

The Wits Astro Data Center



Sergio Colafrancesco

Wits University - DST/NRF SKA Research Chair

Email: Sergio.Colafrancesco@wits.ac.za

Outline

- ✚ Astronomy & Astro-Particle Physics at Wits
 - ✚ The challenge of Multi- ν and Multi-disciplinary
- ✚ Science with Multi- ν and Multi-disciplinary
- ✚ Data with Multi- ν and Multi-experiments

- ✚ The Wits Astro Data Center

- ✚ The Wits approach to Data science
- ✚ The future of the WADC
 - ✚ SA
 - ✚ Africa
 - ✚ ... and beyond

Outline

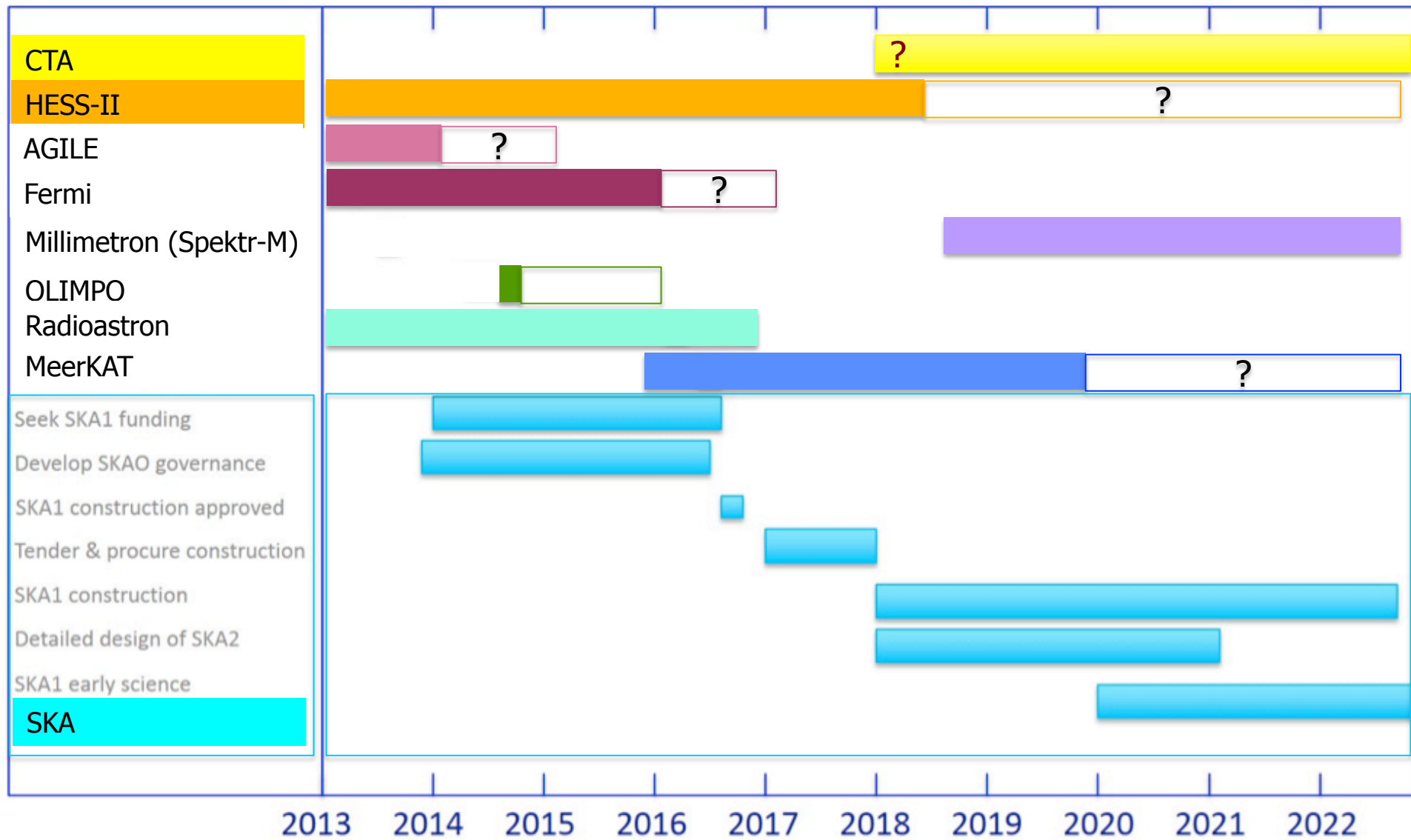
- ✚ Astronomy & Astro-Particle Physics at Wits
 - ✚ The challenge of Multi- ν and Multi-disciplinary
- ✚ Science with Multi- ν and Multi-disciplinary
- ✚ Data with Multi- ν and Multi-experiments

✚ The Wits Astro Data Center

- ✚ The Wits approach to Data science
- ✚ The future of the WADC
 - ✚ SA
 - ✚ Africa
 - ✚ ... and beyond

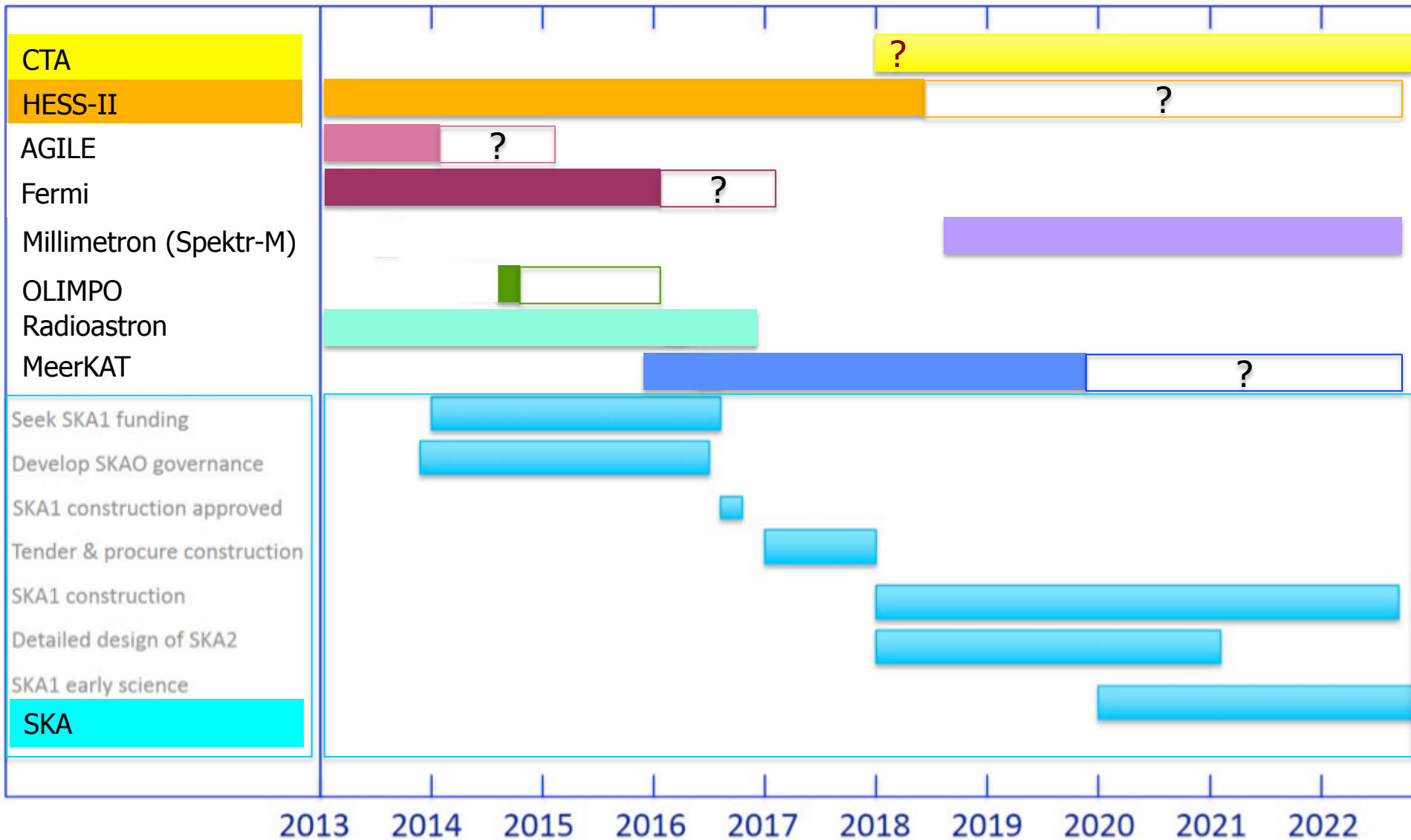
Astronomy & Astro-Particle Physics @ Wits

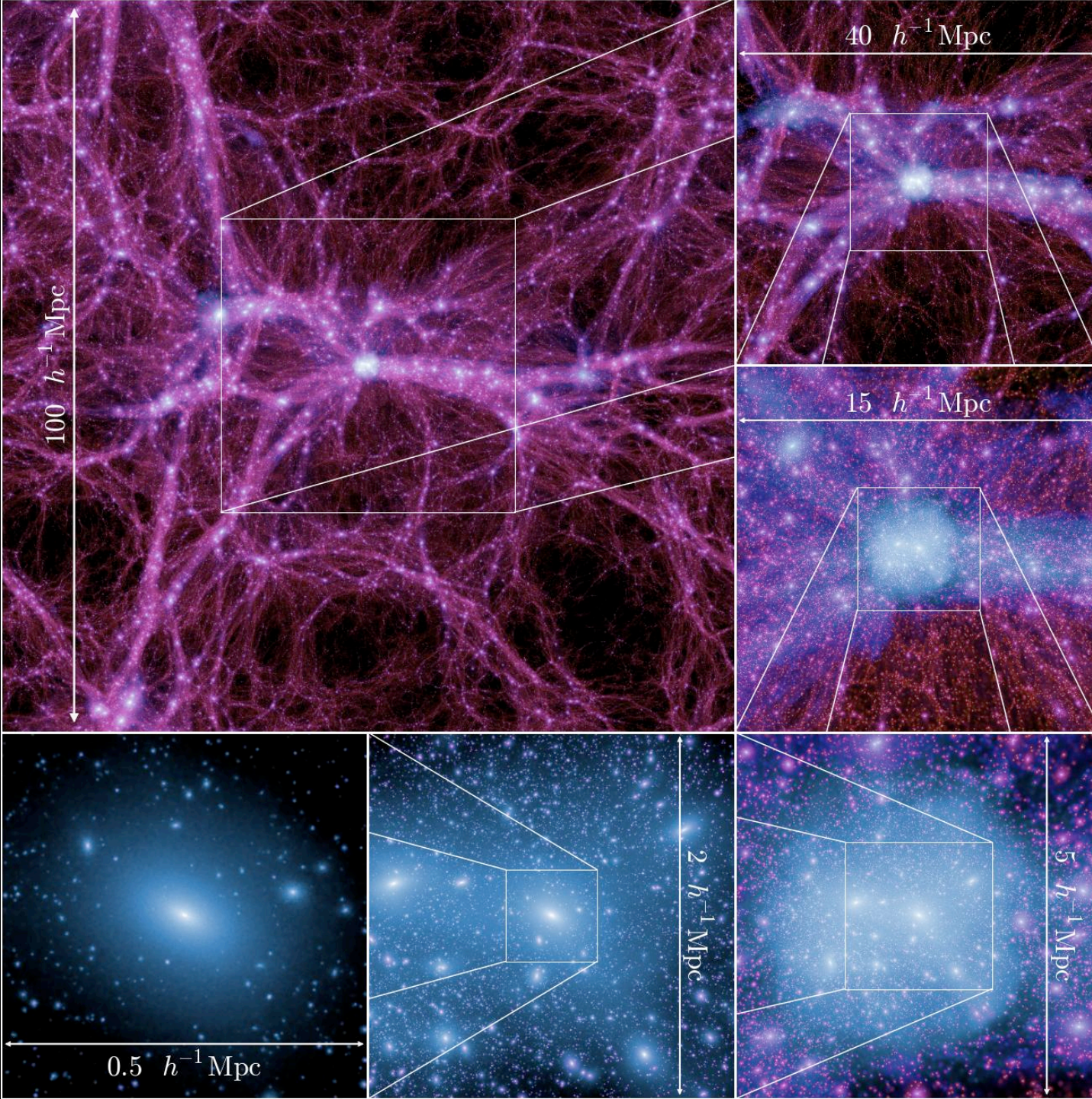
Wits official involvement in Astronomy and Astro-Particle projects



