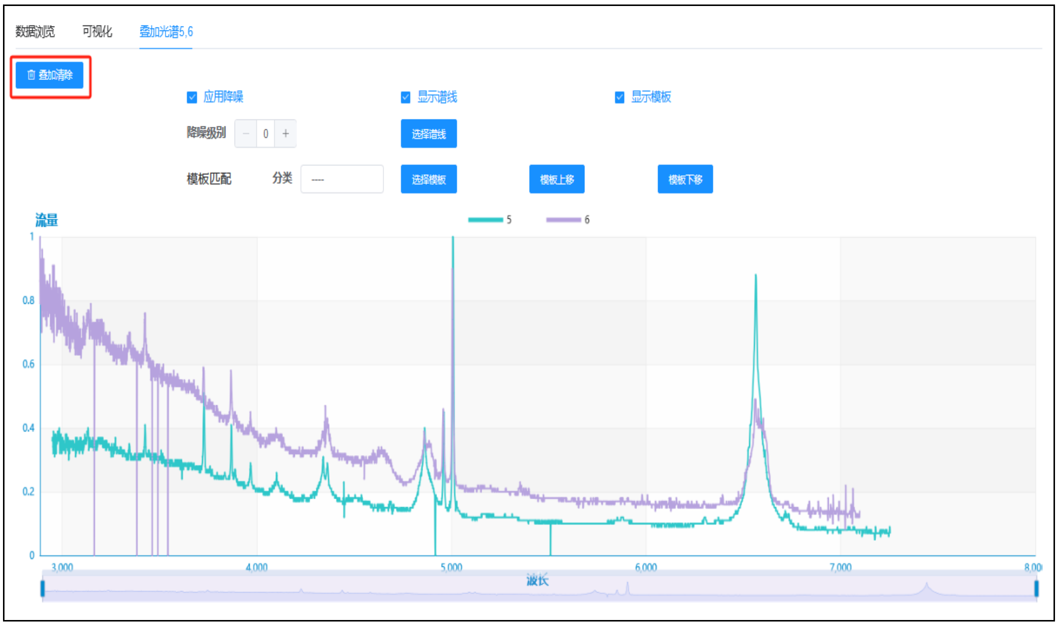
1、 In the "Data Browse" tab, retrieve the data you want to display;

2、 Check the checkboxes on the left as needed; (in the figure below, after checking lines 5 and 6, the id of the "Overlay Spectrum" tab label will be displayed synchronously)



	行号	数据行ID	zlamost	zSDSS	ra	dec	obsid	fitsFileName
☐	1	1	1.77235	1.771086	213.502668	23.598623	995304172	spec-59646-...
☐	2	2	0.205387	0.2055347	147.701667	39.44735	965311077	spec-59585-...
☐	3	3	0.761284	0.7581016	215.851018	53.586442	995909129	spec-59647-...
☐	4	4	0.416529	0.4157251	143.620016	17.675373	948815097	spec-59551-...
☑	5	5	0.254398	0.2543997	129.245604	44.433944	978108152	spec-59614-...
☑	6	6	0.281424	0.2820169	227.88558	10.164766	991606186	spec-59640-...
☐	7	7	0.47	0.4709931	148.90332	46.511727	948403064	spec-59550-...
☐	8	8	0.896016	0.8966451	241.033224	51.593033	1001809054	spec-59674-...
☐	9	9	1.1457	1.146664	252.486331	46.44255	1011109223	spec-59703-...
☐	10	10	1.70543	1.707583	150.69069	38.29267	963505123	spec-59581-...

3, Click the "Overlay Spectrum" tab.



4, Click the "Overlay Clear" button in the upper left corner to cancel the current selection and select other data rows as needed.

11. Access rights to star table data

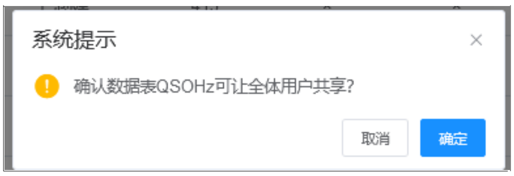
For the "Spectrum Expert" role (normal user), the menu items "My Database ", "Public Database", and "Working Group Database" are always visible.

11.1 My database

The list of the "My Database" menu item interface displays the data that the user has created and stored in the database. The user can access the star table data uploaded by himself here.

