PS Status Report

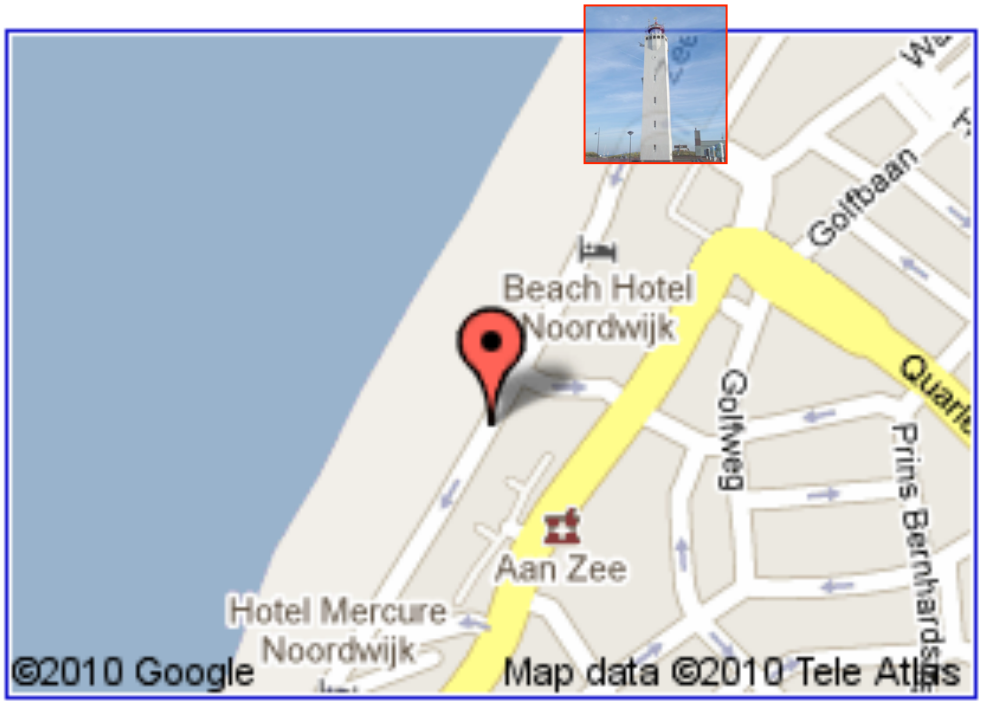
INTEGRAL

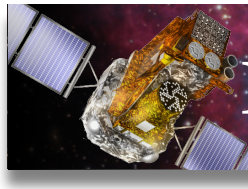
- Observatory status
- Community interfaces
- Science highlights
- Outreach

TONIGHT, 16 June 2010, 19:30

“La Galleria”