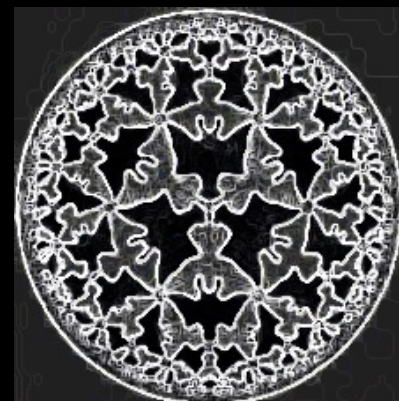
Astronomy & Astro-Particle Physics @ Wits

Wits is the only group in the World that is officially part of MeerKAT, SKA, HESS-II, CTA



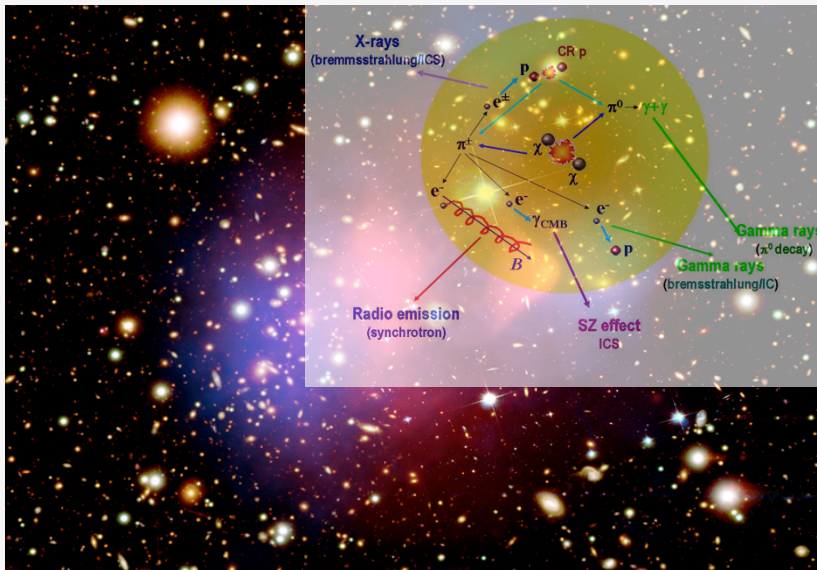


Science at Multi Scales

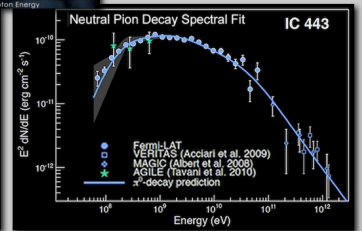
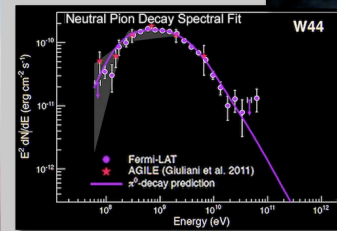
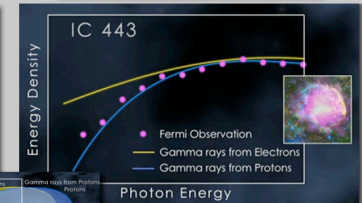
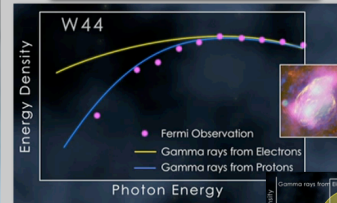
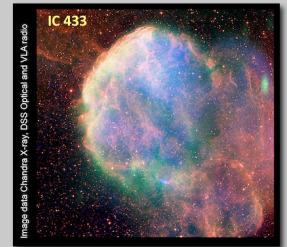
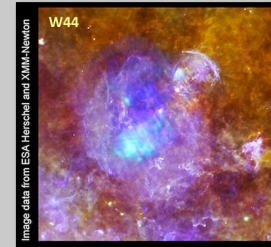


Science at Multi- ν

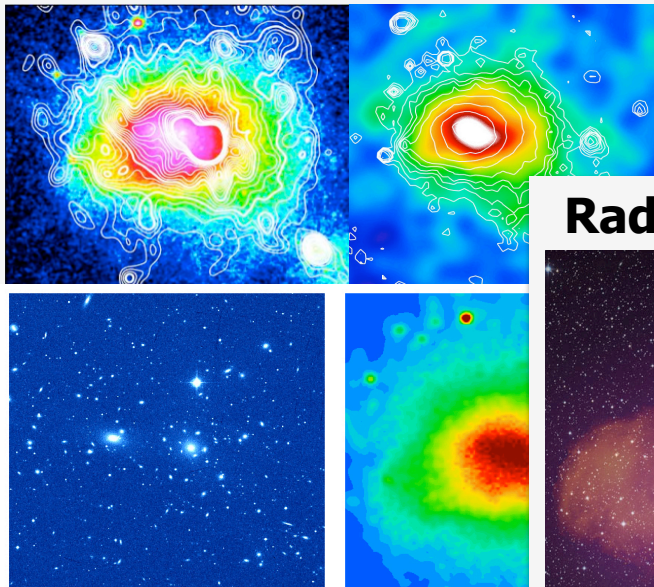
Dark Matter



**S
N
R**



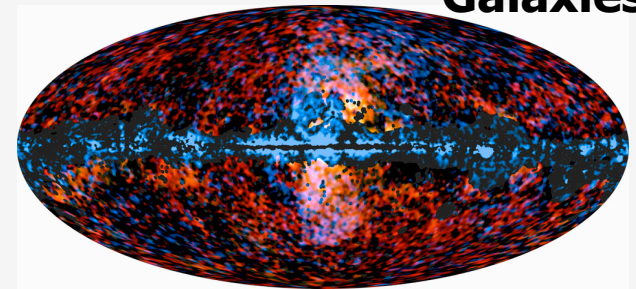
Galaxy Clusters



Radio Galaxies



Galaxies



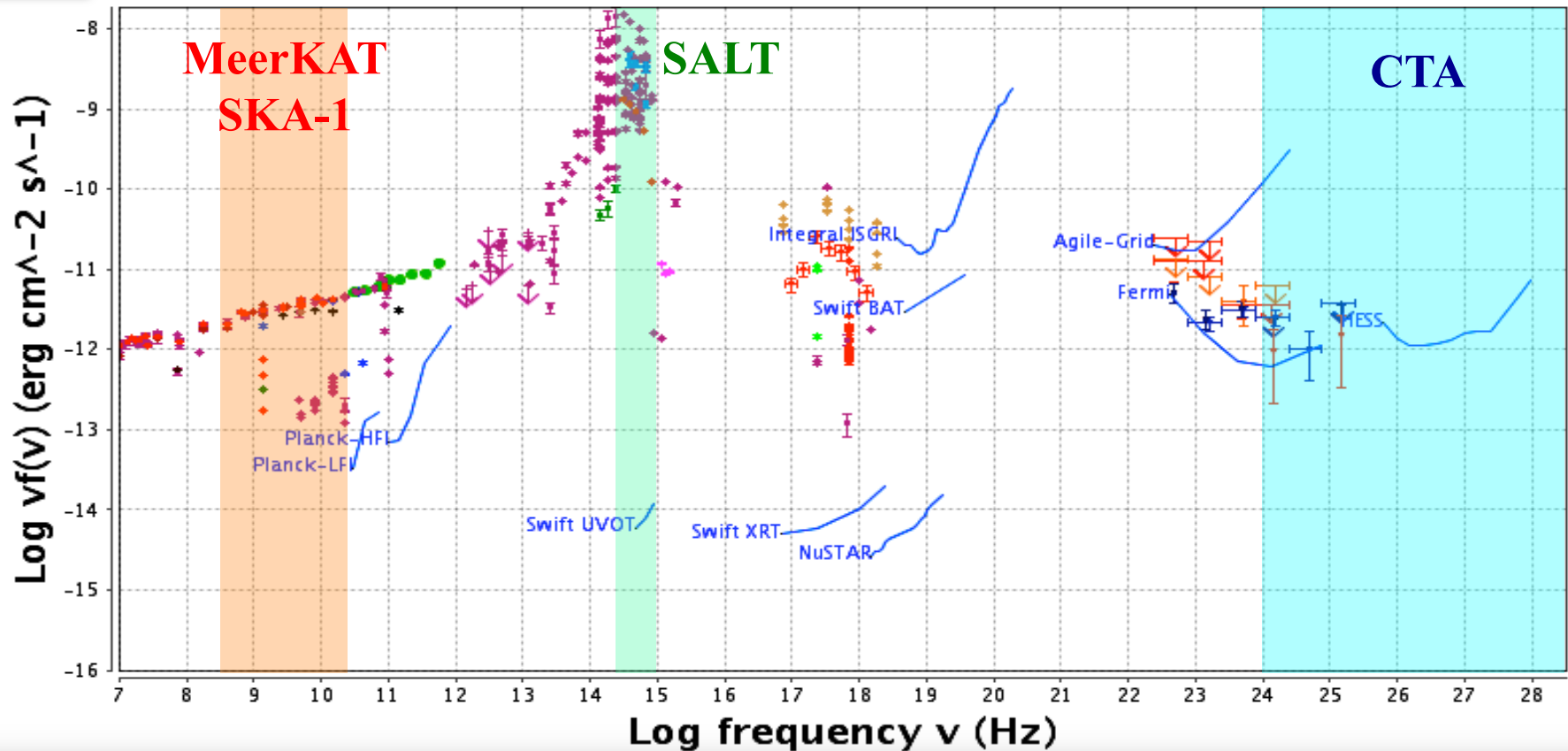
Science at Multi-experiments

M87

non-thermal-B

dust-thermal

non-thermal-Radiation



- DIXON • FIRST • KUEHR • NVSS • PKSCAT90 • VLSS • NED • IRASFSC 12 • IRASFSC 60 • IRASPSC 60 • ERCSC030 • ERCSC044 • ERCSC070
- ERCSC100 • ERCSC143 • ERCSC217 • ERCSC353 • ERCSC545 • GB6 • NORTH20CM (flux 20 cm) • NORTH20CM (flux 6 cm) • PCCS1F030 • PCCS1F044
- PCCS1F070 • PCCS1F100 • PCCS1F143 • PCCS1F217 • PCCS1F353 • PCCS1F545 • PCCS1F857 • WMAP5 (Freq. 23e9 Hz) • WMAP5 (Freq. 33e9 Hz)
- WMAP5 (Freq. 41e9 Hz) • WMAP5 (Freq. 61e9 Hz) • WMAP5 (Freq. 94e9 Hz) • ARIEL3A • IPC • UHURU4 • MAXIGSC • Fermi1FGL (200 Mev)
- Fermi1FGL (2Gev) • Fermi1FGL (600 Mev) • Fermi2FGL (200 Mev) • Fermi2FGL (2Gev) • Fermi2FGL (600 Mev) • Fermi2FGL (6Gev) • Fermi2FglILC • IRASFSC 25
- ↓ IRASFSC100 ↓ IRASPSC 12 ↓ IRASPSC 25 ↓ IRASPSC100 ↓ Fermi1FGL (60Gev) ↓ Fermi1FGL (6Gev) ↓ Fermi2FGL (60Gev)

The problem(s)

