

VO Activities @ Space Science Data Center:

use of an experimental TOPCAT version
to enable SAMP over both the http/https protocols

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Agenzia Spaziale Italiana

ASI - Italian Space Agency

The Space Science Data Center is a Research Infrastructure of the Italian Space Agency

MAIN GOAL

acquire, manage, process and distribute data from (mainly) space based mission adopting the FAIR (Findable, Accessible, Interoperable, Reusable) principles.

SSDC adopts international standards ensuring both the long term preservation of archives and the interoperability with other data centers.

ASI - Italian Space Agency

Space Science
Data Center

Since 2017

Universe
Observation

Information &
Computing
Technologies

Earth
Observation



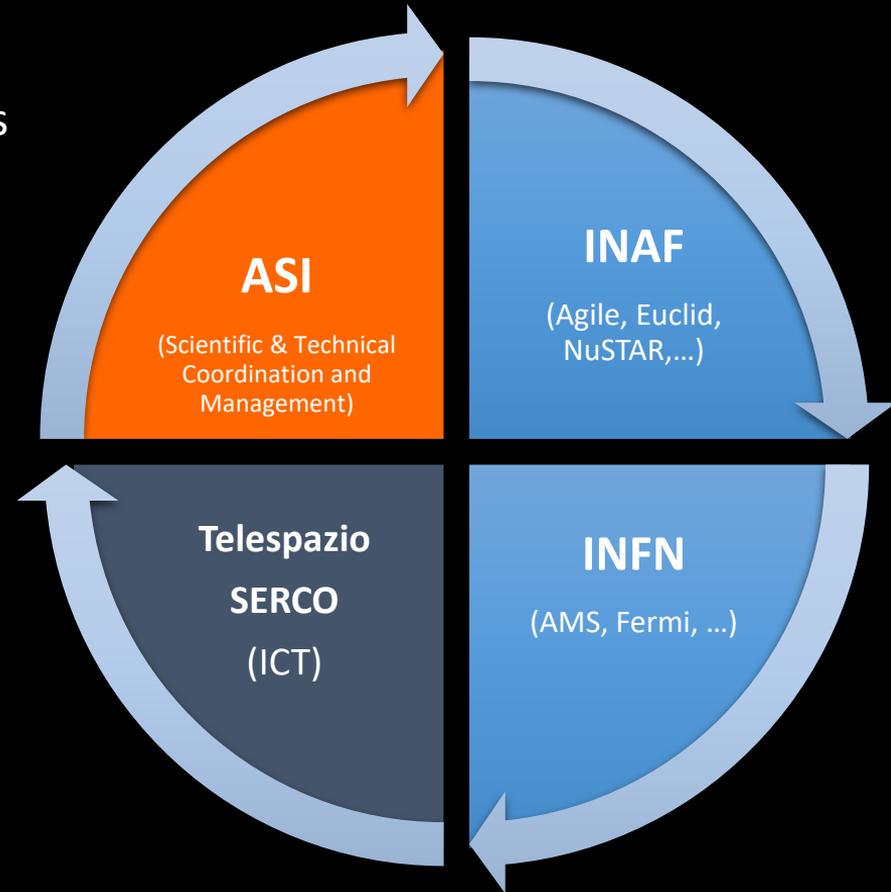
ex - ASDC

SSDC – Universe Observation

SSDC – UO management and organization involves several Research Institutes:

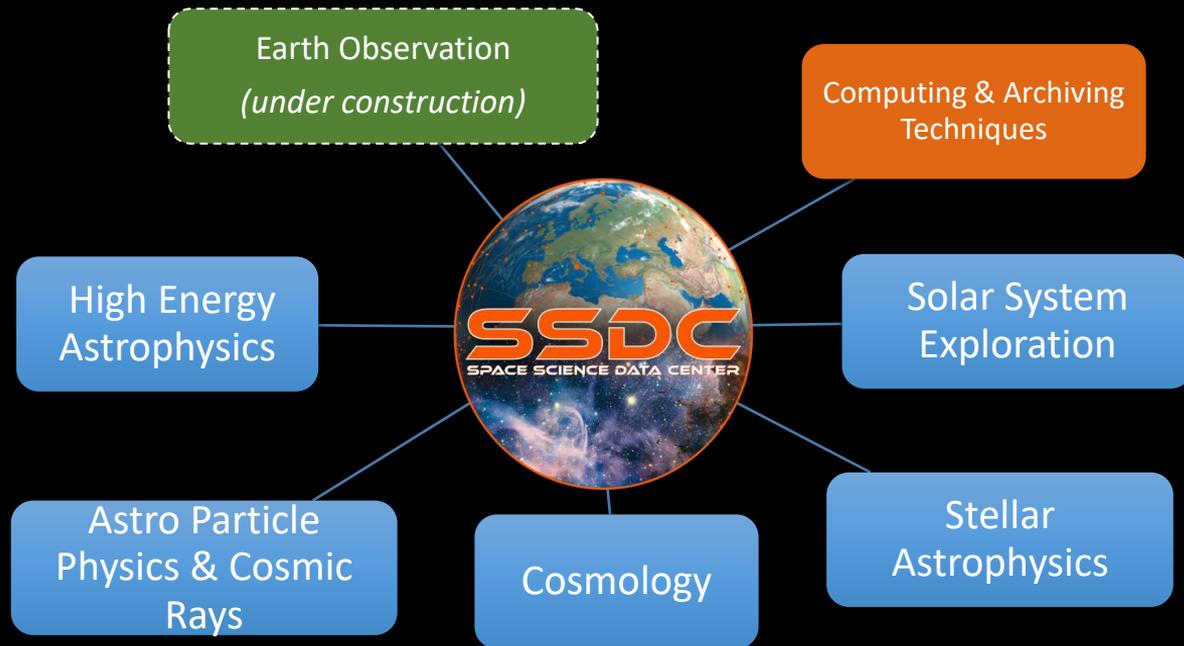
- **ASI** – Italian Space Agency
- **INAF** – National Institute for Astrophysics
- **INFN** – National Institute for Nuclear Physics

Industries are involved for Information and Communication Technology supports.



SSDC Scientific Expertise

At present, SSDC team involves around 40 people: **scientists** from ASI, INAF, INFN and SW **engineers** from Telespazio & SERCO, experts in different fields.



Effective approach: Developers and Users belong to same communities.

SSDC VO activity

SSDC (ex-ASDC) has participated to the european data center census promoted by EuroVO Data Center Alliance (DCA) to identify public european data center following or which will follow the VO standards.

Current activities:

- Review of the VO access to the astronomical catalogs hosted within the SSDC services
 - Update SSDC TAP service (new registration)
 - GAIA TAP service integration
 - **Recover Catalog VO interoperability with SAMP protocol**
- Activity to allow access to the Multi-Mission scientific data archives hosted at SSDC through the VO
 - Development of new services (SSAP, SIAP)
 - Development of MATISSE 2.0 and integration within VESPA for the planetary mission scientific archives
- Implementation of IVOA standards in the on-line SSDC services and tools;
 - SED, Data Explorer, Multi Catalog Search e Multi Mission Interactive Archive

Future further developments

- Study of a Space Weather portal in SSDC (ASPIS): assessment of applicable VO protocols
- Earth Observation: assessment of applicable VO protocols

SSDC Science Gateway

http://www.ssdc.asi.it

The screenshot shows the Space Science Data Center website. At the top left is the SSDC logo, and at the top right is the ASI logo (Agenzia Spaziale Italiana). The main title "Space Science Data Center" is prominently displayed. Below the title is a navigation menu with items: Home, About SSDC, News and Communication, Quick Look, Missions, Multimission Archive, **Catalogs** (circled in red), Tools, Links, Biographic services, and Helpdesk. A search bar is located to the right of the menu. The main content area features a large image of a satellite in orbit over a colorful astronomical map. Below this image is a grid of icons for various science tools and missions, including SED BUILDER, SKY EXPLORER, MATISSE, GAIA PORTAL, COSMIC RAY DATABASE, and others. A vertical sidebar on the right lists various catalogs and missions, categorized by energy range: VHE (TeV Catalog, 1WHSP Catalog, 2WHSP Catalog), Gamma-Ray (AGILE Catalogs, Fermi Catalogs, Third EGRET Catalog), X-ray (SuperAGILE, BeppoSAX, Swift), UV-optical-NIR (White dwarfs in the SDSS, The Plotkin Catalog), Radio/Microwave (Planck, WMAP3, WMAP5, BOOMERanG Blazars, Multi-frequency, BZCAT Blazars), and ROXA (Sedentary survey, GRBase). A red arrow points from the "Catalogs" menu item to the "BOOMERanG Blazars" entry in the sidebar. At the bottom of the page, there is a date and time stamp: "20 SETTEMBRE 2016 | VENERDI | 16.00-24.00".

