IVOA Newsletter - July 2020

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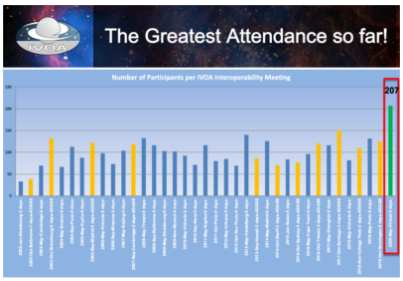
IVOA Newsletter Editors: Deborah Baines, Bruce Berriman, Jamie Anne Budynkiewicz, Theresa Dower, Giulia Iafrate, Shanshan Li, Simon O'Toole, Yihan Tao.

The International Virtual Observatory Alliance (IVOA) was formed in June 2002 with a mission to facilitate the international coordination and collaboration necessary for the development and deployment of the tools, systems and organizational structures necessary to enable the international utilization of astronomical archives as an integrated and interoperating virtual observatory. The IVOA now comprises 20 VO programs from Argentina, Armenia, Australia, Brazil, Canada, Chile, China, Europe, France, Germany, Hungary, India, Italy, Japan, Russia, South Africa, Spain, Ukraine, the United Kingdom, and the United States and an inter-governmental organization (ESA). Membership is open to other national and international programs according to the IVOA Guidelines for Participation. You can read more about the IVOA and what we do at http://ivoa.net/about/.

What is the VO?
The Virtual Observatory (VO) aims to provide a research environment that will open up new possibilities for scientific research based on data discovery, efficient data access, and interoperability. The vision is of global astronomy archives connected via the VO to form a multiwavelength digital sky that can be searched, visualized, and analyzed in new and innovative ways. VO projects worldwide working toward this vision are already providing science capabilities with new tools and services. This newsletter, aimed at astronomers, highlights VO tools and technologies for doing astronomy research, recent papers, and upcoming events.

IVOA NEWS



The Northern Spring Interoperability Meeting
Janet Evans and Patrick Dowler

The Northern Spring Interop meeting was held May 4–8 virtually via Zoom. Like many other conferences caught in the pandemic, the meeting originally scheduled for Sydney Australia was quickly re-organized. A virtual meeting seemed appropriate for an organization that has 'Virtual' in its name – so we set forth to meet the challenge! A surprising outcome was that this year's Northern Spring Interop meeting had the largest number of attendees, at 207, of any IVOA meeting previously. Many participants attended sessions of interest with an average of ~50 attendees at each session.

At registration, participants were given the opportunity to 'vote' on topics of interest. The most popular topics made up approximately half of the program. The other half of the sessions focused on core topics related to status and discussion on current technical coordination group efforts.

The meeting format included serial sessions during three time slots, arranged so that two of the sessions could easily be attended for 2/3 of the world-wide participants in a given day, while the third session would fall somewhere during the overnight hours. Each session had a presenter, a moderator and a note-taker. The Zoom 'chat' and 'raised hand' features were used to take questions. Etherpad was used for notes and added questions from the audience. Each session was 60 minutes and video recorded for convenient access to meeting content.

Highlights of the meeting included a Radio Astronomy Plenary. The Radio Astronomy interest group is a new group within the IVOA and presentations highlighted a number of projects that are making use of the VO in their current work and identified some areas of further work that are needed going forward. The FAIR Data Maturity Model presentation and discussion in the IVOA drew considerable interest and is core to many of our discussion about data handling. The Working and Interest groups provided status updates in their sessions on ongoing efforts. Each session fielded questions and engaged in discussions with the audience. Included was a Data Model status on the Source data model, and the Measurements, Coordinates, and Transform models. The Data Access Layer (DAL) group updated the attendees on current efforts including DataLink, ADQL, SIA2 and SODA. The Timing interest group engaged in several joint sessions with other groups and covered topics including light curves in VOTables, VOevent next steps, Cone search, and an update on the working standard that identifies Observatory object visibility and schedule for joint and follow-up observations at other facilities. The Grid and Web Services group held sessions on Standardizing Science Platforms and moving toward a new single sign-on standard able to allow applications and services to easily access private data. Other interesting sessions focused on Python based tools and applications, Vocabularies in the VO, and an instructional 'How To' session using Git to edit and build a VO document. Further information on these topics is available from the Interop program page.