Koningin Wilhelmina Boulevard 18, Noordwijk, 071-3617196





Executed observations

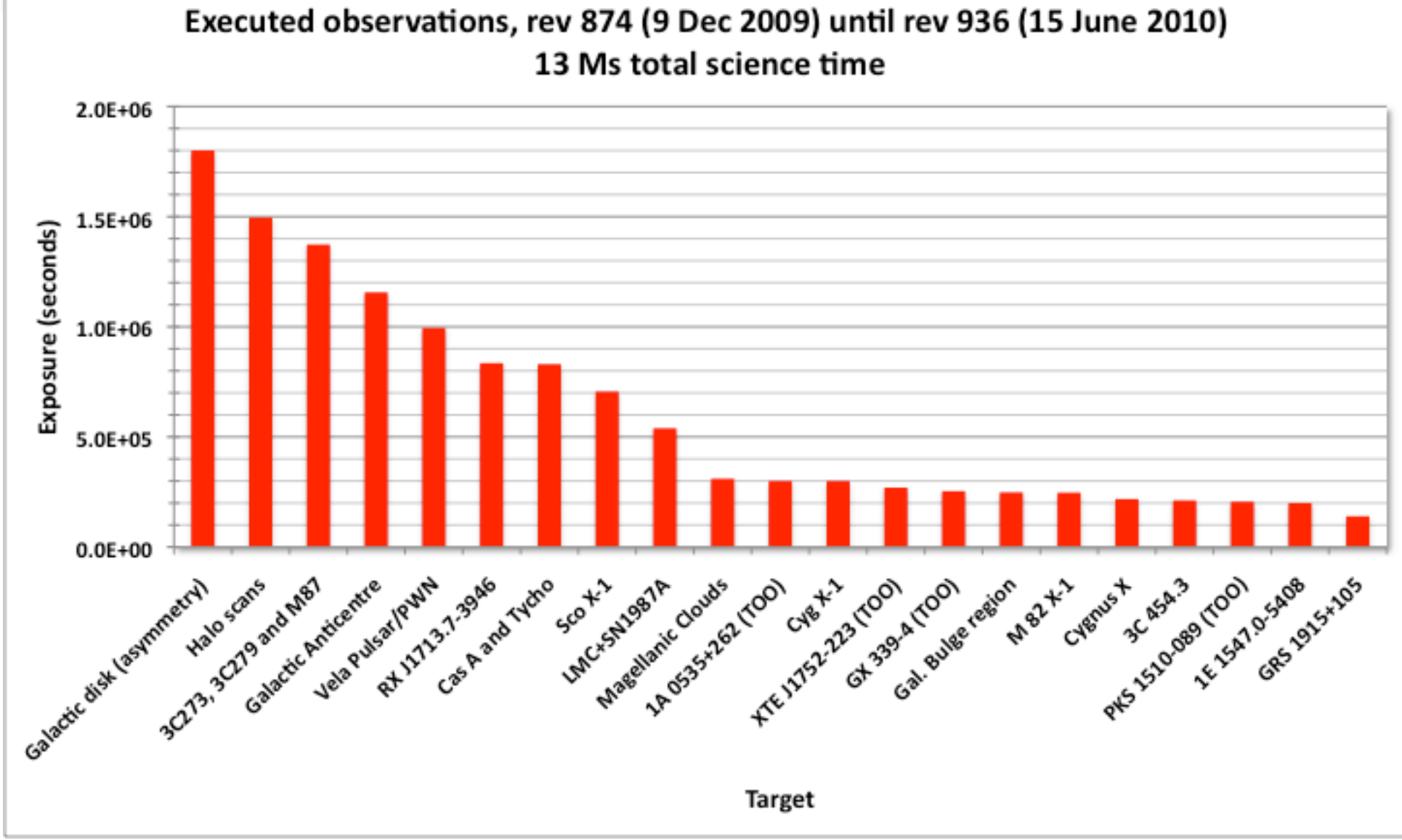
INTEGRAL

Revolutions 874 (Dec 2009) until 936 (June 2010)

Source	PI	Proposal #
Galactic disk (asymmetry)	Georg Weidenspointner	720018
Halo scans	Andrew Strong	720003
3C273, 3C279 and M87	Roland Walter	720006
Galactic Anticentre	Pietro Ubertini	720028
Vela Pulsar/PWN	Anthony Dean	720015
RX J1713.7-3946	Regis Terrier	720047
Cas A and Tycho	Pierrick Martin	720030
Sco X-1	Mikhail Revnivtsev	720011
LMC+SN1987A	Sergei Grebenev	720039
Magellanic Clouds	Malcolm Coe	720017
1A 0535+262 (TOO)	Andrea Santangelo	740013
Cyg X-1	Joern Wilms	720035
XTE J1752-223 (TOO)	Emrah Kalemci	740026
GX 339-4 (TOO)	Marion Cadolle Bel	740001
Gal. Bulge region	Erik Kuulkers	720001
M 82 X-1	Sergei Sazonov	720010
Cygnus X	Pierrick Martin	720026
3C 454.3	Stefano Vercellone	770002
PKS 1510-089 (TOO)	Elena Pian	740016
1E 1547.0-5408	Peter Richard Den Hartog	720027
GRS 1915+105	Joern Wilms	720035

Executed observations

INTEGRAL



TOO follow-up observations + GRB

INTEGRAL

Date	Source	PI	Comments
January 2010	PKS 1510-089	Pian	Scheduled
April 2010	1A 0535+26 Accreting pulsar	Santangelo	Scheduled
April 2010	GX 339-4 BHC	Cadole-Bel	Scheduled
April 2010	XTE J1752-223 Binary	Kalemci	Scheduled
March 2010	V 407 Cyg	Den Hartog	Too risky (no INTEGRAL detection expected). No Swift detection.
April 2010	SS Cyg	Migliari	Technically unfeasible (no INTEGRAL detection expected)
May 2010	SN 2010ad in NGC 300	Leising	a SN "impostor" (LBV outburst of a massive dust-enshrouded star)
GRB 091230, 100331A, 100518A	GRB inside FOV	Hanlon Wunderer	All instrument data SPI/IBIS data, ms timing analysis only

U Sco (recurrent nova) in FoV during Sco X-1 obs, OMC data few hrs after outburst
Rev 916: Included observations of two ToO (1A 0535+262 and GX 339-4)
Rev 917: Included observations of two ToO (1A 0535+262 and XTE J1752-223)

Response to AO-8

INTEGRAL

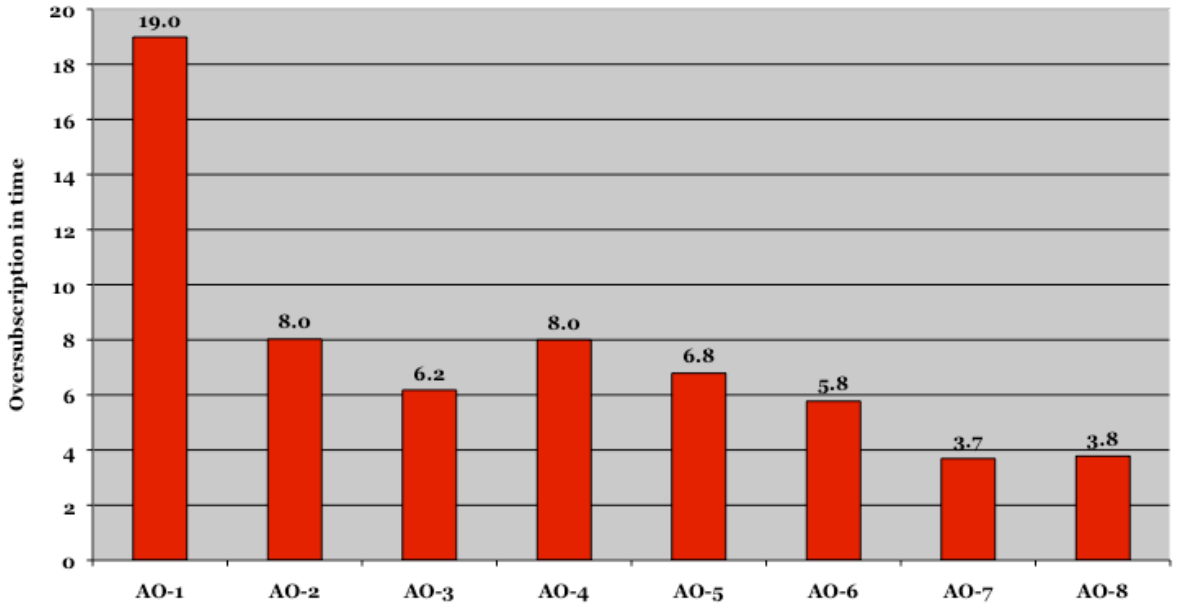
- Phase 1: Call for observing time proposals, select observing time proposals