Science Tools allow the on-line access to data within a multifrequency environment

On-line Access to Space Missions Data Archives

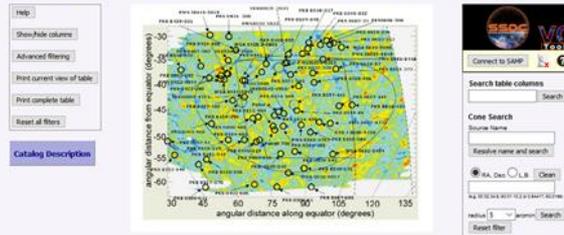
2019, Paris, France

SSDC scientific catalog web pages

SSDC catalog web pages are developed in PHP and Javascript and allow the connection with all the scientific multi-frequency tools and multi-mission data archives, in particular through the Data Explorer MMC tools.

<http://www.ssdsc.asi.it/boomerang>

Evidence for a significant Blazar contamination in CMB anisotropy maps



P. Giommi & S. Colafrancesco AAA 414, 7, 2004

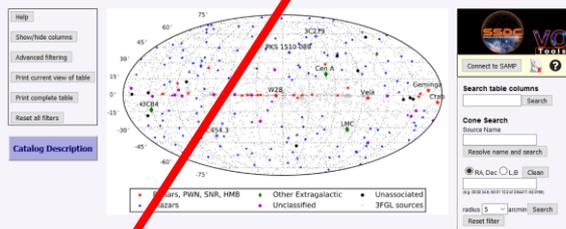
Export Current view of Table as: Latex format, HTML format, Raw text format, CSV text format, Selection table

Previous Page Next Page Page Size (n. of lines) 200 Reset all filters Show all entries

This view includes 54 entries

Entry number	Selection mode	MHC	Source name	RA (J2000.0)	Dec (J2000.0)	Rises/sets	Vmag	Redshift	Source classification	LLI (degrees)	BLI (degrees)
1	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0252-549	02 53 30.79 -54 41 40.91	1193	17.7	0.537	FSRQ - WMAP	272.48	-84.42
2	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0257-510	02 58 37.7 -50 52 15.95	452	23	0.834	FSRQ	264.21	-56.21
3	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0308-611	03 09 55.6 -40 58 27.47	1103	18.6		NEO-QSO	278.11	-48.95
4	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0310-558	03 12 05.8 -55 41 38.0	901	18		Blazar candidate	271.2	-51.89
5	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0317-570	03 18 55.99 -56 50 53.0	257	17.5		Blazar Candidate	271.9	-50.46
6	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PMN J0321-3711	03 21 23.2 -37 11 33.0	5020			NEO- Radio S- Extended - WMAP	245.18	-56.96
7	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0340-372	03 42 05.4 -37 03 10.87	872	18.1	0.284	QSO	239.34	-52.86
8	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0402-362	04 03 53.08 -36 04 47.95	1132	17.2	1.417	FSRQ	237.73	-48.49
9	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0405-385	04 06 56.7 -38 26 22.92	830	17.7	1.285	FSRQ - WMAP	241.28	-47.9
10	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PKS 0410-519	04 11 36.19 -51 49 19.99	361	17.8		NEO-QSO	260.51	-45.38
11	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PMN J0419-3010	04 19 48.28 -30 10 06.96	184	17.5		Blazar candidate	228.66	-44.03
12	<input checked="" type="checkbox"/>	SSDC Data Explorer	Cross-search SSDC catalogs	PMN J0422-3844	04 22 14.68 -38 44 48.11	130	17	3.11	NEO-QSO	241.76	-44.92

The First Catalog of Fermi-LAT of Sources below 100MeV (1FLE)



G. Príncipe, D. Malyshev, J. Baller, S. Funk, A&A 618, 22, 2018

Download the 1FLE file here

All AGNs BL Lacs FSRQs BCU Pulsars Binaries & Novae

SNR, PWN, SFR Galaxy & Starburst LBSY1 SSRC/SS Unassociated Unclassified

Export Current view of Table in: Latex format, HTML format, Raw text format, CSV text format, Selection table

Previous Page Next Page Page Size (n. of lines) 200 Reset all filters Show all entries