The IVOA meeting did miss the hallway chats and working tag-ups that many members find valuable in moving efforts forward. There were no coffee breaks, lunches or dinners together where team bonding and coordination also take place. However, we were encouraged by the number of attendees, and we learned that we reached people who would otherwise not travel to a meeting. Many familiar faces and new friends met in this virtual environment for 5 days. Our plan forward is to work to find the balance between the traditional meeting and virtual meetings. We thank all who participated in the first Virtual Interop meeting and encourage you to continue to participate in the efforts of the IVOA through the working group and interest group email discussions and engaging with the IVOA.

More information: https://wiki.ivoa.net/twiki/bin/view/IVOA/InterOpMay2020

SCHOOLS AND WORKSHOPS

SVO schools become even more virtual
In these times of lockdown, SVO schools become even more virtual. The tutorial on how to discover brown dwarfs using Aladin is now available in Youtube:

https://youtu.be/Ajro94X7kUc

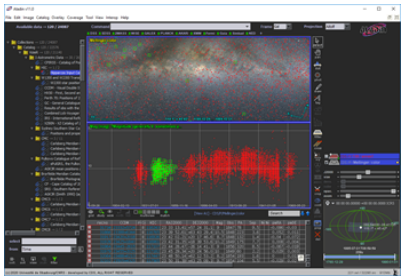
The tutorial is intentionally in Spanish to cover the needs of the amateur and citizen science communities.

Access more scientific usage tutorials here

VO APPLICATIONS AND IMPLEMENTATION HIGHLIGHTS

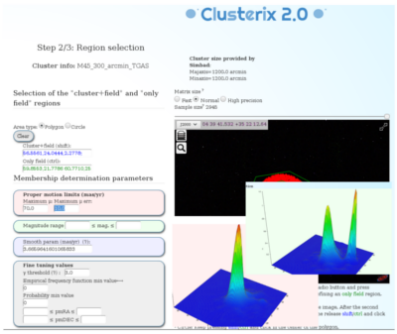
Aladin V11
The CDS is pleased to announce the 11th release of its Aladin Desktop software on April 2020.

Aladin Desktop is an interactive sky atlas allowing an “all-sky” approach to the visualisation of astronomical data. Aladin provides access to astronomical image surveys with capabilities for superimposing entries from astronomical catalogues or databases, and also providing access to related data and information from the SIMBAD database, the VizieR service and many other VO services.



The main innovation of Aladin v11 is the support of the temporal dimension of data collections, whether for filtering catalog sources, or for handling time coverages. This new version also includes support for the most recent IVOA standards, including TAP1.1 (s_region definition), MOC1.1 (ASCII serialization) and VOTable 1.4 (TIMESYS support). The new compression modes described in version 4.0 of the FITS reference document are also now supported (RICE, GZIP_1, GZIP_2, HCOMPRESS ...).

More information: https://aladin.u-strasbg.fr/AladinDesktop/



Clusterix 2.0: a virtual observatory tool to estimate cluster membership probability
(2020MNRAS.492.5811B)
Clusterix 2.0 is a web-based, Virtual Observatory compliant, interactive tool for the determination of membership probabilities in stellar clusters based on proper-motion data using a fully non-parametric method. The system offers the possibility to query different catalogues, such as Gaia, or upload a user's own data.

More information: http://clusterix.cab.inta-csic.es/clusterix/

ESASky in Chinese and new datasets available
The latest release of ESASky is now available in Chinese. The Chinese translation, aimed at reaching larger segments of the professional and amateur astronomical community, was made possible thanks to a collaboration with colleagues from the China-VO and China's Large Sky Area Multi Object Spectroscopic Telescope (LAMOST), with the ESASky team offering to incorporate the observatory's data into the platform and their Chinese counterparts offering to translate the app.

In addition, and thanks to the data protocols set by the IVOA and the opportunities for collaboration in this context, ESASky also provides access to data from ground based observatories and major data centres, such as the European Southern Observatory (ESO), NASA's Mikulski Archive for Space Telescopes (MAST) and the Canadian Astronomy Data Centre (CADC), all via an external Table Access Protocol (TAP) functionality. The data include images, spectra, data cubes, time series data and more. Future plans include adding more TAPs from large data centres and to include data from any TAP of the user's choice.

More information: sky.esa.int and how to use ESASky

Gran Telescopio Canarias VO Services
The Gran Telescopio Canarias (GTC) is the largest telescope in the optical-infrared regime. Its VO-compliant

archive is mantained by the Spanish Virtual Observatory (SVO).

SVO has built high-level data products (astrometrically and photometrically corrected images, detection and source catalogues) for one of the most demanded GTC instruments: OSIRIS. Data Release 1 includes 6788 broad-band images in the Sloan griz filters obtained between April 2009 and January 2014 and the associated catalogue with roughly 6.23 million detections of more than 630 000 unique sources.