- Phase 2: Call for data rights proposals to be associated with selected observing time proposals

AO-8 Proposals

INTEGRAL

Category	Number of proposals	Requested observing time (Ms), includes ToO x 0.1
Compact galactic objects	29	27.5
Extragalactic objects	16	26.3
Nucleosynthesis	7	15.6
Miscellany	12	21.5
Total	**64**	**90.8**

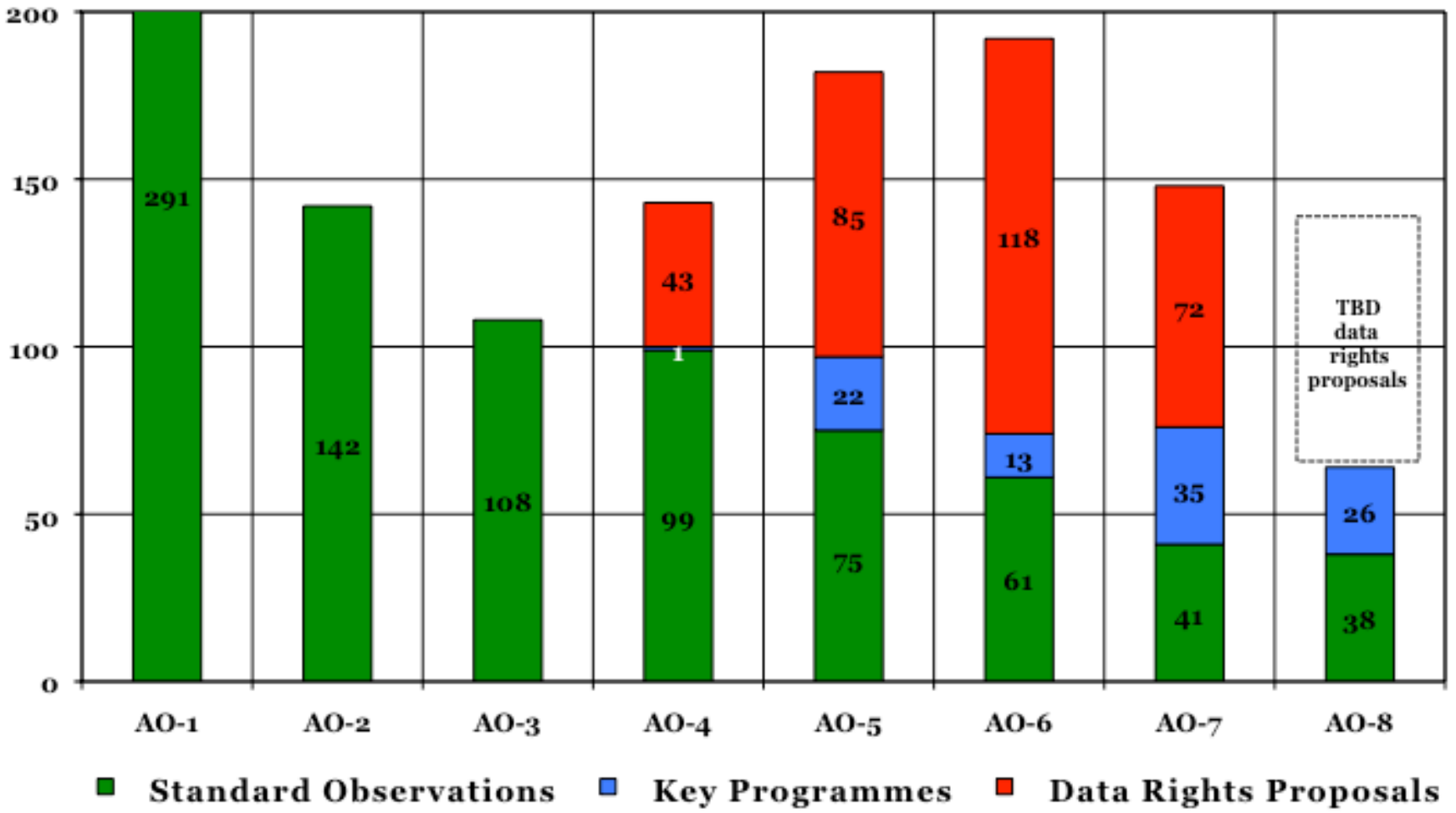


esa European Space Agency

Number of proposals

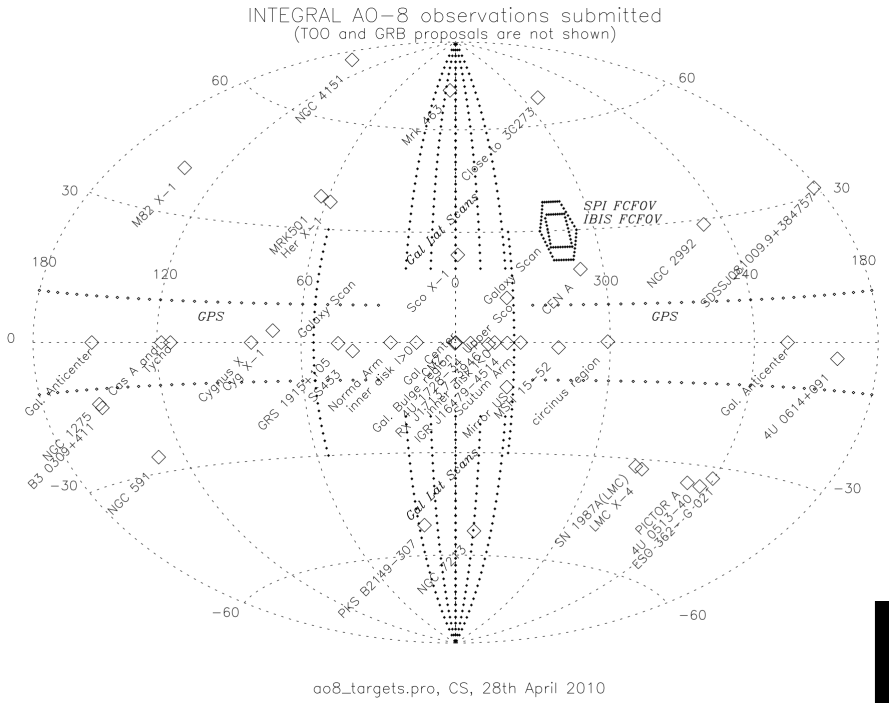
INTEGRAL

Number of proposals received in response to INTEGRAL AO

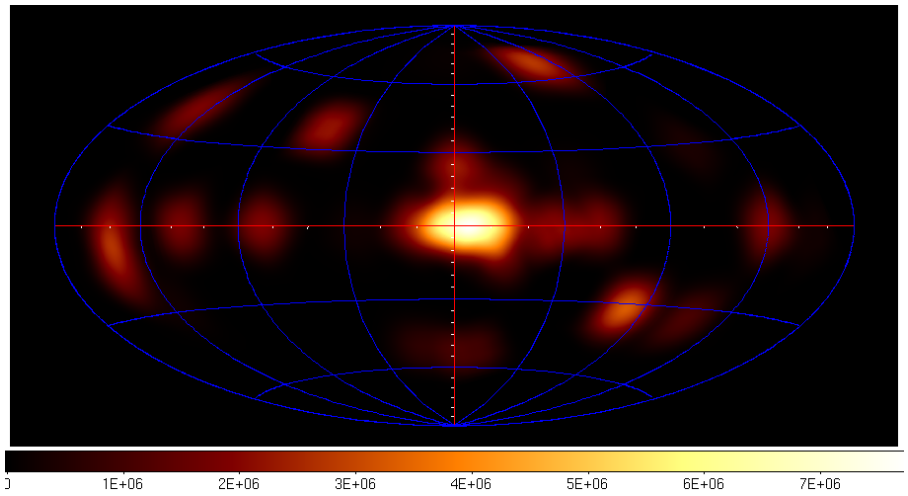


Proposed AO-8 targets

INTEGRAL



ao8_targets.pro, CS, 28th April 2010



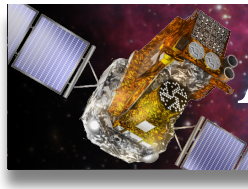
- 23 Apr 2010: 64 proposals requesting observing time received
  - < 1 Ms, non-ToO: 12 proposals, request 4.1 Ms total
  - ≥ 1 Ms, non-ToO: 26 proposals, request 58.1 Ms total
  - ToO/GRB: 26 proposals, request 255 Ms total
  - Oversubscription 3.8
  - Total non-TOO available: (24 Ms – 2.2 Ms (TOO earmark) -1.2 Ms (carry-over)) x 120% = 24.7 Ms
  - ~ 50% of non-TOO proposals are ”multi-year”

- 03 June 2010: TAC recommended 17 non-TOO, 21 TOO , 3 GRB: 41 total

Compact galactic:	6/13 non-TOO	5.5 Ms total, (5.6 Ms max to be allocated)	16/17 TOO
Extragal.:	4/12 non-TOO	6.6 Ms total, (6.2 Ms max to be allocated)	3/4 TOO
Nucleosynthesis:	3/5 non-TOO	6.0 Ms total, (5.7 Ms max to be allocated)	2/2 TOO
Miscellany:	4/8 non-TOO	7.0 Ms total, (7.2 Ms max to be allocated)	3/3 TOO