If a user opens public access permissions for a newly created data table, allowing all users to share it, then everyone can see the data table that has just been opened for public access in the list displayed on the "Public Database" menu item. Similarly, the current user can also see data tables that have been opened for public access by others.

In the above figure, the table "QSOHz" is currently not open to public access. The content of the "All Share" column shows as "×". Clicking the "All Share" hyperlink on the right can open public access permissions; the table "dataset20240606" is already open to public access, and the content of the "All Share" column shows as "√". Clicking the "Cancel All Share" hyperlink on the right can revoke public access permissions.

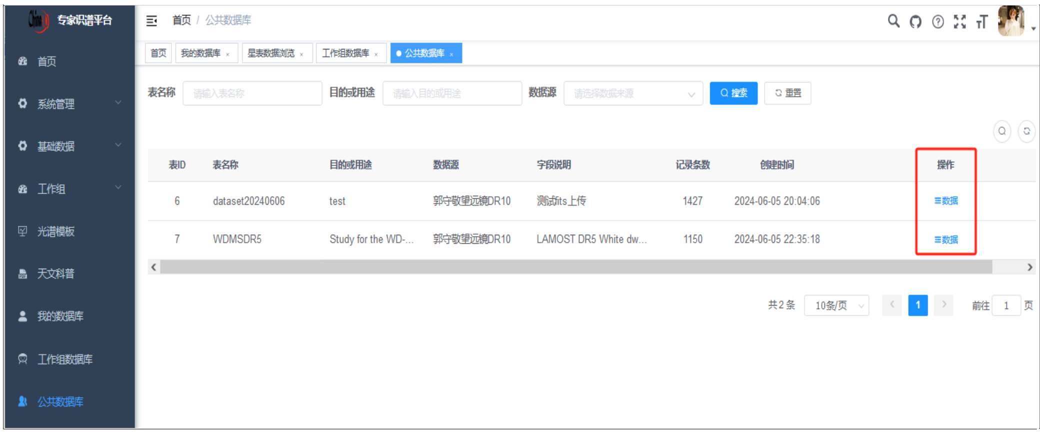


If a user opens a newly created data table to a specific workgroup and allows the group users to share it, then all members of that group can see the data table with newly opened access permissions in the list displayed on the "Workgroup Database" menu. Similarly, the current user can also view data tables with access permissions opened by other members of the same group. If the current user has not joined any groups, this operation cannot be performed.

In the above figure, the table "QSOHz" has not yet opened group access permissions. The content of the "Group Sharing" column is marked with a "×". Clicking the "Group Sharing" hyperlink on the right can open group access permissions. The table "dataset20240606" has already opened group access permissions. The content of the "Group Sharing" column is marked with a "√". Clicking the "Group Sharing" hyperlink on the right can further open group access permissions to other groups you have joined.

11.2 Public databases

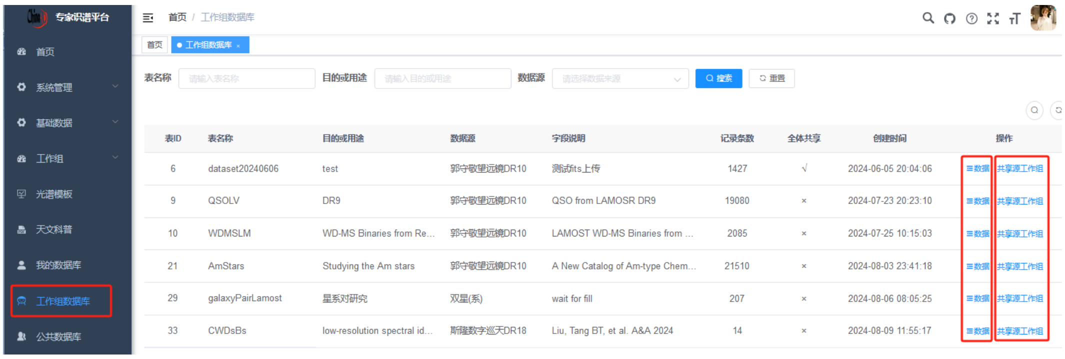
The following is the list of data tables after clicking the menu item "Public Database." As can be seen, there is only an input box for search conditions at the top of the list, with no "Add" button; on the right side of the list, there is only a "Data" hyperlink, without any links for modificati-on, fine-tuning attributes, deletion, fits upload, group sharing, or full sharing, as these actions belong to the creator's rights.



