



Facultad de Ciencias Matemáticas y Naturales

**SEMANA** de las  
**CIENCIAS**

Química - Biología - Física - Matemáticas



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**FRANCISCO JOSÉ DE CALDAS**

Facultad de Ciencias Matemáticas y Naturales

# Visualización de datos astronómicos de la SDSS.

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# Contenido

- 1 Introducción
- 2 SciServer:
- 3 Datos astronómicos

# Contenido

- 1 **Introducción**
- 2 SciServer:
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Laura S. Cortes, Maria A. Moreno

The Sloan Digital Sky Survey has created the most detailed three-dimensional maps of the Universe ever made, with deep multi-color images of one third of the sky, and spectra for more than three million astronomical objects. Learn and explore all phases and surveys—past, present, and future—of the SDSS.

**Figure 1:** <https://www.sdss4.org/>

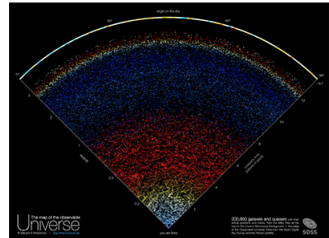
## Map of the Universe

SDSS researchers and developers led by Brice Ménard of Johns Hopkins University have created [the most detailed and accurate map](#) of the universe ever devised, from near-Earth asteroids to distant quasars. You can explore the map, read about each feature, and download a poster showing the entire map.

You can also read about how Ménard and his colleagues created this new map from the [press release from Johns Hopkins University](#).

Visit [mapoftheuniverse.net](https://mapoftheuniverse.net)

Mapoftheuniverse.net



The SDSS map of the universe ([click for a larger version](#))

Figure 2: <https://mapoftheuniverse.net>

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# Qué es el SciServer:

## About SciServer

SciServer is a fully integrated cyberinfrastructure system encompassing related tools and services to enable researchers to cope with scientific big data. SciServer enables a new approach that will allow researchers to work with Terabytes or Petabytes of scientific data, without needing to download any large datasets.

**Figure 3:** <https://sciserver.org/about/>

# Actividad 1: Creando Una cuenta en el SciServer:

- Revisar el manual en el git del curso [https://github.com/Almarm-r/VISUALIZACION\\_SDSS\\_-SEMANA-DE-LA-CIENCIA\\_2023-.git](https://github.com/Almarm-r/VISUALIZACION_SDSS_-SEMANA-DE-LA-CIENCIA_2023-.git)



# Actividad 1: Creando Una cuenta en el SciServer:

- Revisar el manual en el git del curso [https://github.com/Almarm-r/VISUALIZACION\\_SDSS\\_-SEMANA-DE-LA-CIENCIA\\_2023-.git](https://github.com/Almarm-r/VISUALIZACION_SDSS_-SEMANA-DE-LA-CIENCIA_2023-.git)
- Ingresar en <https://apps.sciserver.org/login-portal>

En la pagina de inicio podemos ver algunas opciones para trabajar .

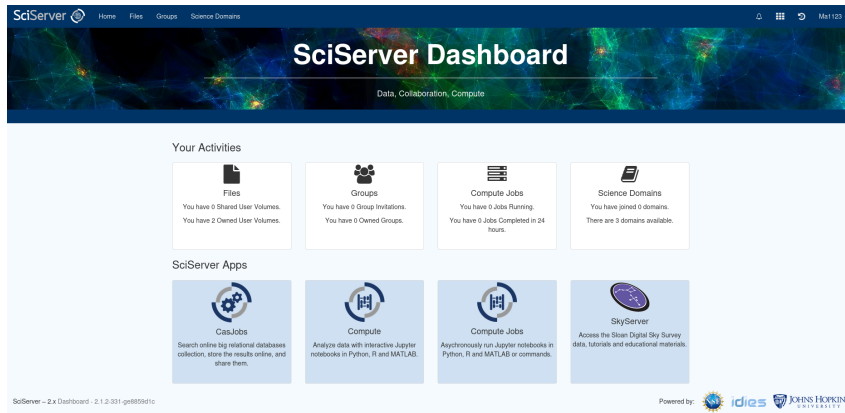


Figure 4: Inicio SciServer

Containers					
Created At	Name	Domain	Image	Status	
2023-09-10 21:17:42.0	xD	Interactive	SciServer Essentials 2.0	stopped	  
<button>Create container</button>					