  - Total non-TOO allocated: 25.1 Ms (only 1.6% above target !)
  - Grade A: 60% (proposals), 60% (time)
  - 3 proposals will make use of XMM time (Seyfert, ULIX, binary)
  - ESA approval 15 June 2010

- Russian return:
  - total time approved 8.8 Ms incl 0.8 Ms TOO
  - return in AO-8: 25% (6 Ms) + 1.8 Ms (under-return)



AO-8 recommended programme

INTEGRAL

Non-TOO observations by science category, all grades									
Science category	**Time requested**		**Time accepted**		**Proposals submitted**		**Proposals accepted**		**Accepted/submitted proposals**
	(Ms)	(%)	(Ms)	%	(#)	(%)	(#)	(%)	(%)
Compact Objects	14.8	22.7	5.5	21.9	13	34.2	6	35.3	46
Extragalactic Objects	16.5	25.3	6.6	26.3	12	31.6	4	23.5	33
Nucleosynthesis	15.0	23.0	6.0	23.9	5	13.2	3	17.6	60
Others	19.0	29.1	7.0	27.9	8	21.1	4	23.5	50
Total	**65.3**	**100.0**	**25.1**	**100.0**	**38**	**100.0**	**17**	**100.0**	

Time for TOO observations by science category, all grades									
Science category	**Time requested**		**Time accepted**		**Proposals submitted**		**Proposals accepted**		
	(Ms)	(%)	(Ms)	(%)	(#)	(%)	(#)	(%)	
Compact Objects	151.1	59.3	7.8	50.7	17	65.4	16	66.7	94
Extragalactic Objects	97.5	38.3	1.6	10.4	4	15.4	3	12.5	75
Nucleosynthesis	6	2.4	6.0	38.9	2	7.7	2	8.3	100
Others (incl GRB)	0.0	0.0	0.0	0.0	3	11.5	3	12.5	100
Total	**254.6**	**100.0**	**15.4**	**100.0**	**26**	**100.0**	**24**	**100.0**	

Note: Requested TOO time = # proposed sources x exposure per source.Trigger probability is typically a few% (depending source type) or less.

Committee's membership

- TAC: rotation of members for AO-9 (2011) and AO-10 (2012)
- IUG:
  - the following new members have been appointed by D/SRE for a period of two years, starting 01 July 2010:
    - Margarida Hernanz, IEEC, Barcelona (E)
    - Maurizio Falanga, ISSI, Bern (CH)
    - Mark McConnell, UNH, Durham/NH (USA)
  - The two-year term is ending in July 2010 for:
    - Tomaso Belloni
    - Andrea Goldwurm
    - Mark Leising
  - The two-year term is ending in July 2011 for:
    - Angela Bazzano
    - Konstantin Postnov
    - Jörn Wilms

Mission Extension

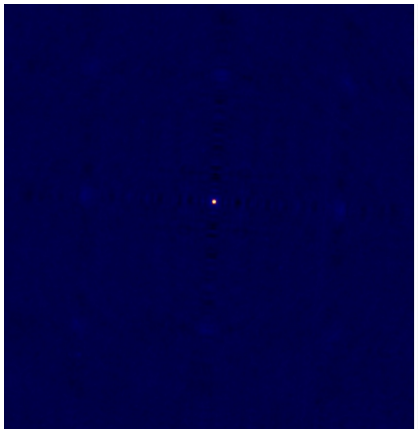
- **Draft** science paper V1.0 distributed to IUG for review 08 June
- Very little time to work on the draft before submission to IUG due to (very) late input!
- Future schedule (see Dec 2009 IUG meeting):
  - ◎ Update paper to (almost) final version before end July 2010
  - 16 August: Submit final (~ (100-x)%) version to SRE-SA
  - 31 August: Submit final (100%) version to SRE-O
  - 03 Sep: Submit paper to D/SRE
  - 26 Oct: AWG meeting
  - Early Nov: SSAC meeting
  - 18/19 Nov: SPC meeting
- Note: FINREF makes life more expensive for everybody !

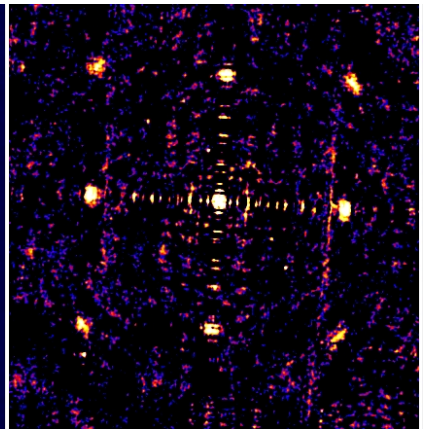
- NASA SR (May 2010): The recommendation of the Senior Review Committee to NASA was to discontinue funding for the INTEGRAL project in the US including funding for the US INTEGRAL GOF and the US Guest Observer Program. The US mirror to the INTEGRAL Public Data Archive will be maintained as part of the HEASARC.