Click on the "Data" hyperlink and browse through the data operations and spectrum visualization operations, as described in section 10.4.

11.3. Working Group database

The following is the list of data tables after clicking on the menu item "Workgroup Database." As can be seen, there is only an input box for search conditions at the top of the list, with no "Add" button; the only actionable items on the right side of the list are the hyperlinks for "Data" and "Share Source Workgroup," but there are no links for modifying, fine-tuning attribu-tes, deleting, uploading fits, sharing within the group, or sharing with all users, as these actions belong to the creator's rights.



Click on the "Data" hyperlink to browse data operations and spectral visualization operations, as described in section 10.4.

Click the "Shared Source Workgroup" hyperlink, and a dialog box appears on the interface showing which or which groups share the current data table. In most cases, there is only one shared source workgroup, unless the creator of the current data table has shared it with several workgroups, and the current user has joined at least two of these workgroups.

Twelve, research and research-based learning tasks

Astronomers or astronomical educators can assign scientific research tasks or research-based learning tasks to the staff or students in the group, collect research results or research-based learning results on the spectrum recognition platform.

After completing the task, submit the results, primarily focusing on annotating the properties of the spectrum within the assigned task scope. Different categories require different physical parameters to be marked; for example, quasars need to have their redshift values, emission line widths, and continuum fluxes annotated; galaxies need to have their redshift values, ages, metal abundances, and masses annotated; stars need to have their radial velocities, surface gravity, and metal abundances annotated.

In order to maintain the flexibility of the platform, the system incorporates these physical parameters to be labeled into dynamic management.

12.1 Add or modify the name of the annotation property

Application scenario: Before the system goes online, the system administrator registers the names of physical parameters that need to be labeled for each type of spectrum. After the system goes online, an astronomer or an astronomy educator thinks that some physical parameters should be added and asks the system administrator to remind him.

1、 In the working environment, users enter the "Home Page/Basic Data/ Spectral Type" menu. Find the corresponding type in the spectral type list displayed on the interface, and click the "Annotation Attribute" hyperlink in the operation bar on the right side of the same row.

2. A new tab "Annotation Properties" is generated on the interface.

3. The system administrator selects a row according to the need, clicks the "Modify" button on the right side, modifies the property name, Chinese expression or English expression in the dialog box that pops up, and then clicks the "OK" button to save.

4. If you need to add a new annotation property name, click the "Add" button in the upper left corner.


添加新的标注属性
光谱类型：恒星_Star
* 属性名称
请输入属性名称
* 显示排序
1
* 中文表述
请输入中文表述
* 英文概述
请输入英文表述
确定
取消

Fill in the property name, Chinese expression, or English expression in the dialog box that pops up, and then click the "OK" button to save. For the same type of annotation properties, the names should be different.

12.2 Release of research and research-based learning tasks

Application scenario: Astronomers have planned new research objectives and are preparing to collaborate with some members of the working group; Astronomy educators have planned new learning objectives or target groups and are preparing for students in the working group to engage in research-based learning. Before releasing the task, the data sheet should already be shared within the working group.

1、 The group leader enters the "Home/Work Group/Spectrum Task Assignm-ent" menu in the working environment. The interface will display all tasks previously posted by the user. (Only the group leader can post tasks)

2Click the "Add" button in the upper left corner, select the working group and data sheet in the dialog box, enter the task name, task content, start date of the task, deadline of the task, the number of times a single spectrum can be re-marked, and the number of spectra that each person should mark, and then click the "OK" button to save.


布置新的任务
* 工作组
请选择所属工作组
* 任务名称
请输入任务名称
* 任务内容
请输入任务内容
* 数据表
请选择待识谱数据表
* 开始日期
* 截止日期
* 单条光谱可重标次数
1
* 每人应标注光谱条数
50
确定
取消

In most cases, the group leader creates only a few groups and shares data tables with these groups sparingly. Note that the selectable data tables are not necessarily created by the group leader; they can be shared by any user in the same group (most likely by the group administrator, who is usually the group leader's assistant). Here, "the number of re-identification attempts for a single spectrum" refers to situations where some spectra may not be accurately identified by one person alone. However, if 2-3 people identify them separately and then consolidate their results, the reliability significantly increases.