Next generation Astronomical telescopes will all be Digital Instruments

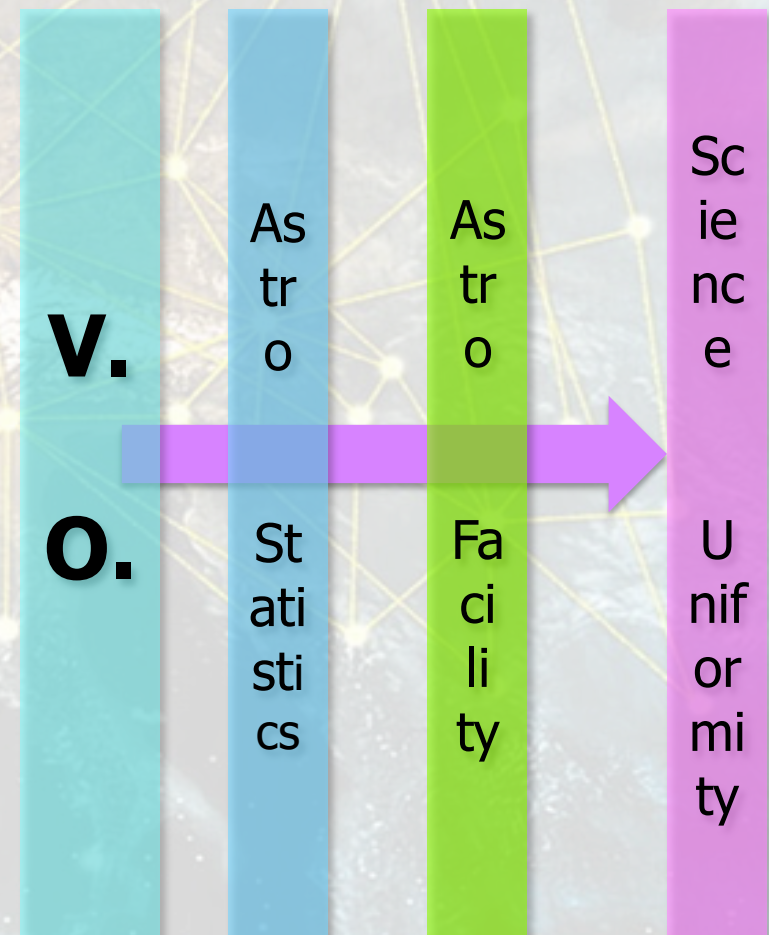
A change of approach is required:

- At the Telescope
 - Modes of scheduling, observing, calibrating, etc...
- At the Data
 - Modes of data flow, analysis, archiving, interacting, etc...

A generic approach

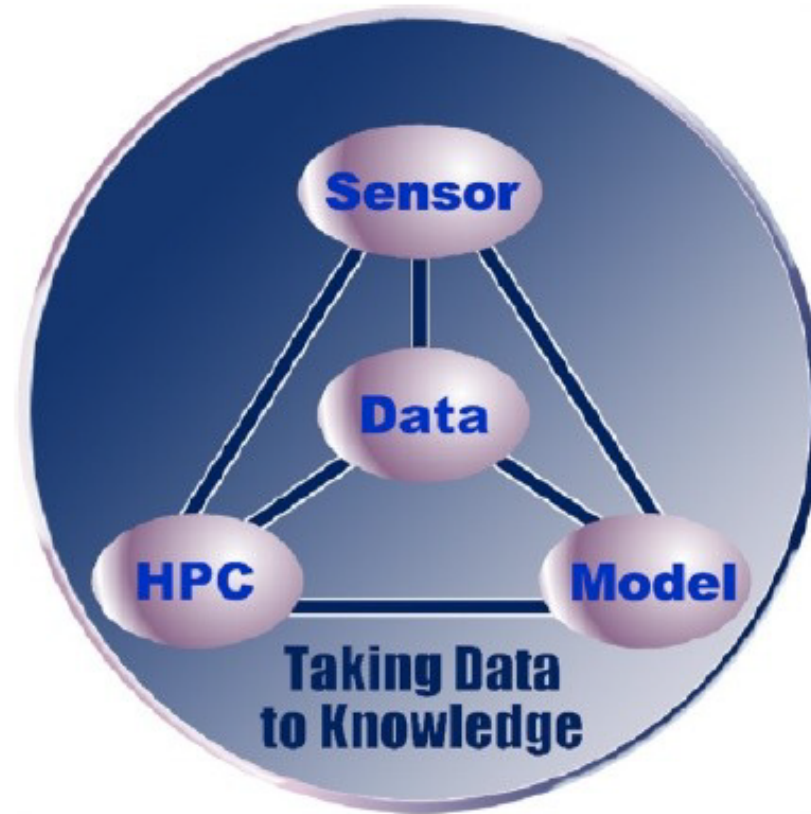
In ≈ 2030 a typical day for an astronomer on a university campus will have her start work by looking at:

- A list of science papers that have been intelligently selected by a software tool that surfed the Internet overnight.
- She clicks on an object in an online science paper and the Virtual Observatory (V.O.) database delivers views in γ -ray, X-ray, Optical, InfraRed and Radio observations.
- She queries the archive to do an automatic search to pull up information relevant to the questions she is asking about the object.



Astro Information Science

The V.O. and other astronomical community structures (i.e., ADASS, WGAS, and FITS WG) have been essential but incomplete steps toward an Astronomical Info/Data Science.



Need data-intensive **science research** tools to mine & discover **new knowledge** from the distributed data repositories & experiments.

Outline

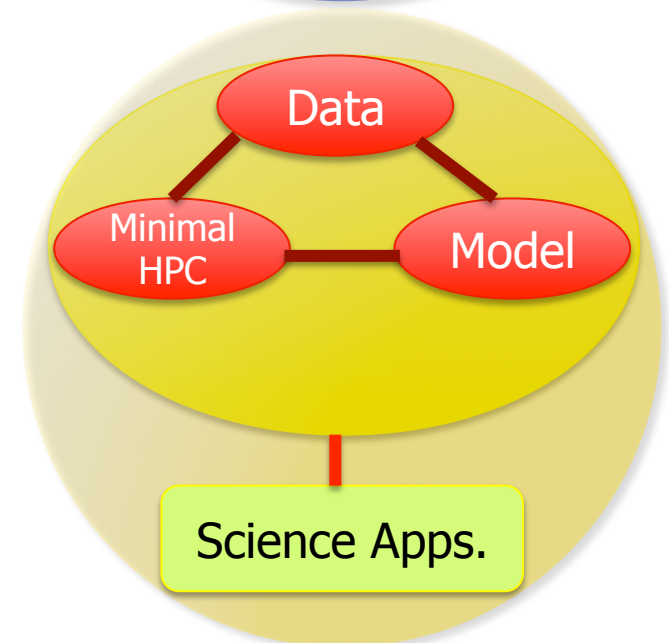
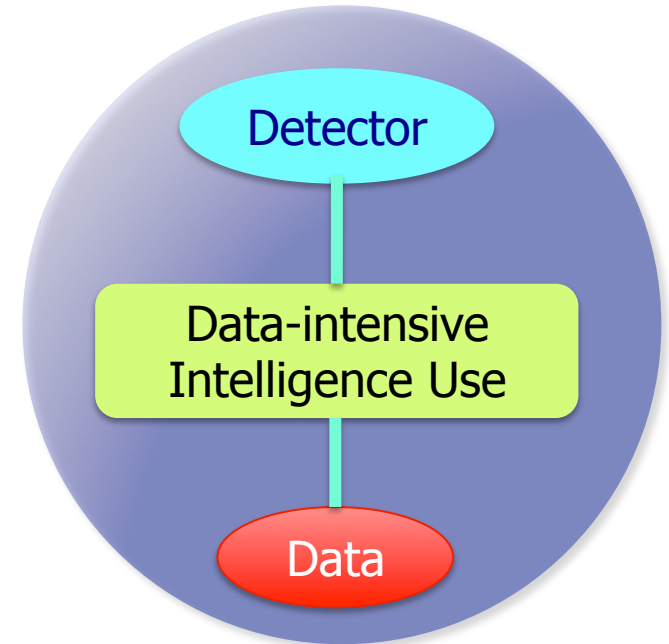
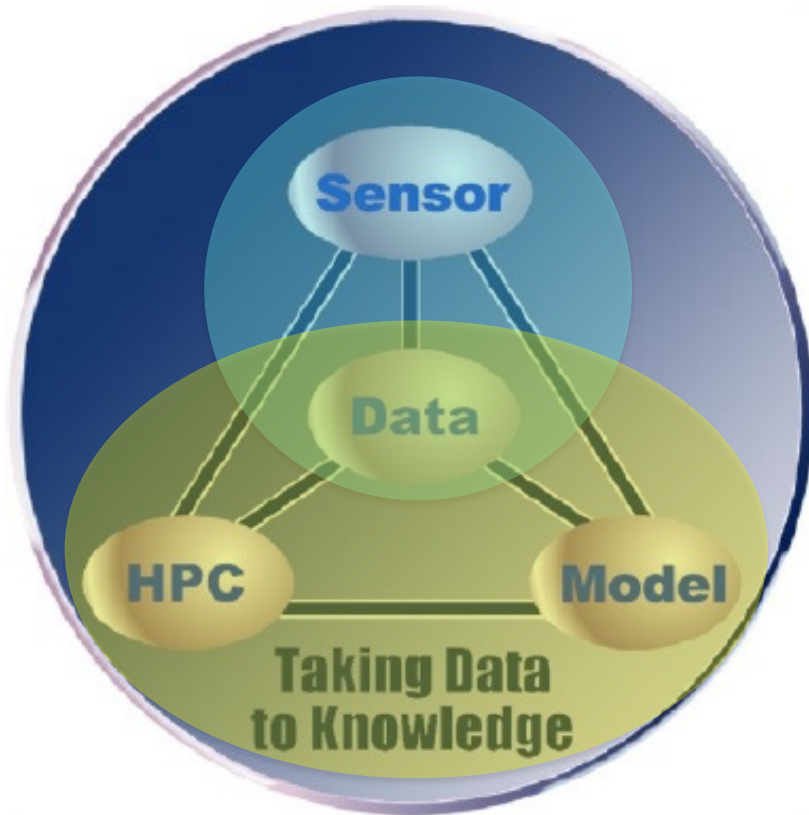
- ⊕ Astronomy & Astro-Particle Physics at Wits
 - ⊞ The challenge of Multi- ν and Multi-disciplinary
- ⊕ Science with Multi- ν and Multi-disciplinary
- ⊕ Data with Multi- ν and Multi-experiments

⊕ The Wits Astro Data Center

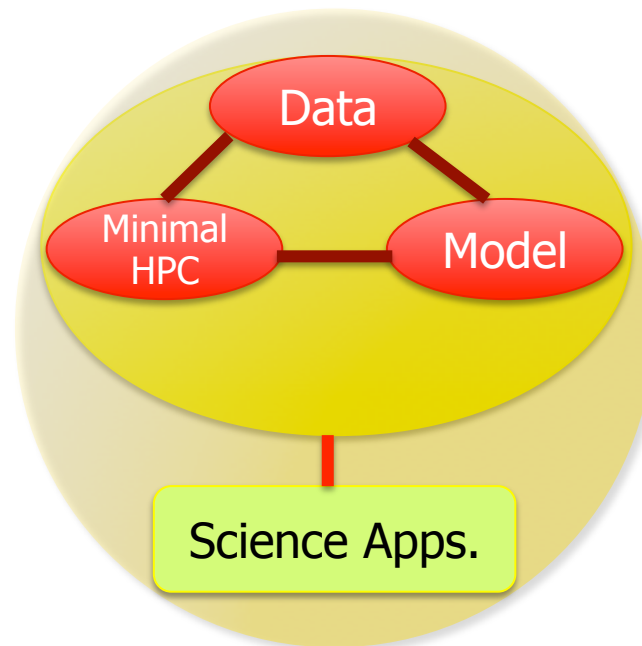
- ⊕ The Wits approach to Data science
- ⊕ The future of the WADC
 - ⊞ SA
 - ⊞ Africa
 - ⊞ ... and beyond

Wits Astro Data Science

**A breakdown of specific tasks
in a modulated strategy**



Research-oriented Data Center



The Wits Astro Data Center

The WADC aims at conducting research in Astro Data Applications and make data and Apps available to the world-wide community through a Multi-Experiment Interactive (hands-on) Archive
Example from a similar Data Center that I managed (2007-2011)