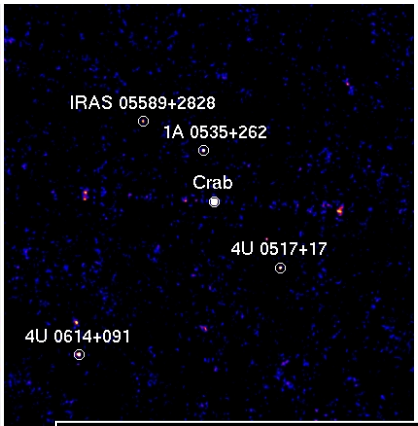
Selected science highlights

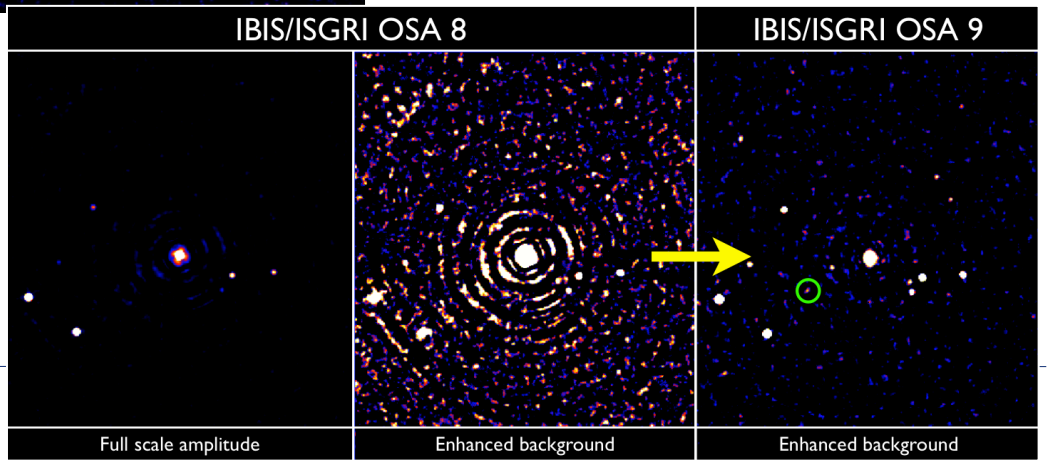
INTEGRAL

The Fermi/LAT Sky as Seen by INTEGRAL/IBIS	P. Ubertini et al., ApJ 706, L7, 2009
The Magellanic Bridge: evidence for a population of X-ray binaries	V. McBride et al., arXiv:0912.2951
Predicted gamma-ray line emission from the Cygnus complex	P. Martin et al., A&A 511, 86, 2010
Fading hard X-ray emission from the Galactic Centre molecular cloud Sgr B2	R. Terrier et al., arXiv:1005.4807, 2010