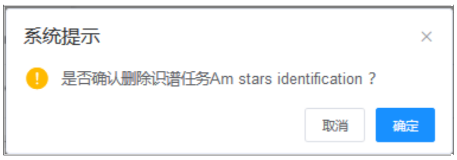
3. Find the newly added task record in the list, click the "Participants" hyperlink on the right side of the same row, and specify which group members should participate in completing this task. Participants can be specified by checking the checkboxes on the left side.

任务ID	工作组	任务名称	参与人数	单条光谱可重标次数	每人应标注光谱条数	创建时间	操作
10	施建嵘工作组	星系对研究测试	3	1	8	2024-08-06 12:30:25	参与者 微调属性 标注统计 标注导出 撤销任务 结束任务
9	田海俊工作组	Am stars identification	2	5	100	2024-08-05 15:22:52	修改 删除 参与者 发布

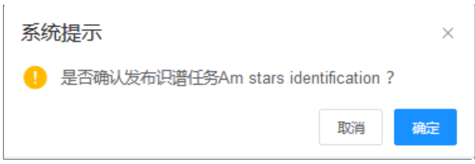
4、 Verify the number of participants before publishing and verify the attributes of the task just entered. If there is an error, click the "Modify" hyperlink to modify it.


修改任务信息
* 工作组
田海俊工作组
* 任务名称
Am stars identification
* 任务内容
Am stars identification
* 数据表
AmStars(21510条记录)
* 开始日期
2024-08-04
* 截止日期
2024-08-30
* 单条光谱可重标次数
5
* 每人应标注光谱条数
100
确定
取消

5. After adding a task, you may hesitate whether to assign the task or not. If you regret it, you can delete it before publishing. The specific method is to click the "Delete" hyperlink on the right side of the list data row.



6、 When everything is ready, go back to the list and click the "Publish" hyperlink on the right side of the list data row.



After the task is released, the list is automatically refreshed. You can see that there are no more "modify", "delete" and "publish" hyperlinks in the operable items on the right side of the data row, but there are more hyperlinks such as "fine-tune properties", "cancel task" and "end task".

In addition, if a task-related participant enters the "Home/Working Group/ To-Be-Finished Tasks" menu item, the newly assigned tasks can be seen in the list.

7. After a period of time after the task is released, the team leader may want to modify some of the task attributes. At this time, you need to go back to the list and click the "Fine-tune attributes" hyperlink.

In the dialog box, adjust the deadline, the number of times a single spectrum can be re-marked, and the number of spectra that each person should mark. Then click the "OK" button to save the new properties.

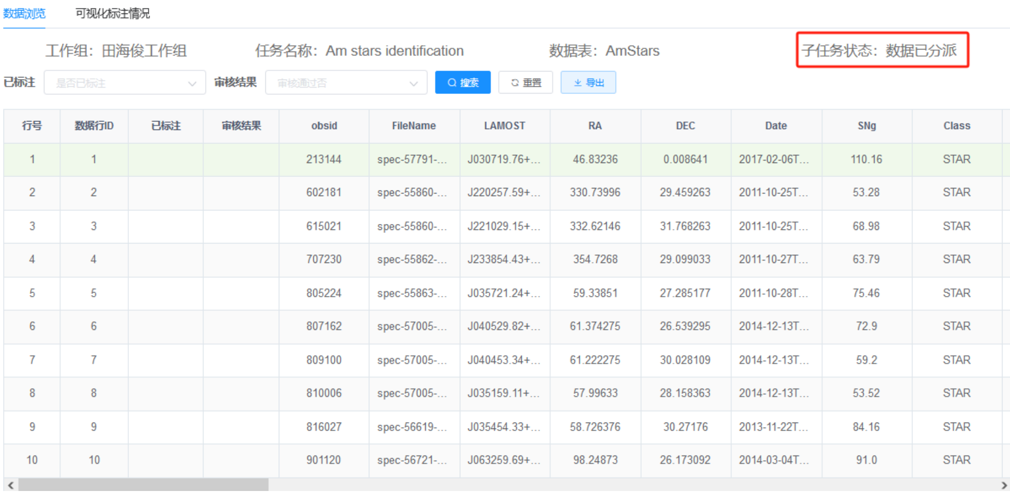
12.3. Execute the labeling task and submit the results

Application scenario: The spectrum recognition expert (ordinary user) has received the notification offline and needs to participate in the execution of the annotation task recently.