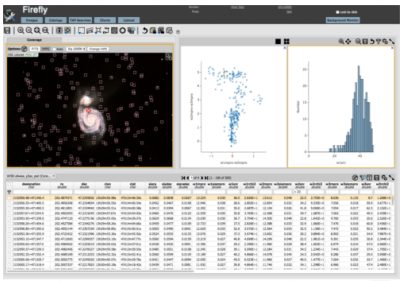
Data access is available through web forms:
- Images
- Catalogues

More information: 2020MNRAS.491..129C

Information Management System for the Largest Radio Telescope Powered by the VO

China-VO have developed an information management system for the Five-hundred-meter Aperture Spherical radio Telescope (FAST), which is the world's largest single radio dish telescope located in Guizhou, China. The system provides a portal for the public, telescope users and telescope managers. Some of the key functions include: user management; release of news; announcements and scientific achievements; management of observation projects and parameter submission; management and search of observation logs; application of user accounts; and data usage authorisation for the FAST data center, etc. The system is designed to be in accordance with several IVOA standards, which lays the foundation for future data releases of FAST using VO standards. The system is running online at https://fast.bao.ac.cn/.

More information: https://fast.bao.ac.cn/



IPAC Firefly

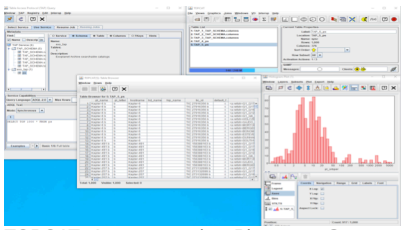
We want to bring to your attention to IPAC Firefly and its support for IVOA standards. Firefly is open source and available at GitHub. It is the underlying software for several of IRSA's applications, like IRSA Viewer, Finderchart, WISE archive and ZTF. It has been used in the NED user interface for table data display, image visualization and plotting. Here are some of its functions:

1. Read in VOTable and display it properly, respecting the data types
2. Make scatter plot and heat map for table data
3. Support for TAP services. It has a simple interactive editor to compile the ADQL statement, sends the search request to TAP service, display the results nicely
4. Visualize HiPS and MOC images. It can use HiPS as background image for objects overlay. User can also pick the image from a list, zoom in/out
5. Support for datalink
6. APIs to use its different displaying and visualization components

More information: https://github.com/Caltech-IPAC/firefly/

nexsciTAP: a Python-based TAP server

The NASA Exoplanet Science Institute (NExScI) at Caltech/IPAC has developed nexsciTAP, a Python-based TAP server. It has been deployed to serve the Planetary Systems table in the NASA Exoplanet Archive. Deployment of all the tables in the archive will follow this year. nexsciTAP has been tested with the PyVO, TAP+ and TOPCAT clients. It is being incorporated into the archive for the NEID exteme-precision radial velocity engine, and underpins the Python client to the Keck Observatory Archive (KOA) (release date July 2020). The code will be made freely available on Git Hub by July 31 2020, and will have an Open Source BSD-3 clause license. NExScI is now seeking evaluators for the code and documentation.



TOPCAT Access to the Planetary Systems Table at Exoplanet Archive via the Archive TAP service

Interested persons please contact Bruce Berriman at gbb 'at' ipac.caltech.edu.