This view includes 198 entries

Entry number	Archive	MHC	1FLE Source name	Class	RA (J2000.0)	Dec (J2000.0)	Significance	Flux 30-100 MeV (ph/cm ² /s)	Flux 30-100 MeV Error (ph/cm ² /s)	Flux 100-300 MeV (ph/cm ² /s)	Flux 100-300 MeV Error (ph/cm ² /s)	Energy Flux 30-100 MeV (erg/cm ² /s)	Energy Flux 100-300 MeV (erg/cm ² /s)	Energy Flux 30-300 MeV (erg/cm ² /s)
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J0835-4507	psr	08 35 44.79	-45 07 14.26	230.49	1.315e-5	1.315e-6	6.537e-6	1.603e-6	1.095e-9	1.095e-10	1.718e-10
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J0930+2144	pwn	09 30 59.01	+21 44 43.37	161.65	8.074e-6	9.685e-7	1.574e-6	3.605e-7	6.724e-10	8.069e-11	4.136e-11
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J0939-4655	pwn	16 39 39.75	-46 55 05.86	55.572	3.714e-6	7.545e-7		3.094e-10	6.286e-11		
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J2025+1817	hrg	22 54 15.02	+18 17 16.14	99.997	3.289e-6	6.652e-7	9.539e-7	2.239e-7	2.732e-10	5.550e-11	2.558e-11
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J2238+4115	hmb	02 38 45.88	+41 15 25.58	64.455	3.034e-6	6.103e-7	6.023e-7	1.414e-7	2.528e-10	5.134e-11	1.933e-11
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J2708-4429	psr	17 08 17.29	-44 29 02.36	25.141	2.921e-6	5.934e-7	6.090e-7	1.420e-7	2.434e-10	4.943e-11	1.600e-11
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J3026+3655		20 26 34.27	+38 55 09.87	59.975	2.906e-6	5.988e-7		2.423e-10	4.922e-11		
SSDC Data Explorer	Data Access	Cross-search SSDC catalogs	1FLE J3003+214	nr	18 03 57.0	-22 41 51.92	41.875	2.833e-6	5.751e-7	1.419e-6	3.332e-7	2.359e-10	4.791e-11	3.790e-11

The interactive catalog pages can be filtered and exported in various format, and source information can be searched dynamically.

<http://www.ssdsc.asi.it/fermi1fle>

IVOA Interop. 12-17 May 2019, Paris, France

VO activities: catalogs SAMP connector

SSDC catalog web pages included a VO toolbox to send catalog table to VO tools, either TOPCAT or Aladin, using a SAMP connector.

In each page clicking on the "Connect to SAMP" button in the VO menu two clickable icons will appear to allow for the VO applications (TOPCAT Experimental and Aladin) to be downloaded and executed on your system through the use of the Javascript library "tlsamp.js" by Mark Taylor. Then the "Send" button will allow to pass the table information to the tool.

Evidence for a significant Blazar contamination in CMB anisotropy maps

P. Giacomè & S. Colafrancesco A&A 414, 7, 2004

entry number	name	source name	RA (J2000)	DEC (J2000)	z	log flux	log flux error	log flux upper	log flux lower	classification	l (arcmin)	b (arcmin)
1	PKS 0252-549		43.3783	-54.6947	1193.	17.7	0.537	FSRQ - WMAP	272.48	-54.62		
2	PKS 0257-510		44.6571	-50.8711	452.	23.	0.834	FSRQ	266.21	-56.21		
3	PKS 0308-011		47.48167	-60.9743	1103.	18.6		NED: QSO	278.11	-48.95		
4	PKS 0310-558		48.02417	-55.69389	501.	18.		Blazar candidate	271.2	-51.89		
5	PKS 0317-570		49.73333	-56.04778	257.	17.5		Blazar Candidate	271.9	-50.46		
6	PMN J0321-3711		50.3467	-37.1925	5020.			NED - Radio S. Extended - WMAP	240.18	-56.96		
7	PKS 0340-372		55.5225	-37.05305	872.	18.1	0.284	QSO	239.34	-52.86		
8	PKS 0402-362		60.9712	-36.08	1132.	17.2	1.417	FSRQ	237.73	-48.49		
9	PKS 0405-385		61.7446	-38.4397	830.	17.7	1.285	FSRQ - WMAP	241.28	-47.9		
10	PKS 0410-519		62.90083	-51.82222	361.	17.5		NED: QSO	260.51	-45.38		
11	PMN J0419-3010		64.9512	-30.1686	184.	17.5		Blazar candidate	229.66	-44.58		
12	PMN J0422-3844		65.5612	-38.7467	130.	17.	3.11	NED: QSO	241.76	-44.92		
13	WGA J0424.6-3849		66.1637	-38.8172	309.	18.5	2.34	FSRQ	241.87	-44.45		
14	PKS 0422-380		66.1742	-37.94	1706.	18.1	0.782	FSRQ - WMAP	240.65	-44.41		
15	WGA J0428.8-3805		67.2104	-38.0956	51.	16.5	0.15	BL Lac	240.65	-43.6		
16	1RXS J043208.7-35065		68.0362	-35.1142	182.	18.		Blazar candidate	236.92	-42.52		
17	PKS 0432-606		68.39208	-60.50389	636.	19.		NED: QSO	270.84	-40.16		
18	PKS 0435-300		69.4962	-29.9031	691.	17.2	1.328	FSRQ	230.26	-40.74		
19	0438-43		70.0738	-43.5489	3933.	18.8	2.852	FSRQ - WMAP	248.4	-41.57		