The screenshot displays the ASI Science Data Center (ASDC) website. At the top, the header includes the ASDC logo, the text "ASI Science Data Center", and the logo for "agenzia spaziale italiana". A navigation bar contains links: Home, About ASDC, Public Outreach, Quick Look, Missions, Multimission Archive, Catalogs, Tools, Links, Bibliographic services, and Helpdesk. Below the navigation bar, a row of satellite icons is shown with labels: AGILE, SWIFT, FERMI, HERSCHEL, PLANCK, BeppoSAX, NUSTAR, and Gaia. A central banner features a timeline of satellite missions: 1998 (The BeppoSAX team), 2007 (N. Gehrels and the Swift team), 2011 (B. Atwood, P. Michelson and the Fermi-LAT team), and 2012 (M. Tavani and the AGILE team). The banner also mentions the "Bruno Rossi Prize". To the right of the banner, a section titled "TOP RESULTS/PRESS RELEASES" lists recent events: "Jun 13, 2013: Happy Fifth Birthday to Fermi. Five spectacular years in orbit!", "Apr 08, 2013: First results from the AMS-02 experiment: on the cover of Physics Review Letter", and "Mar 21, 2013: Planck reveals an almost perfect Universe". Below the banner, there are three main sections: "ASDC Sky EXPLORER" with "web tools", "Time SED tool V 2.0" with "web tools", and "ASDC Newsletter". To the right of these is a "SCIENTIFIC NEWS" section with a list of recent discoveries: "Jul 29, 2013: Significant increase in the gamma-ray emission from the FSRQ 4C +38.41 (BZQ J1635+3808) reported by Fermi and AGILE satellites", "Jun 08, 2013: GRB 130606B: AGILE-MCAL observation", and "Apr 30, 2013: GRB 130427A: high energy gamma-ray detection by AGILE and Fermi". Further right is an "EVENTS" section with posters for "Serata sotto le Stelle" (12 luglio 2013, Monte Porzio Catone), "EWASS 2013" (Turku, Finland 8-12 July 2013), and "sclops 2013" (10-12 september 2013). At the bottom, a footer states: "The ASDC is a facility managed by the Exploration and Observation of the Universe, which is part of the ASI Technical Directorate. If your research benefits from the use of ASDC, we would appreciate the following acknowledgement in your paper: Part of this work is based on archival data, software or on-line services provided by the ASI Science Data Center (ASDC)." Below the footer is a "Best viewed with" section showing logos for various web browsers and operating systems.

Surfing the WADC

ASDC - Netscape

http://www.asdc.asi.it/

ASDC Science Data Center

HOME ISAC Documentation Data Archive Quicklook Data

Swift: catching Gamma-Ray Bursts on the Fly

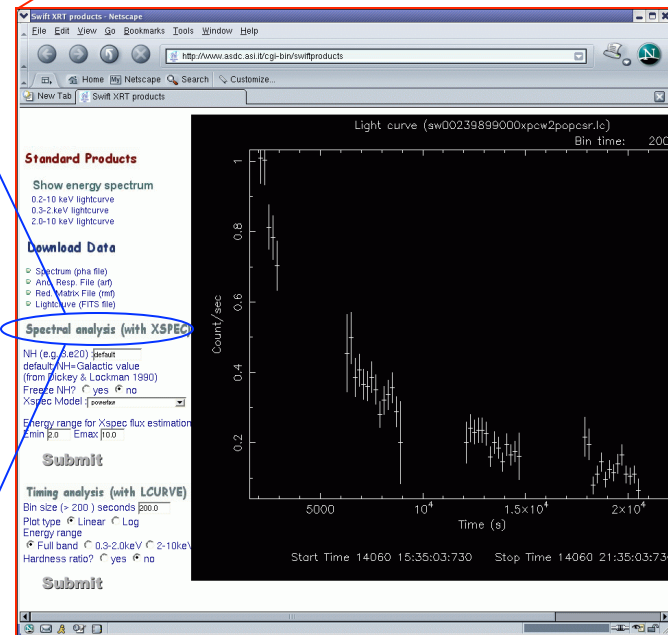
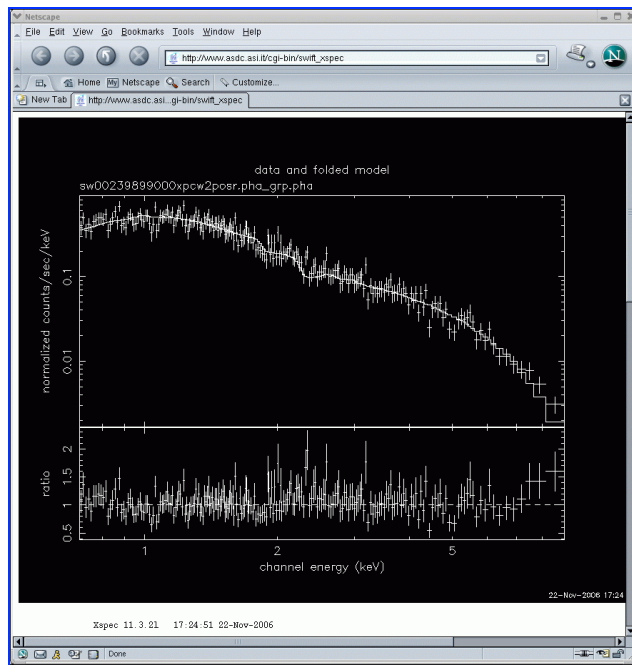
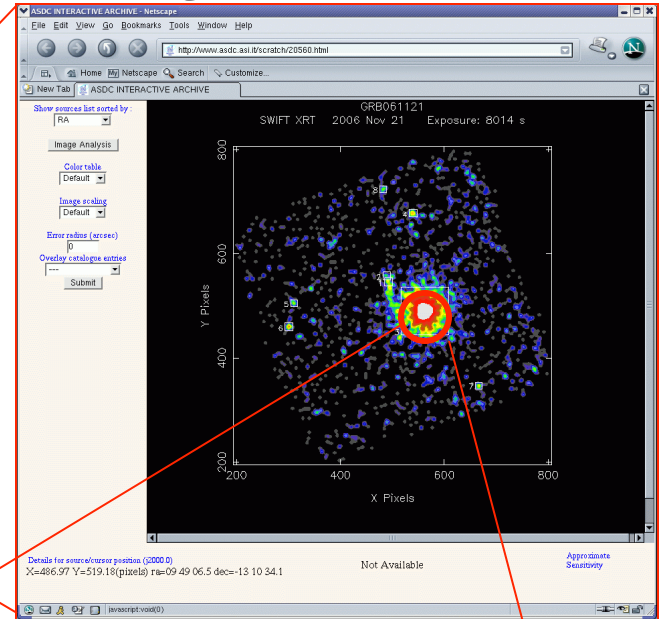
Swift XRT simulator ASDC main page GCN

Wed Nov 22 14:09:01 2006 GMT

Instructions:

- Click on a sequence number to access data for that sequence.
- Click on a column header to sort the table by that column.
- Rows with a gray background have been replaced by a more recent reprocessing.
- After one week the data are archived at HEASARC, ISAC, and UKDC and removed from this list.
- The columns are described at the bottom of the table.

Sequence	Version	Object	Observed	Processed	Comment	XRT Interactive Archive
00030810021	006	SN2006jc	2006-11-07T01:14.01	2006-11-15	FINAL FOR ARCHIVE	XRT Interactive Quick Look
00030810022	007	SN2006jc	2006-11-13T16:25.00	2006-11-19	FINAL FOR ARCHIVE	XRT Interactive Quick Look
00030810023	008	SN2006jc	2006-11-17T10:28.01	2006-11-19	new data moc2006-11-19T04501	XRT Interactive Quick Look
00030810024	005	SN2006jc	2006-11-19T11:47.01	2006-11-19	new data moc2006-11-19T104501	XRT Interactive Quick Look
00030810026	006	SN2006jc	2006-11-19T11:51.01	2006-11-19	new data moc2006-11-19T202201	XRT Interactive Quick Look
00030810028	013	SN2006jc	2006-11-21T01:20.01	2006-11-22	new data moc2006-11-22T014500	XRT Interactive Quick Look
00030826002	007	SN20061011	2006-11-07T03:39.01	2006-11-13	FINAL FOR ARCHIVE	XRT Interactive Quick Look
00030827002	007	VarCas2006	2006-11-14T17:21.01	2006-11-20	FINAL FOR ARCHIVE	XRT Interactive Quick Look
00030827003	013	VarCas2006	2006-11-16T01:23.01	2006-11-21	FINAL FOR ARCHIVE	XRT Interactive Quick Look
00030827004	016	VarCas2006	2006-11-17T23:59.00	2006-11-19	new data moc2006-11-19T063601	XRT Interactive Quick Look
00030828001	004	SN2006mr	2006-11-07T14:54.52	2006-11-13	FINAL FOR ARCHIVE	XRT Interactive Quick Look



WADC Sky-Data Explorer

ASDC + VO Catalogs
Interactive Data Access at ASDC
Spectral Energy Distribution
Error circle EXPLORER
Full Entry Details

Entry ---
with sky coordinates Ra= 22 53 57.8 Dec=16 08 52.8, L= b=

Current position Ra= 22 53 57.8 Dec=+16 08 52.7, L=86.11 b=-38.

Click to open a new ASDC Data Explorer window

Multi- λ measurements via ASDC Browse
Multi- λ measurements via VO interface

Search radius 0.2 arcmin
STSCI MAST
CSC2
2MASS
NED
SIMBAD
HEASARC(X-R-G)
VIZIER(X-R-G)
ASDC-R
ASDC-X
SDSS
USNO

ASDC + VO Catalogs
Interactive Data Access at ASDC
Spectral Energy Distribution
Error circle EXPLORER
Full Entry Details

Entry ---
with sky coordinates Ra= 22 53 57.8 Dec=16 08 52.8, L= b=

Spectral Energy Distribution of

add gsc2
add 2mass
add Sloan DSS
SED
Enter NED name:
Browse SED

ASDC + VO Catalogs
Interactive Data Access at ASDC
Spectral Energy Distribution
Error circle EXPLORER
Full Entry Details

Entry ---
with sky coordinates Ra= 22 53 57.8 Dec=16 08 52.8, L= b=

Optical/Radio data
X-ray data from ASDC

Opt-DSS from eso
Image size 3 arcmin
NVSS from NRAO
Image pixel size 15 arcsec
Image size 10 arcmin