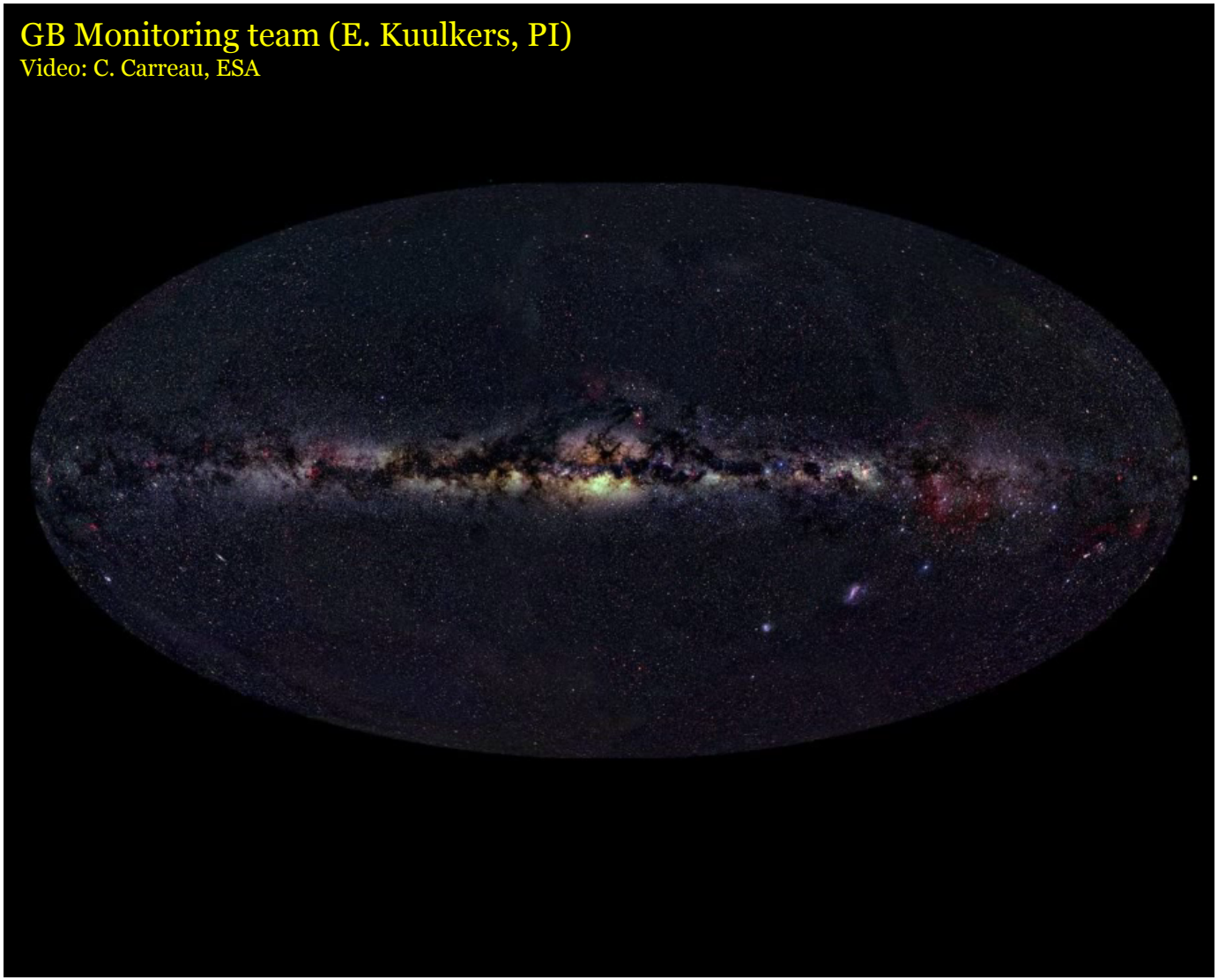




The Galactic Bulge

INTEGRAL

GB Monitoring team (E. Kuulkers, PI)
Video: C. Carreau, ESA



esa European Space Agency

Astronomy & Astrophysics

Vol. 441 • N° 2
OCTOBER II • 2005

nature

Dark matter could be light

Gamma rays from galaxy centre may signify less massive miss

17 March 2004

Philip Ball

Gamma rays streaming from the centre of our galaxy could be signature of elusive dark matter, astrophysicists claim. The ray support an exotic theory about dark matter: that it consists of v particles.

Physicists know that a large proportion of the universe's mass

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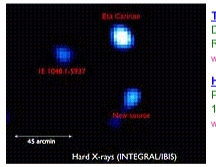
STELLAR CHEMISTRY

Integral: Stellar Winds Colliding At Our Cosmic Doorstep

by Staff Writers
Paris, France (SPX) Feb 22, 2008
ESA's Integral has made the first unambiguous discovery of high-energy X-rays coming from a rare massive star at our cosmic doorstep, Eta Carinae. It is one of the most violent places in the galaxy, producing vast winds of electrically-charged particles colliding at speeds of thousands of kilometres per second.



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1048.1-5937 is
Credits: ESA/

de Volkskrant

Mysterieuze magnetar op heterdaad betrapt

Door Govert Schilling
gepubliceerd op 28 januari 2009 16:41, bijgewerkt op 16:41

Met de Europese kunstmaan Integral zijn de afgelopen dagen gedetailleerde waarnemingen verricht van een zogeheten magnetar tijdens een krachtige uitbarsting. De nieuwe metingen zullen er hopelijk toe bijdragen dat sterrenkundigen een beter inzicht krijgen in de ware aard van deze mysterieuze hemellichamen. Magnetars zijn kleine, compacte neutronensterren (zwaarder dan de zon maar niet veel groter dan een

Godda
Putting idea

Feature

Text Size

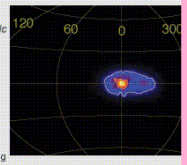
Vast Cloud

Robert Naey
Goddard Sp
301-286-4453/4044

Release No. 08-05

Four years of observations from the European Space Agency's Integral (INTErnational Gamma-Ray Astrophys Laboratory) satellite may have cleared up one of the most vexing mysteries in our Milky Way: the origin of a gi cloud of antimatter surrounding the galactic center.

Image right: Integral mapped the glow of 511 keV gamma rays from electron-positron annihilation. The map shows the whole sky, with the galactic center in the middle. The emission extends to the right. Click image for enlargement. Credit: ESA/Integral/MPE/G. Weidenspointner



As reported by an international team in the January 10 issue of Nature, Integral found that the cloud extends farther on the western side of the galactic center than it does on the eastern side. This imbalance matches the distribution of a population of binary star systems that contain black holes or neutron stars, strongly suggesting that these binaries are churning out at least half of the antimatter, and perhaps all of it.

"The reported Integral detection of an asymmetry represents a significant step forward toward a solution of one of the major outstanding problems in high-energy astrophysics. I think I can hear a collective sigh of relief emanating from the community," says Marvin Leventhal, a University of Maryland professor emeritus and a pioneer in this field.

Djokovic en el Masters de Shanghai

REPORTAJE: ASTRONOMÍA Observaciones

n en el centro de la Vía Láctea

gencia Europea del Espacio (ESA), dice que no cree en milagros, y por eso sólo da una explicación para una curiosa observación realizada por su grupo.

En abril del pasado año el telescopio espacial de rayos gamma *Integral*, de la ESA, apuntó hacia el centro de nuestra galaxia y se encontró con que una decena de objetos emisores de radiación de alta energía estaban apagados, en palabras de Kuulkers. "Es raro, pero sólo puede ser pura casualidad", señala.