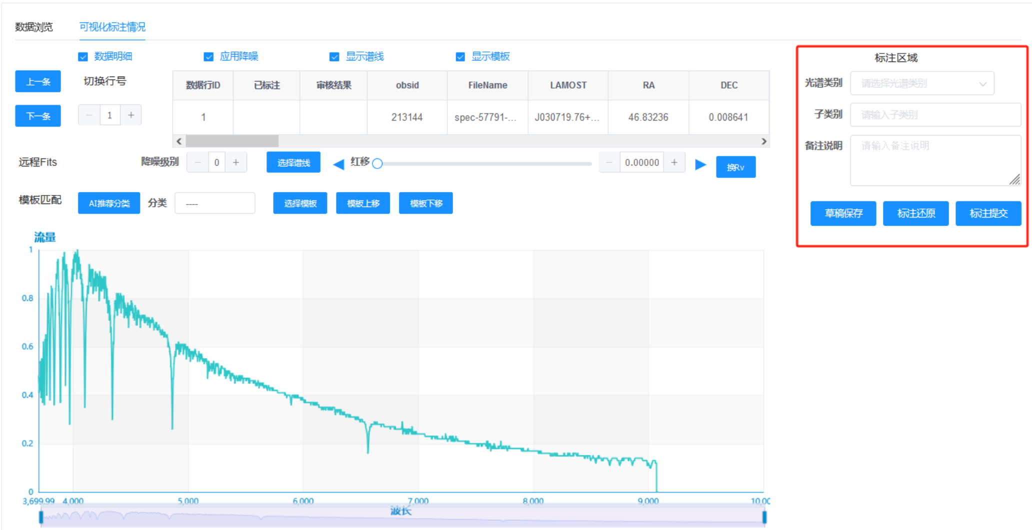
1、 The user enters the "Home/Work Group/To-Be-Finished Tasks" menu in the work environment. The interface lists the current user's unfinished transcription tasks, including newly released tasks. A published task is completed collaboratively by multiple people, with each participant transcribing a part of the score. We refer to the task each participant needs to complete as a "sub-task," and each "sub-task" has its own sub-task status. If a participant first "sees" their assigned sub-task, this is the current "sub-task."

The status is "claimed", and if the participant never "processes", the subtask remains in the "claimed" state.

2. Click the "Process" hyperlink for the first time (the status of subtask changes from "received" to "data has been assigned"), and a new "Annotation Details" page is generated on the interface. The interface consists of two tabs: "Data browsing" and "Visual annotation situation".



The data seen in the Data Browse tab is the spectrum to be identified that has just been automatically assigned to the current user by the system. Note that compared to section 10.4, there are now a "Marked" column and an "Audit result" column. Similar to section 10.4, the first row of data is selected by default.


数据浏览
可视化标注情况
数据明细
应用降噪
显示谱线
显示模板
上一条
切换行号
下一条
数据行ID
已标注
审核结果
obsid
FileName
LAMOST
RA
DEC
1
213144
spec-57791-...
J030719.76+...
46.83236
0.008641
远程Fits
降噪级别
选择谱线
红移
0.00000
模板匹配
AI推荐分类
分类
选择模板
模板上移
模板下移
流量
波长
标注区域
光谱类别
子类别
备注说明
草稿保存
标注还原
标注提交

Click the "Visualize Annotations" tab label to see a visual interface similar to section 10.4, except that the right side has an additional annotation area.

The specific operation of the left visual area is exactly the same as section 10.4, which will not be repeated here.

With the help of AI recommendations and other algorithms, after users complete their spectrum recognition activities, they should fill in relevant attribute values in the annotation area on the right to showcase their intelligence. To work in the annotation area, one must first select a spectrum category and input a subcategory; the attribute names below will change accordingly, which is closely related to the preparation covered in Section 12.1.

The upper figure shows the different interfaces after selecting stars by spectral class and selecting quasars by spectral class.

The user needs to fill in the attribute value in the input box to the right of the corresponding attribute name. (Getting these attribute values is the crystallization of wisdom)

3. Initially fill in the attribute values, which may not be confident. Users can click the "Save draft" button first and then switch to the surprise to process other spectra.