## Important Information about Compute Container File Storage

- File System** Most of the folders in a Container's file system should not be used to store your files. Your initial container view is of `/home/ides/workspace`, which may contain volumes under the `Storage` and `Temporary` folders. Any user volumes you choose to add to the container at creation will be present within these folders. Do not store your files in `workspace`, or in any other folder except as described here. If a Compute node fails, your incorrectly stored files will be *lost permanently*.
- Storage** Use `Storage` volumes for long term storage of your scripts and small data files. The volumes in the `Storage` folder are backed up. These volumes are mounted according to the username of the user who created them under the path `/home/ides/workspace/Storage/username/user volume name/`. Files saved to this folder persist between your containers, even in the event that a container fails. Other files and folders cannot be placed in any intermediate paths, i.e., under the `Storage/username` or `Storage/` folders. Your `Storage` volumes are subject to size limitations described in the [SciServer Compute Data Storage Policy](#).
- persistent** By default, all users start with a `Storage` volume named `persistent`. The files in this volume correspond to the same `persistent` folder used in previous versions of Compute.
- Temporary** Use `Temporary` volumes for temporary large file storage. The `Temporary` volumes persist between containers and are not affected by Compute node failure, but is not backed up. These volumes are mounted according to the username of the user who created them under the path `/home/ides/workspace/Temporary/username/user volume name/`. Other files and folders cannot be placed in any intermediate paths, i.e., under the `Temporary/username` or `Temporary/` folders. Your `Temporary` volumes are subject to time limit and size limitations described in the [SciServer Compute Data Storage Policy](#).
- scratch** By default, all users start with a `Temporary` volume named `scratch`. The files in this volume correspond to the same `scratch` folder used in previous versions of Compute.

Do not save your scripts or data files anywhere in your Compute container's file system except in "Storage" or "Temporary".

Figure 5: Contenedor



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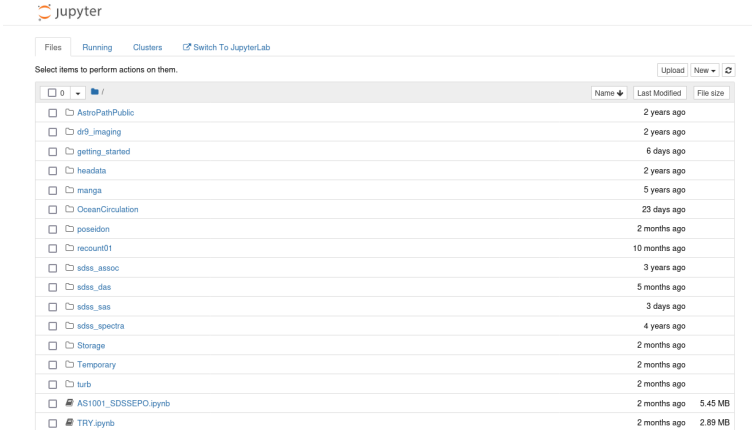


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## Actividad 2: Crear el contenedor de memoria

- Entrar en el manual de la actividad 2 de git [https://github.com/Almarm-r/VISUALIZACION\\_SDSS\\_-SEMANA-DE-LA-CIENCIA\\_2023-.git](https://github.com/Almarm-r/VISUALIZACION_SDSS_-SEMANA-DE-LA-CIENCIA_2023-.git)

# Acceder a Jupyter Notebook



The screenshot displays the Jupyter web interface. At the top, the Jupyter logo is visible. Below it, there are tabs for 'Files', 'Running', and 'Clusters', along with a link to 'Switch To JupyterLab'. A message states 'Select items to perform actions on them.' To the right of this message are buttons for 'Upload', 'New', and a refresh icon. The main area shows a file browser view with a table of files and folders. The table has columns for 'Name', 'Last Modified', and 'File size'. The files listed include various folders like 'AstroPathPublic', 'dr9\_imaging', 'getting\_started', 'headata', 'manga', 'OceanCirculation', 'poseidon', 'recount01', 'sdss\_assoc', 'sdss\_das', 'sdss\_sas', 'sdss\_spectra', 'Storage', 'Temporary', 'turb', and two notebooks: 'AS1001\_SDSSEPO.ipynb' and 'TRY.ipynb'.

Name	Last Modified	File size
/		
AstroPathPublic	2 years ago	
dr9_imaging	2 years ago	
getting_started	6 days ago	
headata	2 years ago	
manga	5 years ago	
OceanCirculation	23 days ago	
poseidon	2 months ago	
recount01	10 months ago	
sdss_assoc	3 years ago	
sdss_das	5 months ago	
sdss_sas	3 days ago	
sdss_spectra	4 years ago	
Storage	2 months ago	
Temporary	2 months ago	
turb	2 months ago	
AS1001_SDSSEPO.ipynb	2 months ago	5.45 MB
TRY.ipynb	2 months ago	2.89 MB

Figure 6: Jupyter interface

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Podemos tomar dos caminos

- Radial search: Buscar a partir de un punto específico
- Rectangular search: Buscar dentro de una sección rectangular.