SOME RECENT PAPERS ABOUT VO-ENABLED SCIENCE

Featured Science Publication

MASCARA-4 b/bRing-1 b: A retrograde hot Jupiter around a bright A-type star
Dorval, P.; Talens, G. J. J.; Otten, G. P. P. L.; Brahm, R.; Jordán, A.; Torres, P.; Vanzi, L.; Zapata, A.; Henry, T.; Paredes, L.; Jao, W. C.; James, H.; Hinojosa, R.; Bakos, G. A.; Csubry, Z.; Bhatti, W.; Suc, V.; Osip, D.; Mamajek, E. E.; Mellon, S. N. Wyttenbach, A.; Stuik, R.; Kenworthy, M.; Bailey, J.; Ireland, M.; Crawford, S.; Lomberg, B.; Kuhn, R.; Snellen, I.
A&A (2020) Volume 635, A60
Context. The Multi-site All-Sky CAmeRA (MASCARA) and bRing are both photometric ground-based instruments with multiple stations that rely on interline charge-coupled devices with wide-field lenses to monitor bright stars in the local sky for variability. MASCARA has already discovered several planets in the northern sky, which are among the brightest known transiting hot Jupiter systems.
Aims. In this paper, we aim to characterize a transiting planetary candidate in the southern skies found in the combined MASCARA and bRing data sets of HD 85628, an A7V star of V = 8.2 mag at a distance 172 pc, to establish its planetary nature.
Methods. The candidate was originally detected in data obtained jointly with the MASCARA and bRing instruments using a Box Least-Square search for transit events. Further photometry was taken by the 0.7 m Chilean-Hungarian Automated Telescope (CHAT), and radial velocity measurements with the Fiber Dual Echelle Optical Spectrograph on the European Southern Observatory 1.0 m Telescope. High-resolution spectra during a transit were taken with the CTIO high-resolution spectrometer (CHIRON) on the Small and Moderate Aperture Research Telescope System 1.5 m telescope to target the Doppler shadow of the candidate.
Results. We confirm the existence of a hot Jupiter transiting the bright A7V star HD 85628, which we co-designate as MASCARA-4b and bRing-1b. It is in an orbit of 2.824 days, with an estimated planet radius of $1.53_{-0.04}^{+0.07}$ $R_{\rm Jup}$ and an estimated planet mass of 3.1 ± 0.9 $M_{\rm Jup}$, putting it well within the planetary regime. The CHAT observations show a partial transit, reducing the probability that the transit was around a faint background star. The CHIRON observations show a clear Doppler shadow, implying that the transiting object is in a retrograde orbit with $|\lambda| = 244.9_{-3.6}^{+2.7}$°. The planet orbits at a distance of 0.047 ± 0.004 AU from the star and has a zero-albedo equilibrium temperature of 2100 ± 100 K. In addition, we find that HD 85628 has a previously unreported stellar companion star in the *Gaia* DR2 data demonstrating common proper motion and parallax at 4.3″ separation (projected separation ~740 AU), and with absolute magnitude consistent with being a K/M dwarf.
Conclusions. MASCARA-4 b/bRing-1 b is the brightest transiting hot Jupiter known to date in a retrograde orbit. It further confirms that planets in near-polar and retrograde orbits are more common around early-type stars. Due to its high apparent brightness and short orbital period, the system is particularly well suited for further atmospheric characterization.
DOI: 10.1051/0004-6361/201935611

Refereed Publications

The full list of refereed publications from October 2019 to June 2020 can be found at the following list, curated by the Spanish Virtual Observatory.

More Ways to Find VO-related Publications

All ADS links mentioning the "virtual observatory" in the abstract.

All refereed publications mentioning the "virtual observatory" in the abstract.

VO CALENDAR

8-12 November 2020 - ADASS XXX
Online
This annual Astronomical Data Analysis Software and Systems (ADASS) conference, held in a different location each year, is a forum for astronomers, computer scientists, software engineers, faculty members and students working in areas related to algorithms, software and systems for the acquisition, reduction, analysis, and dissemination of astronomical data. The ADASS XXX program will include invited talks, contributed papers, display sessions, tutorials, computer demonstrations, and special interest (“Birds of a Feather” or BoF) meetings. This year we regret that we will not be able to welcome you to Granada, Spain as planned due to the COVID-19 pandemic. Instead, ADASS will be a Virtual Conference, hosted by IRAM and IAA-CSIC.

November 2020 (dates TBD) - IVOA Interoperability Meeting
Online
The International Virtual Observatory Alliance (IVOA) semi-annual Interoperability meetings provide an opportunity for discussion and development of virtual observatory standards and VO-based applications, and are open to those with an interest in utilizing the VO infrastructure and tools in support of observatory operations and/or astronomical research. The Northern Fall 2020 IVOA Interoperability meeting will be a Virtual Conference and will be hosted by the Spanish VO.

Spring 2021 - .Astronomy 12
ESAC, Madrid, Spain
The .Astronomy conference series aims to build a dynamic and creative community of scientists and educators to exploit the potential offered by modern computing and the internet in the era of data-driven astronomy. Rather than scientific questions, the focus is on innovative use of the web to develop new research tools, and to communicate with a broad audience through online platforms and innovative engagement resources. .Astronomy provides scientists, developers and science communicators an opportunity to showcase their ideas and skills outside their institutes or research areas, and help them get credit for their work. This event has been postponed to Spring 2021 due to the Covid-19 pandemic. The expression of interest form is frozen until new dates for the meeting are set.

For Astronomers

Getting Started / Using the VO
VO Glossary / VO Applications
IVOA newsletter / VO for Students & Public

For Deployers/Developers

Intro to VO Concepts /
IVOA Standards/ Guide to Publishing in the VO / Technical Glossary

For Members

IVOA Calendar / Working Groups/
Twiki / Documents in Progress /
Mailing Lists / IVOA Roadmap