TOPCAT

TOPCAT(1): Table Browser

name	ra	dec	rflux	vmag	redshift	classification	l	b	
1	PKS 0252-549	43.3783	-54.6947	1193.	17.7	0.537	FSRQ - WMAP	272.48	-54.62
2	PKS 0257-510	44.6571	-50.8711	452.	23.	0.834	FSRQ	266.21	-56.21
3	PKS 0308-011	47.48167	-60.9743	1103.	18.6		NED: QSO	278.11	-48.95
4	PKS 0310-558	48.02417	-55.69389	501.	18.		Blazar candidate	271.2	-51.89
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7	PKS 0340-372	55.5225	-37.05305	872.	18.1	0.284	QSO	239.34	-52.86
8	PKS 0402-362	60.9712	-36.08	1132.	17.2	1.417	FSRQ	237.73	-48.49
9	PKS 0405-385	61.7446	-38.4397	830.	17.7	1.285	FSRQ - WMAP	241.28	-47.9
10	PKS 0410-519	62.90083	-51.82222	361.	17.5		NED: QSO	260.51	-45.38
11	PMN J0419-3010	64.9512	-30.1686	184.	17.5		Blazar candidate	229.66	-44.58
12	PMN J0422-3844	65.5612	-38.7467	130.	17.	3.11	NED: QSO	241.76	-44.92
13	WGA J0424.6-3849	66.1637	-38.8172	309.	18.5	2.34	FSRQ	241.87	-44.45
14	PKS 0422-380	66.1742	-37.94	1706.	18.1	0.782	FSRQ - WMAP	240.65	-44.41
15	WGA J0428.8-3805	67.2104	-38.0956	51.	16.5	0.15	BL Lac	240.65	-43.6
16	1RXS J043208.7-35065	68.0362	-35.1142	182.	18.		Blazar candidate	236.92	-42.52
17	PKS 0432-606	68.39208	-60.50389	636.	19.		NED: QSO	270.84	-40.16
18	PKS 0435-300	69.4962	-29.9031	691.	17.2	1.328	FSRQ	230.26	-40.74
19	0438-43	70.0738	-43.5489	3933.	18.8	2.852	FSRQ - WMAP	248.4	-41.57

Total: 54 Visible: 54 Selected: 0

Send

Connect to SAMP

Connect to SAMP

No TLS Hub?
(With TOPCAT this page requires the experimental version below)

EXPERIMENTAL

VO activities: experimental TOPCAT

Why Experimental TOPCAT?

Recently the SSDC web site moved to https protocol entirely.

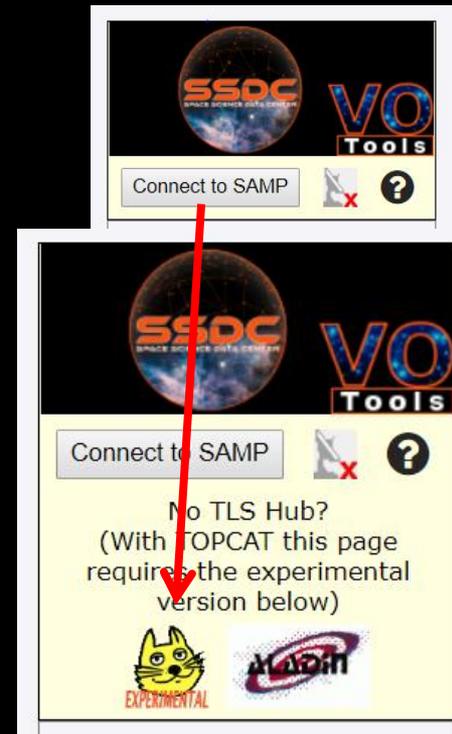
(HTTPS is HTTP Over TLS)