BeppoSAX
ROSAT
ASCA
Einstein
EXOSAT
Chandra
XMM-Newton
Swift
EGRET

FoM Romani = 0.232

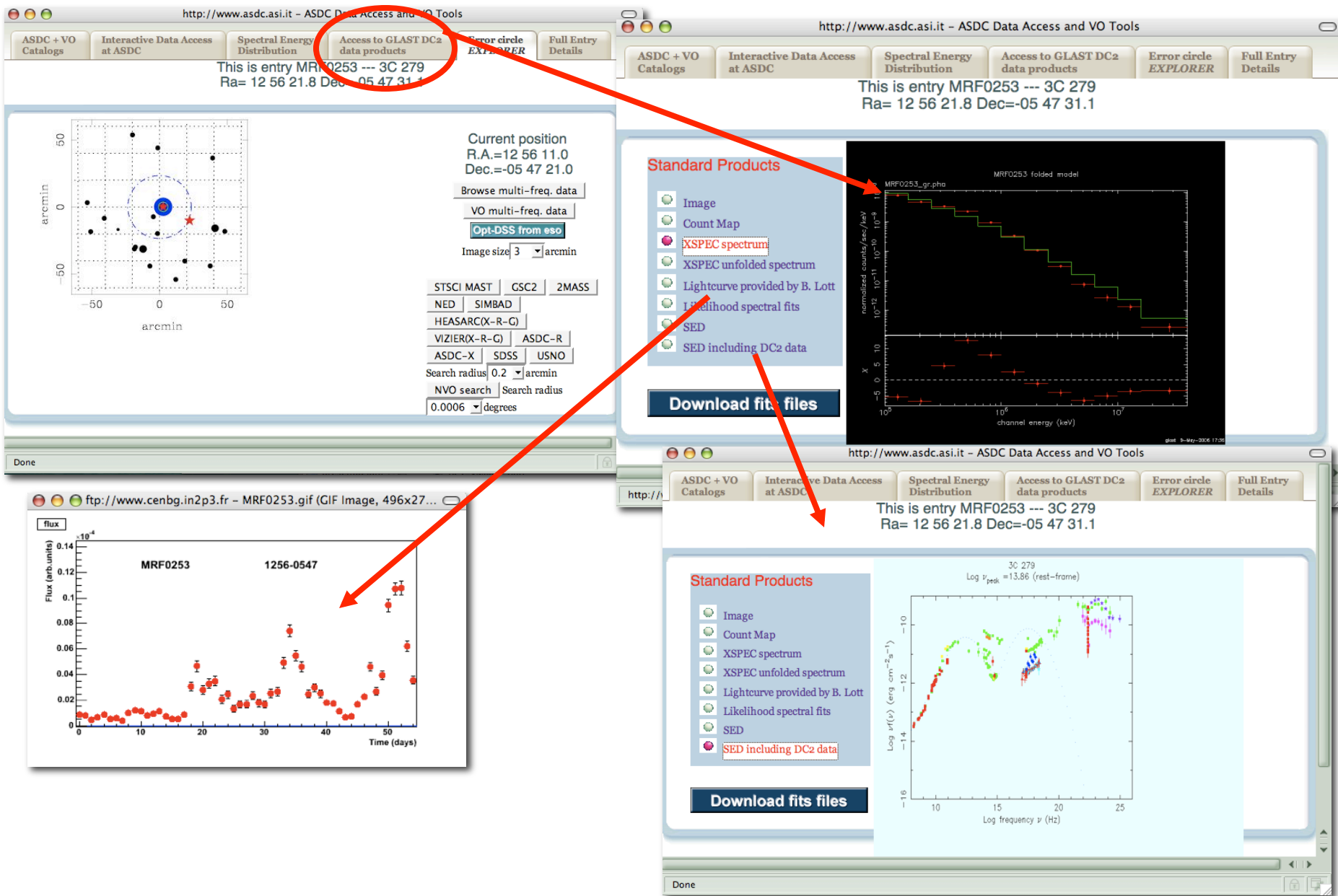
$\alpha_{\mu\gamma} = -0.9597$

Duty cycle (AGILE) = 40.61 (%)

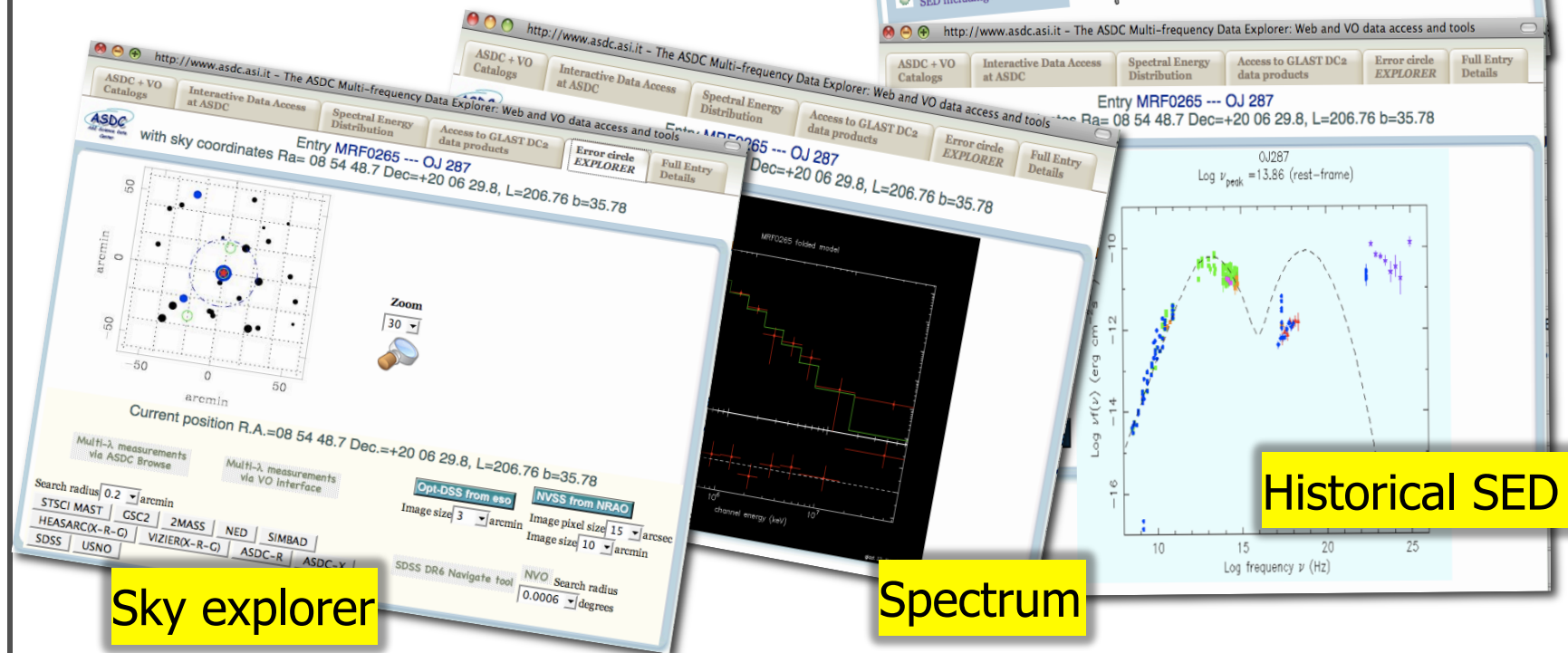
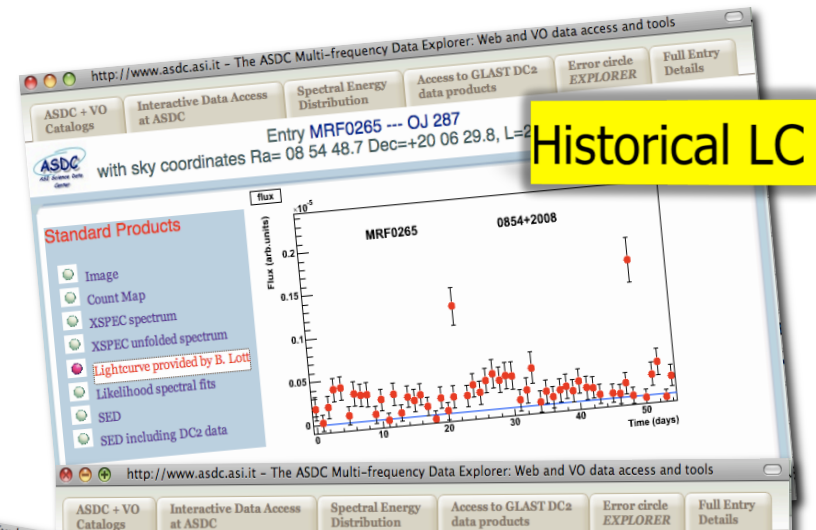
$\alpha_{\mu\gamma} = -1.0737$

Duty cycle (GLAST) = 811.665 (%)

WADC Sky-Data Explorer



WADC Multi- ν Tools

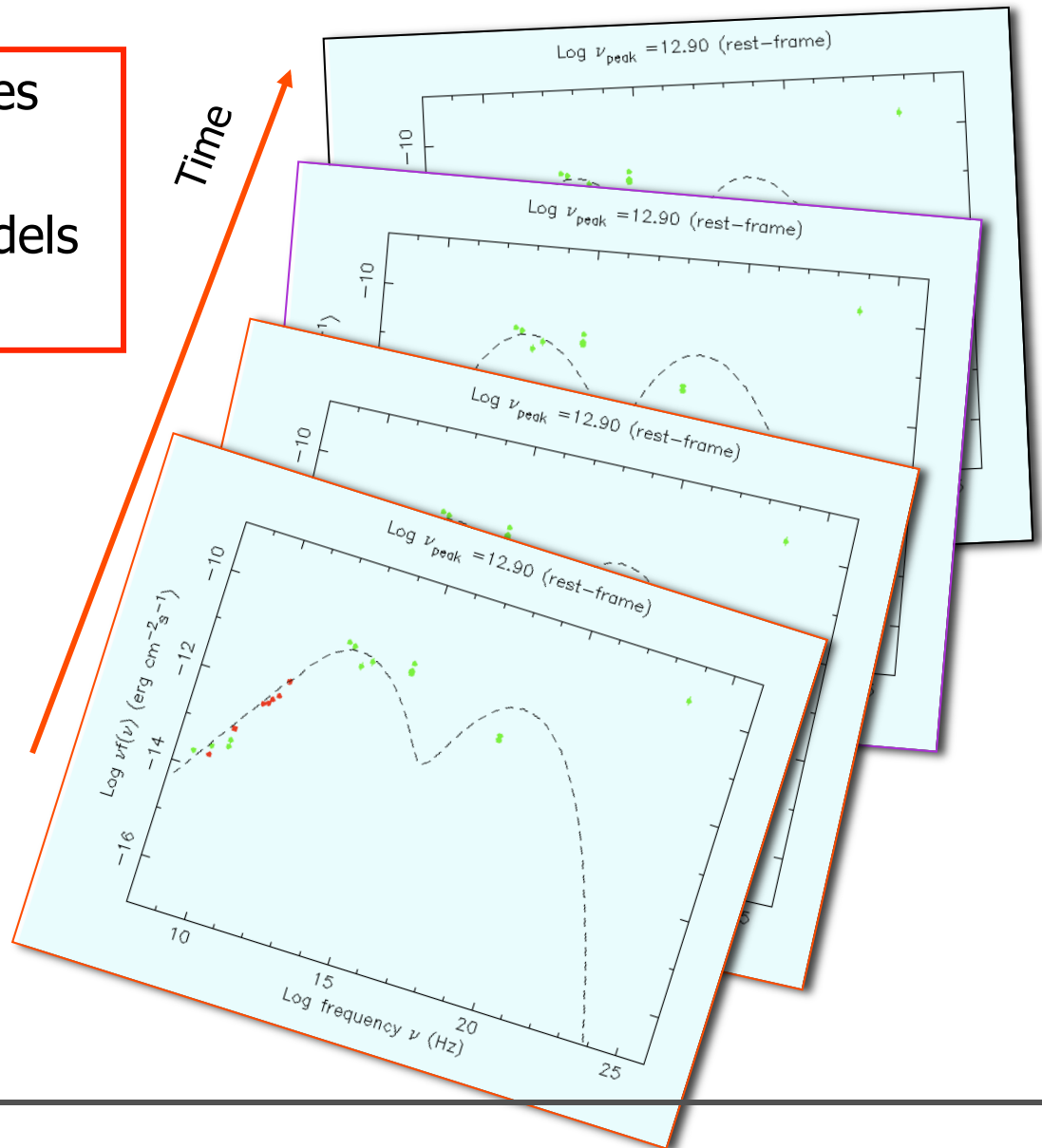


WADC Multi- ν Tools

SEDs at different times
+
Interactive SSC/EC models
and analytical tools

Standard Products

- Image
- Count Map
- XSPEC spectrum
- XSPEC unfolded spectrum
- Lightcurve provided by B. Lott
- Likelihood spectral fits
- SED
- SED including DC2 data



WADC Catalogs Tools

The 3-year WMAP Point Sources Catalog

@ ASDC

P.Giommi, S. Colafrancesco, P. Padovani, D. Gasparrini, E. Cavazzuti and S. Cutini
A&A, 508, 107, 2009 (based on G. Hinshaw, et al., 2007, ApJS, 170, 288)

Complete sample [$F_{41\text{GHz}} > 1 \text{ Jy}$]

Full sample

Help

Show/hide columns

Advanced filtering

Print current view of table

Print complete table

Reset all filters

asdc
ASI Science Data Center

VO mode: off [\(turn on\)](#)