4. Fill in the attribute values of more than 10 spectra, save it

The more skilled you are, the more you can go back to review what you have filled in before, and then c

Click the "submit" button to officially submit your work. Once you

The status of the child task will be changed to "marked" and the releva

The "note" column will be changed to a "checkmark". After submission, go back and check it

The gray area, and the three buttons below it, no longer

5After arduous efforts, users identify 50-100 spectra within a few weeks and submit their work results one by one. Some low-resolution spectra are difficult to identify, and AI recommendations may not be reliable. Users can select "Other" in the spectrum category section and note "Unknown" in the remarks. If all the required spectra have been processed and submitted, the status of the current sub-task will automatically change to "Submitted."

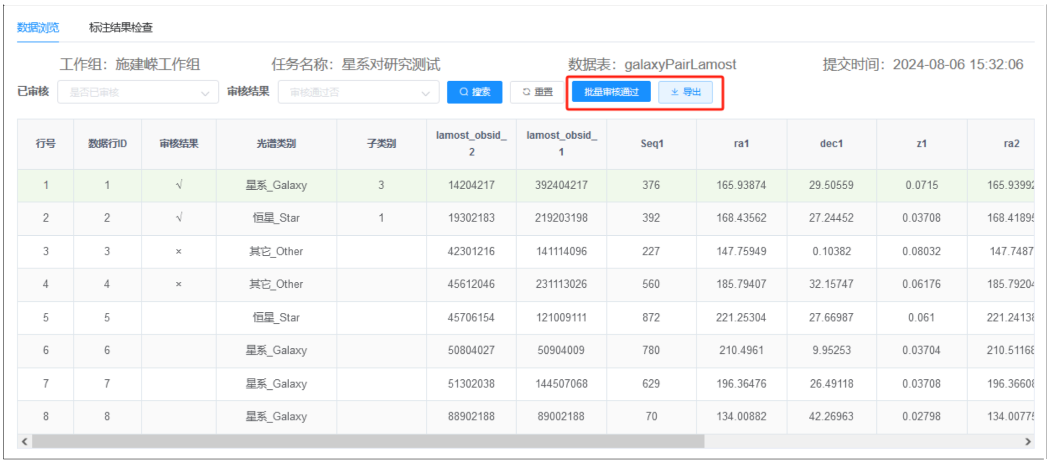
6、 After submission, the group leader or administrator will review it and may find that the participant's annotation of a certain spectrum is obviously wrong and the audit fails. Users can see the reason for the failure in subsequent browsing and modify the annotation result in time before resubmitting for audit again.

12.4 The task has been submitted for review of results

Application scenario: The group leader or the group administrator will review the results submitted by the members of the group from time to time.

1、 The group leader or administrator enters the "Home/Work Group/ Spectroscopy Results Review" menu in the work environment. The interface will list all sub-tasks that have been submitted with spectroscopy results. This means, if only one task has been published and there are 30 team members, with 20 of them having already submitted spectroscopy results, it indicates that there are 20 sub-tasks awaiting review, each corresponding to a specific person responsible for completion.

2. Click the "Review" hyperlink on the right, and a new page of "Result Review Processing" will be generated in the interface. The interface consists of two tabs: "Data browsing" and "Annotation result checking".