The web SAMP connector COULD NOT work with the standard SAMP.js within TOPCAT

=>standard SAMP hub cannot work when page is loaded over HTTPS and HTTP is used to connect to localhost =>trying HTTPS web page + HTTP SAMP

=>error!

=>most browsers block “mixed active content” to prevent possible attacks, only passive content is allowed. Future browsers development MAY CHANGE this behaviour



VO activities: experimental TOPCAT

OUR Activity:

- Update the SAMP library
- Solve the «mixed content» problem: test the Mark Taylor «experimental SAMP hub»

Mark had experimental hub that could resolve the problem, for details see

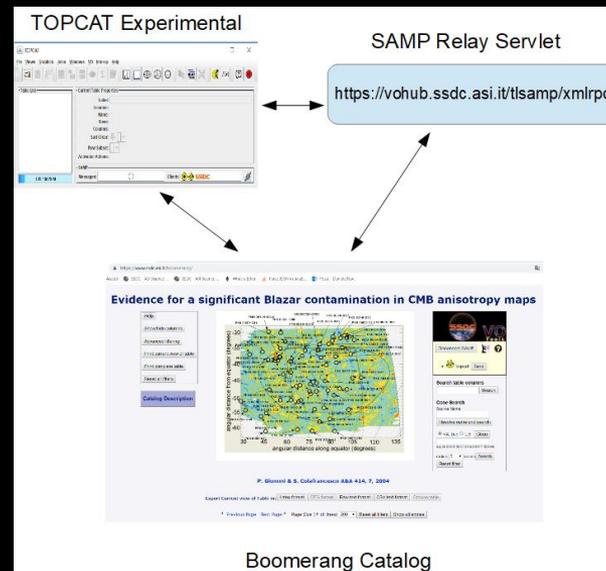
<http://andromeda.star.bristol.ac.uk/websamp/>

We tested this web application with our IT team with partial success, so we collaborated with him to solve some minor issue in the code. Finally Mark released a new TOPCAT version including the updated TLS-hub. **This version is publicly available from our server ONLY.**

To work, this version needs a «relay» (proxy hub, «tlsamp.war»), an application (servlet) developed in JAVA by Mark that has to be installed in an application server, for us it has been installed on a TOMCAT server:

<https://vohub.ssdsc.asi.it/tlsamp/xmlrpc>

with a valid TLS certificate.



VO activities: experimental TOPCAT

We installed the topcat-full_tlsamp.jar (the TOPCAT Experimental) file on our server and it can be downloaded at

https://www.ssdsc.asi.it/votlstopcat/www-topcat-full_tlsamp.jnlp



→through Java WebStart, which helps to trust TLS certificates

The application is working correctly and we are available for feedback from users.

Our further development

- Apply same solution to other SAMP calls, for instance within the SED-Builder tool accessible for instance from the Multi-Mission Interactive Archive

The Multi-Mission

Help

Show/hide columns

Advanced filtering

Print current view of table

Print complete table

Reset all filters



Query results for:
 Details: query by **COORDINATE** with **RA = 83.632977; DEC = 22.014434**

Export Current view of Table in:

◀ Previous Page Next Page ▶ Page

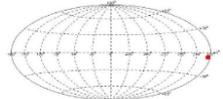
view includes 61 entries

Entry number	Archive	Interactive Analysis	Target Name	obsid	RA (J2000)
1	SSDC Data Explorer	Interactive Analysis	CRAB_CAL15	10013035002	05 34 07.39
2	SSDC Data Explorer	Interactive Analysis	CRAB_CAL08	10013028002	05 34 10.36
3	SSDC Data Explorer	Interactive Analysis	CRAB_OA04	10013004002	05 34 10.89
4	SSDC Data Explorer	Interactive Analysis	CRAB_CAL08	10013028004	05 34 11.85
5	SSDC Data Explorer	Interactive Analysis	CRAB_CAL07	10013027004	05 34 14.06
6	SSDC Data Explorer	Interactive Analysis	CRAB_CAL07	10013027002	05 34 14.59
7	SSDC Data Explorer	Interactive Analysis	CRAB_OA10	10013010001	05 34 17.01
8	SSDC Data Explorer	Interactive Analysis	CRAB_CAL13	10013033002	05 34 17.28
9	SSDC Data Explorer	Interactive Analysis	CRAB_CAL04	10013024002	05 34 18.72