Help

Core Search

Source Name

Resolve name

☒ RA, Dec ☐ L, B Clean

(e.g. 00 02 34.6, 53 01 10.2 or 0.64417, 53.0190)

radius 5 arcmin Search

Reset filter

Export Current view of Table in: [Latex format](#) [FITS format](#) [Raw text format](#) [CSV text format](#)

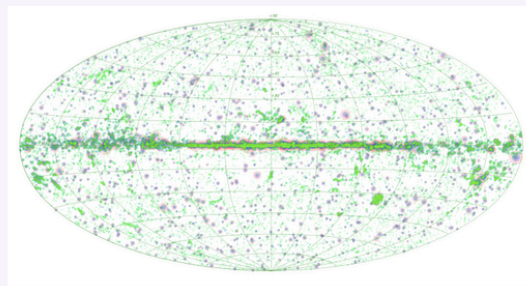
[Previous Page](#) [Next Page](#) Page Size (# of lines) 50 Refresh page Reset all filters Show all entries

Entry number		Source name		RA (J2000.0)	Dec (J2000.0)	LII	BII	Redshift	Source classification	Rflux(5GHz)	Rflux(41GHz)	
		IAU naming convention		hh mm ss.d	dd mm ss.d					mJy	mJy	
Selection mode:												
<div>Include</div> <div><input checked="" type="checkbox"/> All</div>		<div>⬆️⬇️⬆️⬇️</div>		<div>⬆️⬇️⬆️⬇️</div>	<div>⬆️⬇️⬆️⬇️</div>	<div>⬆️⬇️⬆️⬇️</div>	<div>⬆️⬇️⬆️⬇️</div>	<div>⬆️⬇️⬆️⬇️ Stats</div>	<div>⬆️⬇️⬆️⬇️</div>	<div>⬆️⬇️⬆️⬇️ Stats</div>	<div>⬆️⬇️⬆️⬇️ Stats</div>	
1	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0006-0622	00 06 13.8	-06 23 35.0	93.5	-66.65	0.347	Blazar Q-type	2463	2300	
2	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0012-3953	00 12 59.8	-39 54 24.9	332.46	-74.95	0	Blazar B-type	921	1000	
3	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0019+2019	00 19 37.7	+20 21 45.0	112.89	-41.89	0	Blazar B-type	710	900	
4	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0019+2602	00 19 39.1	+26 02 44.9	114.06	-36.28	0.284	Blazar Q-type	435	900	
5	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0025-2604	00 25 49.0	-26 02 12.9	42.29	-84.17	0.322	Misd. NT-AGN RGal-type	3745	0	
6	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0026-3511	00 26 16.3	-35 12 48.9	335	-80.3	0	Unidentified	121	1200	
7	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0029+0555	00 29 45.7	+05 54 41.0	113.12	-56.55	1.317	Blazar Q-type	348	1200	
8	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0042+5208	00 43 08.7	+52 03 33.9	121.63	-10.79	0.174	Misd. NT-AGN RGal-type	4124	0	
9	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0047-2515	00 47 33.1	-25 17 17.0	97.39	-87.97	0.001	Starburst galaxy	2433	1100	
10	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0049-5740	00 49 59.4	-57 38 26.9	303.31	-59.49	1.797	Blazar Q-type	1338	1000	
11	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0051-0927	00 50 41.2	-09 29 04.9	122.32	-72.36	0.537	Blazar B-type	931	800	
12	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0050-0647	00 51 08.2	-06 50 02.0	122.71	-69.71	1.975	Blazar Q-type	841	800	
13	<div><input checked="" type="checkbox"/> <div>Select1</div></div>	<div>ASDC Data Explorer</div>	WMAP3 J0050-4223	00 51 09.4	-42 26 33.0	303.12	-74.69	1.749	Blazar Q-type	926	900	

WADC Catalogs Tools

Planck Catalogue of Compact Sources

@ ASDC v1.0



Help

Show/hide columns

Advanced filtering

Print current view of table

Print complete table

Reset all filters

asdc
ASI Science Data Center

VO
Tools

VO mode: off (turn on)

Help

Cone Search

Source Name

Resolve name

RA, Dec L, B Clean

(e.g. 00 02 34.6, -53 01 10.2 or 0.64417, -53.0195)

radius 5 arcmin Search

Reset filter

30GHz 44GHz 70GHz 100GHz 143GHz 217GHz 353GHz 545GHz 857GHz

This is an interactive version of the First Planck Compact Source Catalogue, released by ESA on March 21th, 2013.

This catalogue is also available from [ESA Planck Legacy Archive](#) and [IPAC](#) website.

A general description of the PCCS is available from [The Planck Collaboration, 2013](#), while more details can be found in the [Explanatory Supplement](#).

Flux density has been estimated using four methods. The appropriate photometry to be used depends on the nature of the source considered.

See [The Planck Collaboration, 2013](#), for recommendations about photometry.

Export Current view of Table in: [Latex format](#) [FITS format](#) [Raw text format](#) [CSV text format](#)

◀ Previous Page Next Page ▶ Page Size (# of lines) 50 Refresh page Reset all filters Show all entries

Entry number		Source name	RA (J2000.0) hh mm ss.d	Dec (J2000.0) dd mm ss.d	Detection pipeline flux density +/- err (mJy)	Extended Extended source?	ERCSC source name
Selection mode:					Flux density +/- err		
<div>Include</div> <div>✓ All</div>		<div>⬆️⬆️</div>	<div>⬆️⬆️</div>	<div>⬆️⬆️</div>	<div>⬆️⬆️</div>	<div>⬆️⬆️</div>	<div>⬆️⬆️</div>
1	<div>✓</div> <div>Select</div>	<div>ASDC Data Explorer</div> PCCS1 030 G118.20+04.89	00 02 11.8	+67 18 28.0	2.1e+4+/-483.6	No	PLCKERC030 G118.11+04.94
2	<div>✓</div> <div>Select</div>	<div>ASDC Data Explorer</div> PCCS1 030 G118.62+06.06	00 04 14.5	+68 32 11.0	5587.8+/-510.5	No	
3	<div>✓</div> <div>Select</div>	<div>ASDC Data Explorer</div> PCCS1 030 G084.71-71.14	00 04 15.4	-11 51 20.0	736.1+/-111.6	No	PLCKERC030 G084.65-71.12
4	<div>✓</div> <div>Select</div>	<div>ASDC Data Explorer</div> PCCS1 030 G323.93-67.58	00 04 40.0	-47 35 38.0	456.2+/-100.1	No	
5	<div>✓</div> <div>Select</div>	<div>ASDC Data Explorer</div> PCCS1 030 G108.31-41.20	00 04 41.5	+20 20 26.9	454.3+/-103.5	No	

WADC Catalogs Tools

The TeGeV Catalogue @ ASDC (v1)

Authors: A. Carosi, F. Lucarelli, L.A. Antonelli, M. Capalbi, C. Leto, F. Verrecchia



The TeGeV Catalogue @ ASDC is a catalogue of VHE sources observed by ground-based Cherenkov telescopes. The TeGeVcat is collecting all the information publicly available about TeV sources observed by the past generation and current generation of imaging Cherenkov telescopes. The catalog contains also the public light curves and spectra (soon available in the v2 version).

Help

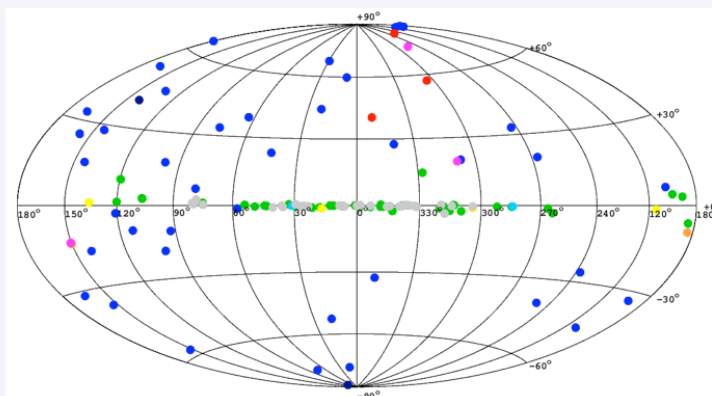
Show/hide columns

Advanced filtering

Print current view of table

Print complete table

Reset all filters



HBL IBL LBL FSRQs AGN STARBURST FRI SNR/PWN XRB WR UNID ALL

Export Current view of Table in: [Latex format](#) [FITS format](#) [Raw text format](#) [CSV text format](#)

[Previous Page](#) [Next Page](#) Page Size (# of lines) 50 [Refresh page](#) [Reset all filters](#) [Show all entries](#)

Entry number		TEV NAME	# OBS.	OTHER NAMES	TYPE	RA (J2000) hh mm ss	Dec (J2000) dd mm ss	INTEGRAL FLUX x E-12 cm ² /s	THR ENERGY [GeV]	Distance z	Observatory	START TIME [MJD]	LIGHT CURVE
Selection mode:	Include <input checked="" type="checkbox"/> All	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓ Stats	↑ ↓ Stats	↑ ↓ Stats	↑ ↓	↑ ↓ Stats	↑ ↓ Stats
1	Select	ASDC Data Explorer TeV J0025+6410	1	TychoSNR/VERJ0025+641	SNR	00 25 27.0	+64 10 50	0.187	1000	-	VERITAS	54740	-
2	Select	ASDC Data Explorer TeV J0240+6115	6	LSI+61_303	XRB	02 40 34	+61 15 25	2.2	400	-	MAGIC	53644	Show
3	Select	ASDC Data Explorer TeV J0534+2200	6	Crab/G184.6-5.8/3C144/SN1054	PWN	05 34 31.1	+22 00 52	-	25	-	MAGIC	54374	-
4	Select	ASDC Data Explorer TeV J0616+2230	2	IC443/SNR189.1+03.0/MAGIC0616+223	SNR	06 16 51	+22 30 11	4.63	300	-	VERITAS	54132	-
5	Select	ASDC Data Explorer TeV J0632+1722	1	MGROJ0632+17/GemingaPWN	PWN	06 32 28	+17 22 00	-	35000	-	MILAGRO	-	-
6	Select	ASDC Data Explorer TeV J0632+0548	4	HESSJ0632+057	XRB	06 32 58.3	+05 48 20	-	200	-	MAGIC	55599	-

asdc
ASI Science Data Center

VO mode: off [\(turn on\)](#)

Help

Cone Search

Source Name

Resolve name

☒ RA, Dec ☐ L, B [Clean](#)

(e.g. 00 00 34.6, 53 01 10.2 or 0.64417, 53.0195)

radius 60 arcmin [Search](#)

[Reset filter](#)

WADC theory apps.



ASDC Sky Explorer

Welcome to ASDC web Tools.

Before entering in the "SED Builder" ([Tutorial](#)) or in the "Data Explorer" tool ([Tutorial](#)), a source query is required.
The "ASDC Sky Explorer" application performs source query by name or coordinates search

Search by Name

Object Name ☒ Local ☒ SIMBAD ☐ NED

Exact String Search by name

Coordinates Equinox

RA-Dec

RA Dec

Galactic Coordinates

L B

Ecliptic Coordinates

Lon Lat

☐ Show ecliptical coordinates

Create SED

Radius Search by coordinates

Galactic Nh

Clear

Search by name : M87 (exact)

3 items found, displaying all items. 1

name	RA (J2000) degrees	Dec (J2000) degrees	L (J2000)	B (J2000)	Distance (arcmin)	Quality Flag	Reference Catalog	Resolver
M87	187.696667	12.3975	283.738311	74.494533	1		TEVCAT	LOCAL
M87	187.7	12.4	283.747129	74.497893	1		MESSIER	LOCAL
M87	187.705931	12.391123	283.777741	74.491156			SIMBAD	

ASDC ASI Science Data Center Version 2.0

Entry

R.A.(J2000) = 12 30 47.2 (187.6967 deg) l=283.74
Dec (J2000) = +12 23 51.0 (12.3975 deg) b=74.49
Galactic nH = 1.93E+20 (cm⁻²) [Source Names](#)

Error circle EXPLORER Source Details

TUTORIAL ?

arcmin

show sources list
download image in ps format

size (arcmin) 5
Create new image

Position selected for the analysis: R.A.=12 30 47.2 (187.6967 deg) l=283.74
Dec=+12 23 51.0 (12.3975 deg) b=74.49 [SED Builder](#) [Source Names](#)
[Reset Position](#) Galactic nH= 1.93E+20 (cm⁻²)

Additional Services - ?