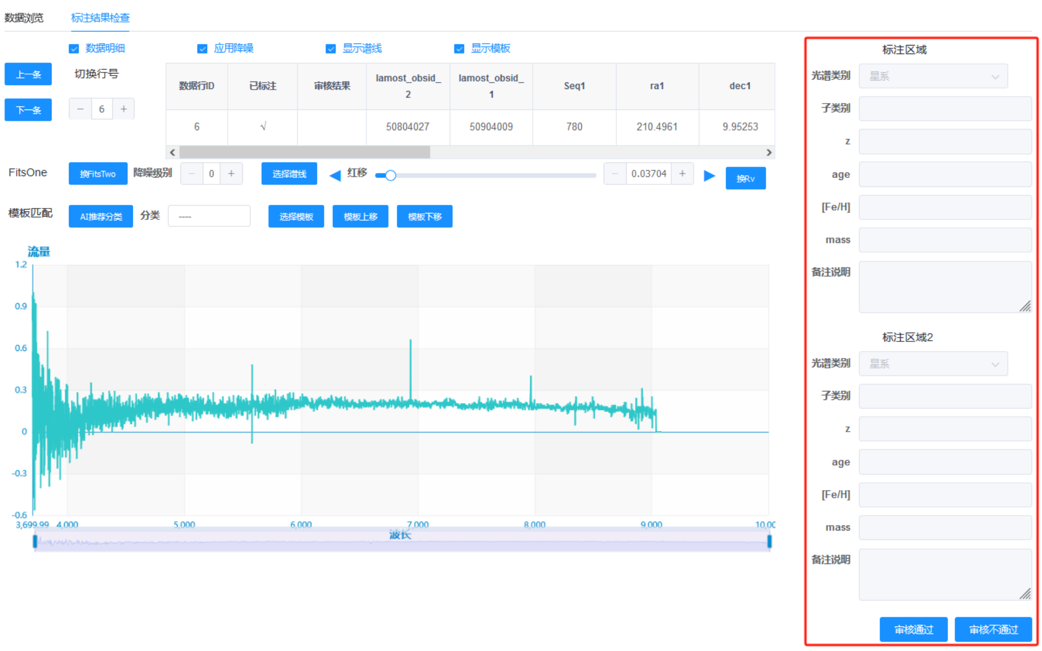


The data seen in the "Data Browse" tab is the spectrum to be identified automatically assigned by the system to the completed person. Note that compared to Section 10.4, this section includes the "Audit Result" column and the "Spectrum Category" and "Subcategory" annotation columns. Similar to

Section 10.4, the first row of data is selected by default.

3. Click the "Annotation Result Check" tab label, and you can see a visual interface similar to section 10.4, except that the pending annotation area is added on the right.

The specific operation of the left visual area is exactly the same as section 10.4, which will not be repeated here.



4. The group leader or administrator sets the redshift value (proper motion velocity) and spectral type template on the right based on the annotated results submitted by the contributor, and checks if they match. If there are no obvious errors, click the "Approve" button; if obvious errors are found, click the "Reject" button, fill in the reason for rejection, and return it for rework.

5. Dozens of spectra, as long as one is under review, the entire sub-task status will be automatically marked as "Under Review"; if all have been reviewed and only one fails, the entire sub-task status will be automatically marked as "Review Failed"; if all have been reviewed and all pass, the entire sub-task status will be automatically marked as "Review Passed".

6. The group leader or administrator may trust or favor a member of the group and do not want to waste time reviewing his work results. You can directly find the "Batch Approval" button in the second row of the "Data Browse" tab, click it, and complete the review operation at once.

7 After most of the audit work is completed, you can find the "Export" button in the second row of the "Data Browse" tab and click it to download the results of the work completed by the user in this spectrum identificat-

ion task.

12.5 Task completion statistics and results export

Application scenario: After a period of time, the team leader wants to know the overall situation of task completion.

1. The group leader enters the "Home page/workgroup/Pictorial task assignment" menu in the working environment. The interface will display all the tasks assigned at present in a list. Find the corresponding task and click the hyperlink of "Annotation statistics" on the right side of the data row.

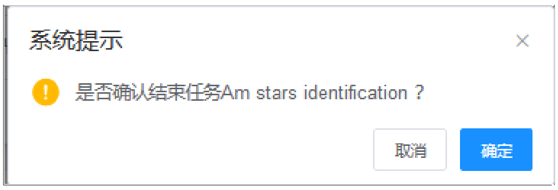
2. Judging that most people have completed the task, go back to the list and find the corresponding task. Click the hyperlink "Annotation Export" on the right side of the data row to download the work results of all people's this time in the spectrum recognition task.

12.6. Withdrawal and termination of tasks

Application scenario: After a period of time, the team leader thinks that the task is very unsatisfactory and plans to cancel the task; or thinks that the task has been basically completed.

A. The group leader enters the "Home page/workgroup/Pictorial task assig-nment" menu in the working environment. The interface will display all the tasks assigned at present in a list. Find the corresponding task and click the hyperlink "Cancel task" on the right side of the data row.

b. The group leader enters the "Home Page/workgroup/Pictorial Task Assignment" menu in the working environment. The interface will display all the tasks assigned at present in a list. Find the corresponding task and click the "End Task" hyperlink on the right side of the data row.



Assuming that some team members have not completed the task before, and the task is cancelled or finished, when the team members log in, the interface list will not display the task in the "Home Page / Working Group / To be Completed Task" menu. (Educators will still score according to the export results)