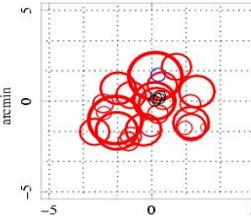


Entry **PKS0531+219**
 R.A. (J2000) = 05 34 32.54 (83.6356 deg) l=184.55
 Dec (J2000) = +22 00 51.47 (22.0143 deg) b=-5.79
 Galactic nH = 3.26E+21 (cm⁻²)

[Source Names](#)



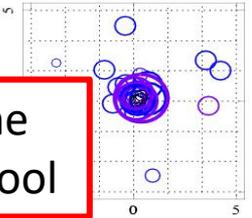
Error circle EXPLORER
Source Details
Feedback



arcmin

[show sources list](#)

[download image in ps format](#)



arcmin

[show sources list](#)

[download image in ps format](#)

Default catalogs (always selected)

Selectable catalogs:

size (arcmin)

[Create new image](#)

Access to the *SED-Builder* tool

Position selected for the analysis: R.A.=05 34 32.54 (83.6356 deg) l=184.55
 Dec=+22 00 51.47 (22.0143 deg) b=-5.79 [SED Builder](#) [Source Names](#)

[Reset Position](#) Galactic nH= 3.26E+21 (cm⁻²)

Additional Services - ?

SSDC-resident astronomical catalogs ?

Group of Catalogs Selected Catalogs

Radio IR Optical X-ray Gamma GORG AGN BZCAT ZCAT NGC ZWICKY

Search radius arcmin

Search Other Services ?

VIZIER(X-R-G) VIZIER(O-IR) NED SIMBAD HEASARC(X-R-G) GSC2 STSCI MAST 2MASS SDSS NVO

Search radius arcmin

VO-VizieR large catalogs

USNO-B1.0 UCAC5 DENIS PanSTARRS1

Search radius arcmin

Bibliography search ?

PKS0531+219

in time range between and

By name via NED

By name via SIMBAD

By coordinates via ADS ?

Another example of SAMP integration

Login is needed to see VO-tools

CRAB Ra=83.63298 deg Dec=22.01443 deg (NH=3.3E21 cm⁻²)

SSDC SED builder v3.2
Creation date: 25-Jun-2018 14:40:13 (UTC)

Load Data Show Data
Save Duplicate Sed
Bibliographic search

Redshift: 0.0 Frame: Observed
X Axis: Frequency (Hz) Y Axis: nuFnu (erg/cm2/s)
Plot Type: Default
Update Plot

Input Data Time Filtering Energy Filtering Models Fit Functions Templates
Instr Sensitivity Plot options Existing SEDs Export VO Tools

VO Tools like TOPCAT can be used to handle SED data in the time domain.

Warning: Data points for which an observation date is not available are artificially associated to $t_{year}=2000.0$ equivalent to $t_{MJD}=51544.0$

TOPCAT Launch

Broadcast Type: Multi Frequency Light Curves

Band:	Log _v min	Log _v max	Label
5 GHz	9.6	9.7	
1 Kev	17.13	17.39	
1 Gev	23.38	23.39	
VMAG	14.7		

Register

Summary and next steps

- Recover catalog interactive web page SAMP connector functionality
- Use of Mark Taylor «experimental» hub
- Mark release of a new TOPCAT version
- Activated from 5 (sorry!) catalog web pages only (May 2019), in other pages
- The logo features a central image of a planet with a blue and white atmosphere. To the left of the planet, the text 'SSDC' is written in a bold, orange font, with 'SPACE SCIENCE DATA CENTER' in a smaller, white font below it. To the right of the planet, the letters 'VO' are written in a large, blue, stylized font, with the word 'Tools' in a white font inside a black rectangular box below it. The entire logo is enclosed in a thin white border.
- Apply same solution to other SAMP calls, for instance within SED-Builder tool

Future eventual development

- Update SAMP protocol to include HTTPS profile??