Search ASDC Catalogs ?

Group of Catalogs Selected Catalogs

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

Search radius 0.2 arcmin

Search Other Services ?

VIZIER(X-R-G) VIZIER(O-IR) NED SIMBAD
HEASARC(X-R-G) GSC2 STSCI MAST 2MASS SDSS
USNO-B1.0 NVO

Search radius 0.2 arcmin

WADC: theory apps.

SED^(t) builder V3.0

A tool to build and handle Spectral Energy Distributions, time-resolved SEDs and multi-frequency light-curves



Version 3.0.16

Login Feedback

Tutorial DATA EXPLORER

User Data Existing SEDs

Current SED Search and build new SEDs



Load Data

Show Data

Duplicate Sed

Redshift: 0.0

Frame: Observed

X Axis: Frequency (Hz)

Y Axis: νf_{ν} (erg/cm²/s)

Plot Type: Default

Update Plot

Input Data

Time Resolved

Energy Filtering

Models

Fit Functions

Templates

Instr Sensitivity

Plot options

Existing SEDs

Export

VO Tools

ASDC Catalogs

<input checked="" type="checkbox"/>	Type
<input checked="" type="checkbox"/>	Radio
<input checked="" type="checkbox"/>	Infrared
<input checked="" type="checkbox"/>	Optical UV
<input checked="" type="checkbox"/>	Soft X Ray
<input checked="" type="checkbox"/>	Hard X Ray
<input checked="" type="checkbox"/>	Gamma Ray
<input checked="" type="checkbox"/>	VHE

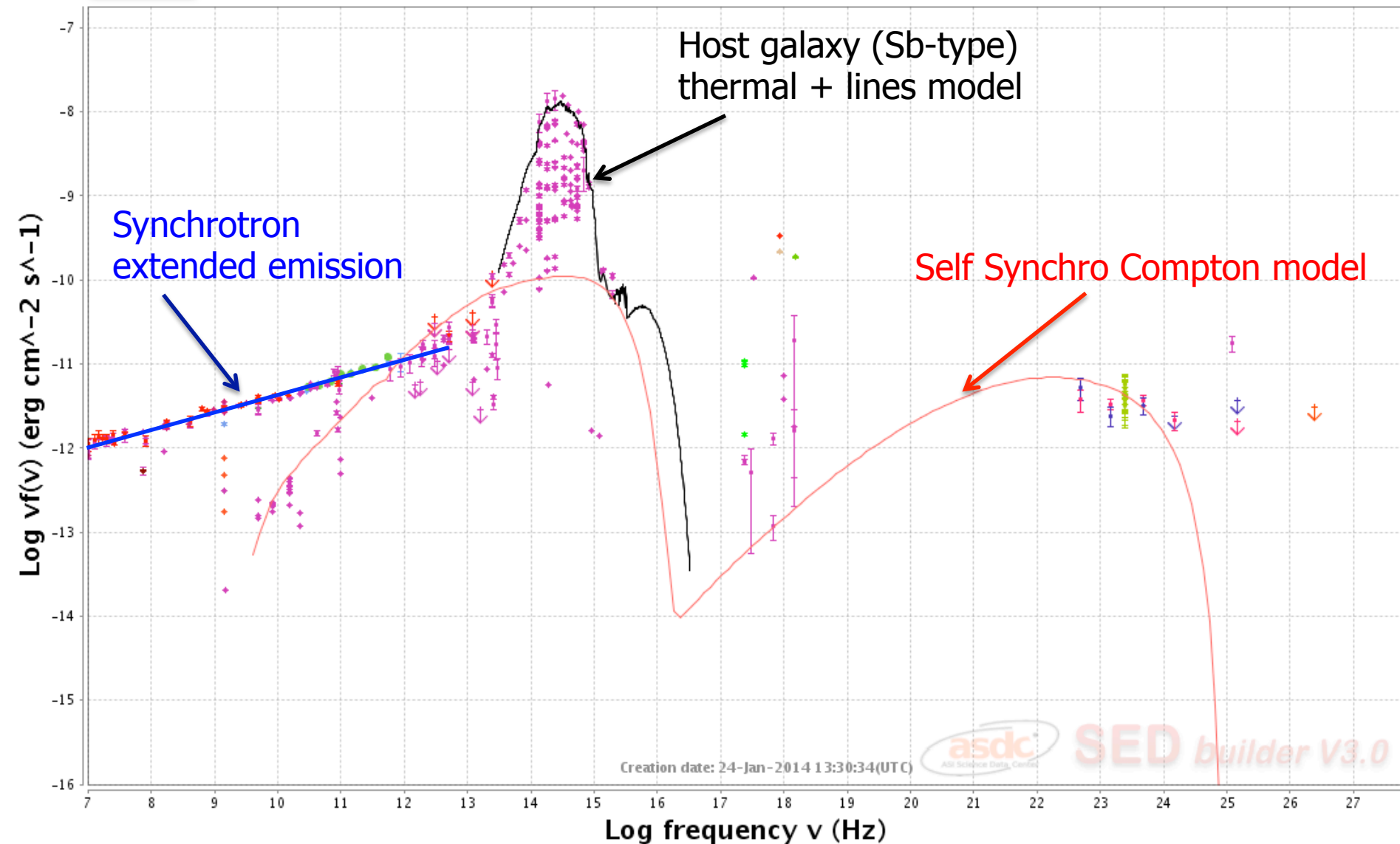
External Catalogs

<input checked="" type="checkbox"/>	Name	Credits	Search	Options
<input checked="" type="checkbox"/>	2MASS			U
<input checked="" type="checkbox"/>	Catalina RTS			U
<input checked="" type="checkbox"/>	NED		AXS_J123047+1224	U
<input checked="" type="checkbox"/>	SDSS7			U
<input checked="" type="checkbox"/>	SDSS10			U
<input checked="" type="checkbox"/>	USNO A2.0			U
<input checked="" type="checkbox"/>	USNO B1			U

WADC theory apps.

M87

sed-1230p1223 Ra=187.69667 deg Dec=12.39750 deg (NH=1.9E20 cm⁻²)

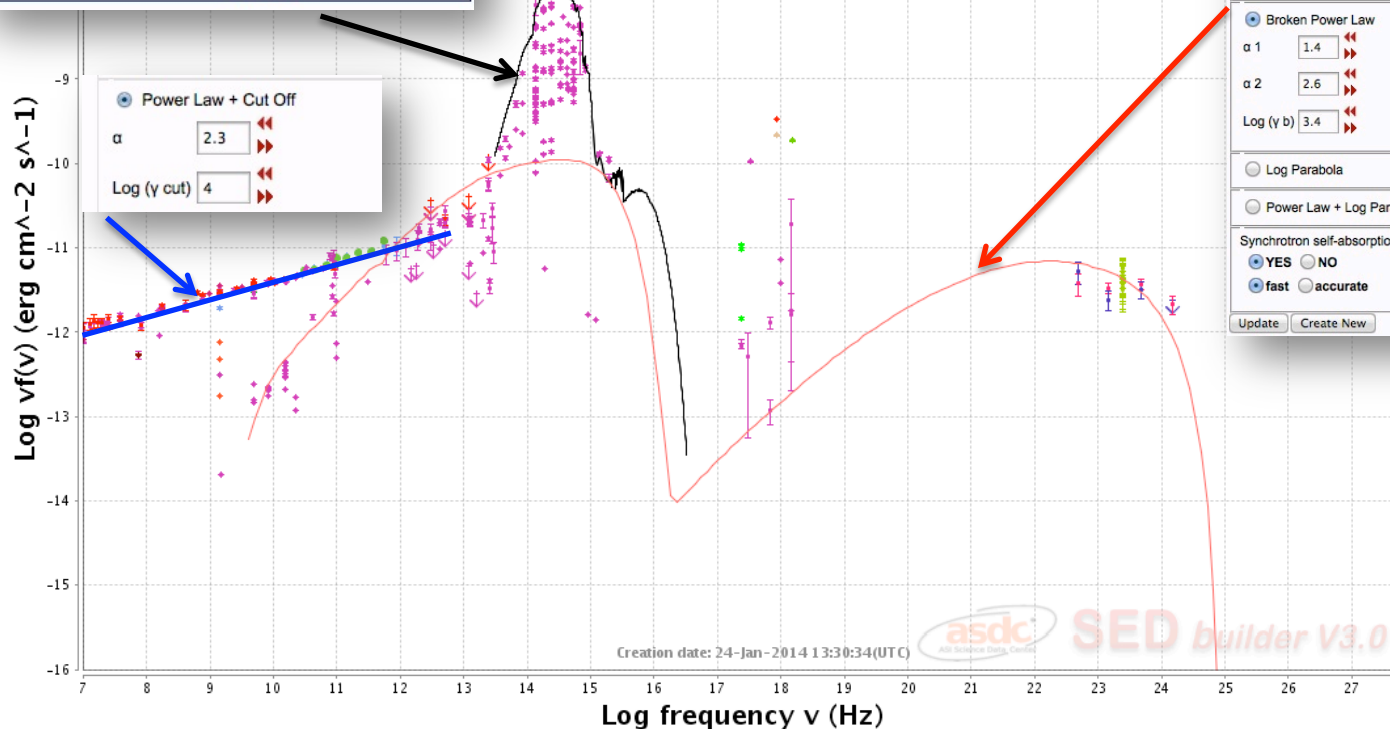


WADC theory apps.

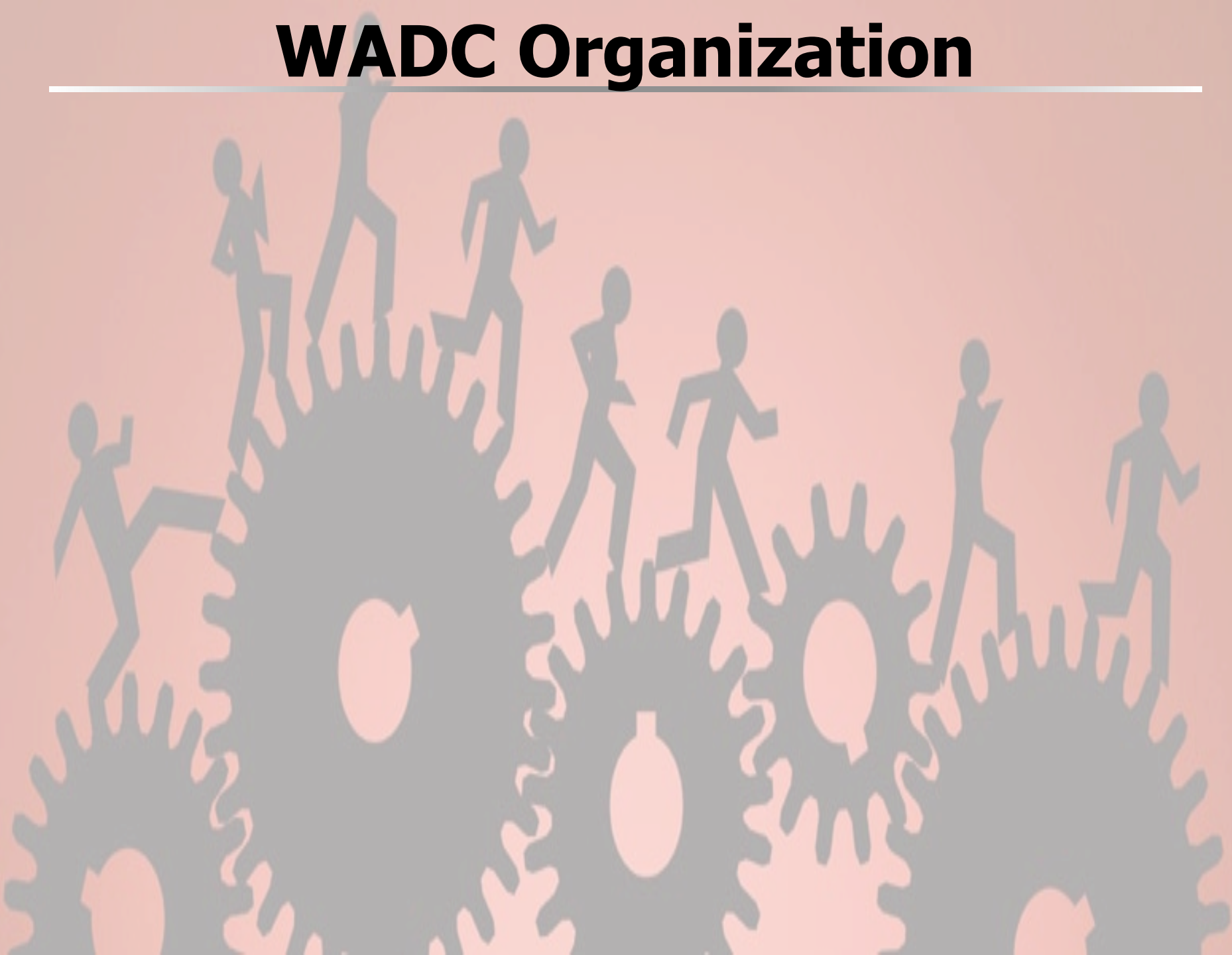
<input type="checkbox"/> Composite QSO sp. and Standard X-ray emission ?	aro 0.7	Update
<input type="checkbox"/> Giant Elliptical ?		
<input type="checkbox"/> Ibm type (NGC4449) ?	scaling factor 1	Update
<input checked="" type="checkbox"/> Sb type (M31) ?	scaling factor 4.5	Update
<input type="checkbox"/> Sbc type (NGC2903) ?	scaling factor 1	Update
<input type="checkbox"/> Scd type (NGC4559) ?	scaling factor 1	Update