Revisa el siguiente link: <https://skyserver.sdss.org/dr17/>

# Radial search :

The form is titled "Radial search" and contains the following elements:

- Type of search:** Radio buttons for ☒ Optical and ☐ Infrared.
- Coordinate System:** Radio buttons for ☒ Equatorial and ☐ Galactic.
- RA:** Text input field with value 258.25.
- Dec:** Text input field with value 64.05.
- radius (arcmins):** Text input field with value 3.
- Magnitude Ranges:** Five rows, each with a checkbox and two input fields (min and max).
  - ☐ u Range: 0 to 20
  - ☐ g Range: 0 to 20
  - ☐ r Range: 0 to 20
  - ☐ i Range: 0 to 20
  - ☐ z Range: 0 to 20
- Output Format:** Radio buttons for ☒ HTML, ☐ CSV, ☐ XML, ☐ JSON, ☐ VOTable, ☐ FITS, and ☐ MyDB.
- Limit number of output rows (0 for max) to:** Text input field with value 10.
- Buttons:** Green "Submit" button and red "Reset" button.
- Instructions:** "Enter the ra and dec either in degrees or in h:m:s, d:m:s notation. The search radius is measured in arcminutes. Check the magnitudes you would like to constrain in your query. If you prefer not to use specific attributes, leave those rows unchecked. (If you do not insert constraints and select all entries, you will receive many records!)"

Figure 7: Formato de búsqueda radial



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# Rectangle search

Tools ▾ CrossMatch Tools ▾ More Tools ▾ Support ▾ CasJobs

RA range 258.126647905 - 258.372257946

Dec range 64.0403313896 - 64.0594022974

☐ u Range 0 - 20

☐ g Range 0 - 20

☐ r Range 0 - 20

☐ i Range 0 - 20

☐ z Range 0 - 20

Output Format ☒ HTML ☐ CSV ☐ XML ☐ JSON ☐ VOTable ☐ FITS ☐ MyDB

Limit number of output rows (0 for max) to: 10

Enter the lower and upper limits for both *ra* and *dec* either in degrees or in h:m:s, d:m:s notation. The lower limit on *dec* should always be less than the upper limit. The range in either coordinates should be less than 0.2 degrees, to constrain the number of objects returned, for the time being. If the lower limit on *ra* is less than the upper limit, it will be interpreted as a wrap around *ra*=0. E.g.  $345 < ra < 15$  means to search between 23h and 1h. Check the magnitudes you would like to constrain in your query. If you prefer not to use specific attributes, leave those rows unchecked. (If you do not insert constraints and select all entries, you will receive many records!)

Figure 8: Formato de búsqueda rectangular

# Imaging search

Output Format ☒HTML ☐CSV ☐XML ☐JSON ☐VOTable ☐FITS ☐MyDB

Limit number of output rows (0 for max) to:

Parameters to return

Imaging

Spectroscopy

Position Constraints

Type of search ☒rectangular ☐cone ☐proximity ☐none

RA range  -

Dec range  -

Figure 9: Formato de búsqueda por imágenes.

# Spectroscopic Search

Magnitude

u range	<input type="text"/>	-	<input type="text"/>
g range	<input type="text"/>	-	<input type="text"/>
r range	<input type="text"/>	-	<input type="text"/>
i range	<input type="text"/>	-	<input type="text"/>
z range	<input type="text"/>	-	<input type="text"/>

Color

ug range	<input type="text"/>	-	<input type="text"/>
gr range	<input type="text"/>	-	<input type="text"/>
ri range	<input type="text"/>	-	<input type="text"/>
iz range	<input type="text"/>	-	<input type="text"/>

Obj Type

☒ Extended Sources  
(e.g. Galaxies)

☒ Point Sources  
(e.g. Stars)

☐ Sky

☐ Unknown

Score

☐ Return Value

Obj Flags

Figure 10: Formato de búsqueda espectroscópico

Para las bases de datos estructuradas existe una manera rápida de filtrar la información. En el caso de la SDSS podemos hacerlo a través de SQL

**Your SQL command was:**

```
SELECT TOP 10 p.objid,  
    p.run, p.rerun, p.camcol, p.field, p.obj,  
    p.type, p.ra, p.dec, p.u,p.g,p.r,p.i,p.z,  
    p.Err_u, p.Err_g, p.Err_r,p.Err_i,p.Err_z  
FROM fGetNearbyObjEq(258.25,64.05,3) n,    PhotoPrimary p  
WHERE n.objID=p.objID
```

**Figure 11:** Petición ejemplo SQL

## Actividad 3: Accedamos a algunos datos

- De los métodos que acabamos de revisar elegir uno y ubicar datos
- Obtener la petición en SQL