Redshift: 0.002	Frame: Rest Frame			
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				
Num. 0 M D				
SSC (Numerical) ?		SSC (Analytical) ?		
Log R(cm) 16.55	B (Gauss) 0.15			
delta 4	N 2.3			
Log (gamma min) 1	Log (gamma max) 4.4			
redshift 0.002				
<input type="radio"/> Power Law				
<input type="radio"/> Power Law + Cut Off				
<input checked="" type="radio"/> Broken Power Law				
alpha 1 1.4				
alpha 2 2.6				
Log (gamma b) 3.4				
<input type="radio"/> Log Parabola				
<input type="radio"/> Power Law + Log Parabola				
Synchrotron self-absorption				
<input checked="" type="radio"/> YES <input type="radio"/> NO				
<input checked="" type="radio"/> fast <input type="radio"/> accurate				
Update		Create New		

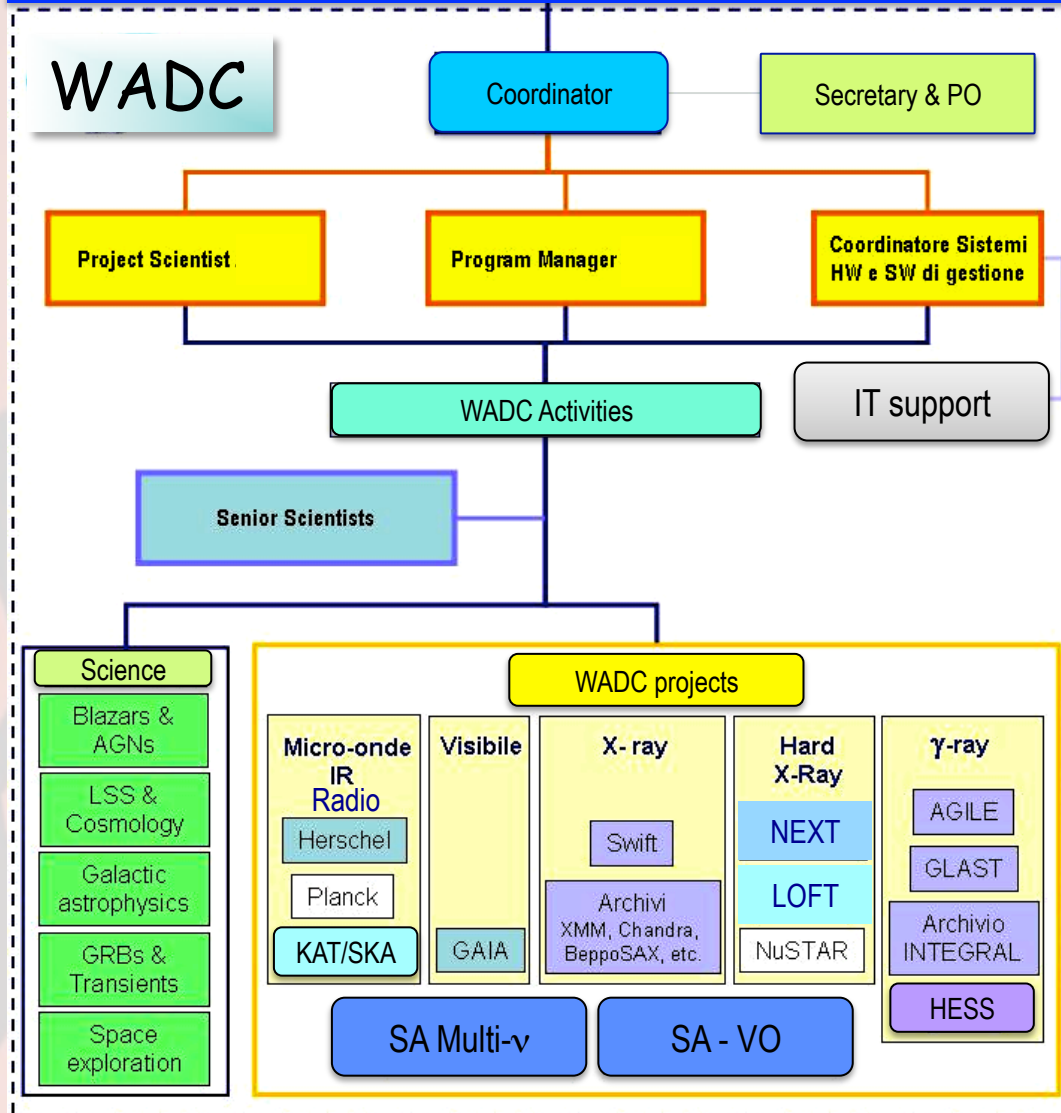
187.69667 deg Dec=12.39750 deg (NH=1.9E20 cm^-2)



WADC Organization



Wits Astro Group



SKA
HESS-II
...
NRF
DST

Project Manager

Project Scientist

- Coordination of scientific activities
- Favor collaboration between WADC and the scientific community
- Collaboration with African countries
- Collaboration extra-Africa

Outline

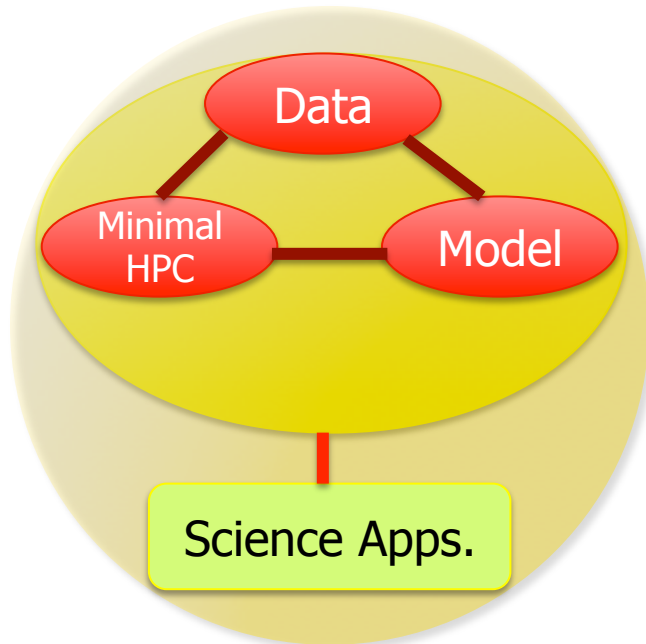
- ⊕ Astronomy & Astro-Particle Physics at Wits
 - ⊞ The challenge of Multi- ν and Multi-disciplinary
- ⊕ Science with Multi- ν and Multi-disciplinary
- ⊕ Data with Multi- ν and Multi-experiments

- ⊕ The Wits Astro Data Center

- ⊕ The Wits approach to Data science
- ⊕ The future of the WADC
 - ⊞ SA
 - ⊞ Africa
 - ⊞ ... and beyond

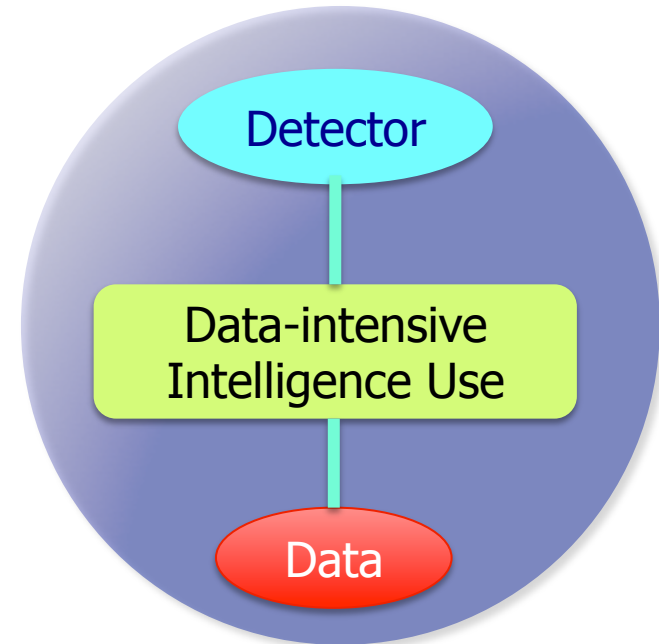
Wits Astro Data approach

Fast, Interactive, Hands-on
Research-oriented
data management



WADC

Data-intensive, Intelligence-use
Decision-making software
Powerful electronics



**SKA
SA-CERN**

Opportunities

WADC: (ex)portable, research-oriented, multi-experiment, multi- ν , Data Center

Scientific Research

Science Apps

MeerKAT / SKA

HESS-II/CTA

Spektr-M, OLIMPO,

Survey telescope fast analysis

AstroInfo Research

Innovation

Flexibility

Scientific return

HESS-SA data center (@ Wits)

Scientific Research

Needs HPC+WADC

An example: LSST survey

Data rate: 30 terabytes of data obtained each night

- $\approx 10^7$ sources/night
- $\approx 2 \cdot 10^8$ sources/month
- $\approx 2 \cdot 10^9$ sources/year

Assume:

$\approx 10\%$ of these sources are unknown (need rapid identification)

We will have:

$\approx 2 \cdot 10^7$ sources/month available for rapid multi- ν identification/study
(possible only with fast data analysis tools like at the WADC)

A Digital Copy of the Universe, Encrypted

As physics prepares for ambitious projects like the Large Synoptic Survey Telescope, the field is seeking new methods of data-driven discovery.



WADCS: specs, costs, upgrade

Present day specifications
for the existing structure
of the WADC

Specs

1 INTEL SERVER	R 150 381.96
4 Intel Worker Nodes	R 340 795.00
Synology NAS 40TB Storage Solution	R 95 056.62
UPS	R 6 039.72
24 Port Ethernet Switch 1Gb	R 5 318.00
42U Rack	R 8 076.90
<hr/>	
Total cost	R 605 668.20

Planned upgrade for the WADC
(April-Dec 2014)

Upgrades

INTEL SERVER NODES	R 368 267.88
INTEL XEON SERVER	R 159 615.96
Synology NAS 40TB Storage Solution	R 95 056.62
42U Rack	R 8 076.90
<hr/>	
Total cost	R 536 056.40

WADC full operational mode

Modes

- Multi-frequency, Multi-experiment Data Center
- HESS-II data pipeline (pre-)analysis