Esa observación es sólo una de las muchas que lleva a cabo *Integral* en su programa de observación del centro de la Vía Láctea, una región sobre la que aún quedan muchas preguntas. Cuando se observa con telescopios ópticos, los más antiguos en la

THE AUSTRALIAN
AUSTRALIA'S NATIONAL DAILY NEWSPAPER

Print this page

French explain gamma ray mystery

From AFP
18mar04

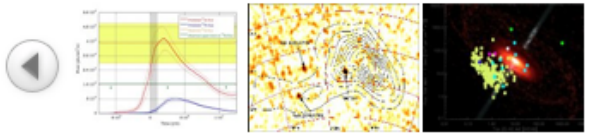
OUR galaxy, the Milky Way, is awash in low-energy gamma rays emitted by black holes and neutron stars which are buried in clusters of dust and gas, according to a French study published on Thursday.

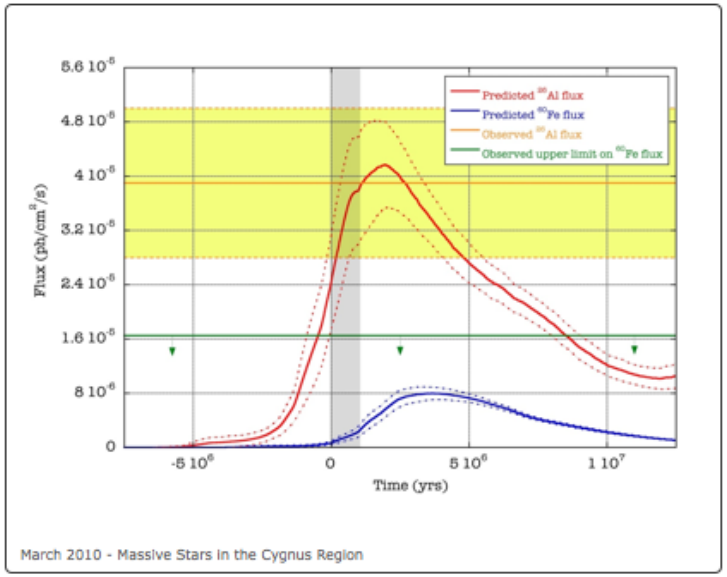
The research, which appears in the British science journal Nature, resolves a 30-year-old enigma as to where this so-called "soft" radiation comes from.

The team from France's Atomic Energy Commission (CEA) say they have found 91 gamma-ray sources, accounting for what they believe to be 90 per cent of the energy.

Twenty-six of these sources were previously unidentified, and most of the other sources are binary star systems that had already been detected in the X-ray part of the energy spectrum.

The remaining 10 per cent of the gamma radiation is likely to come from very compact stars whose emissions are too weak to be detected individually, or from a very weak interstellar





March 2010 - Massive Stars in the Cygnus Region

Massive Stars in the Cygnus Region

The ^{26}Al and ^{60}Fe radio-isotopes are thought to be predominantly produced by massive stars at various stages of their evolution. Through stellar winds and supernova explosions, they are released in the ISM where they decay over Myr timescales. The study of the corresponding nuclear gamma-ray line emission at 1809 keV (^{26}Al) and 1173/1332 keV (^{60}Fe) can be a useful probe of massive star evolution and nucleosynthesis.

The nearby Cygnus region harbours a strong concentration of massive stars: about 170 O stars distributed in half a dozen associations, thereafter called the Cygnus complex. It was observed by CGRO/COMPTEL to shine at 1809 keV. The flux measured by COMPTEL was found to be 2-3 times higher than predicted from the stellar models available in the late 1990s-early 2000s. Now, the Cygnus complex has been re-evaluated using INTEGRAL/SPI observations and improved stellar models.

About 5 years of INTEGRAL observations were used to derive the spectra of the ^{26}Al (see POM June 2009) and ^{60}Fe decay lines from Cygnus. The 1809 keV (^{26}Al) flux from Cygnus is ~ 6.0 x 10^{-5} ph/cm^2/s, while we derived an upper-limit on the ^{60}Fe line flux at 1173/1332 keV of 1.6 x 10^{-5} ph/cm^2/s. Yet, when taking into account the Galactic foreground and background contribution in the direction of Cygnus, it turns out that only ~ 60% of the 1809 keV flux, (3.9 ±1.1) x 10^{-5} ph/cm^2/s, is attributable to the Cygnus complex itself.

The results have been compared with population synthesis predictions based on recent stellar models including some effects of stellar rotation and a coherent estimate of the contribution of SNIb/c. As shown in the Figure, the observations now agree with the theoretical predictions (the vertical shaded bar indicates our estimated current position along the time axis).

ESA press/web news releases

INTEGRAL

Press Releases and Info Notes

- Le Trou Noir de la Galaxie fut très actif, Libération, 31 May 2010.
- The turbulent past of the Milky Way's black hole, CNRS, 27 May 2010.
- El misterio de los positrones galácticos, El Pais, 16 November 2009.
- Integral disproves dark matter origin for mystery radiation, ESA News, 22 July 2009.
- Galactic positron annihilation not a signal of dark matter, ESA Science & Technology, 22 July 2009.
- 'Integral': viaje a un agujero negro, El Pais, 26 June 2009.

Total: 48 ESA press/web news releases since launch
Archive: http://integral.esac.esa.int/press/press.html

Nov – June: hibernation phase on web releases ☹
New start soon ☺ ??

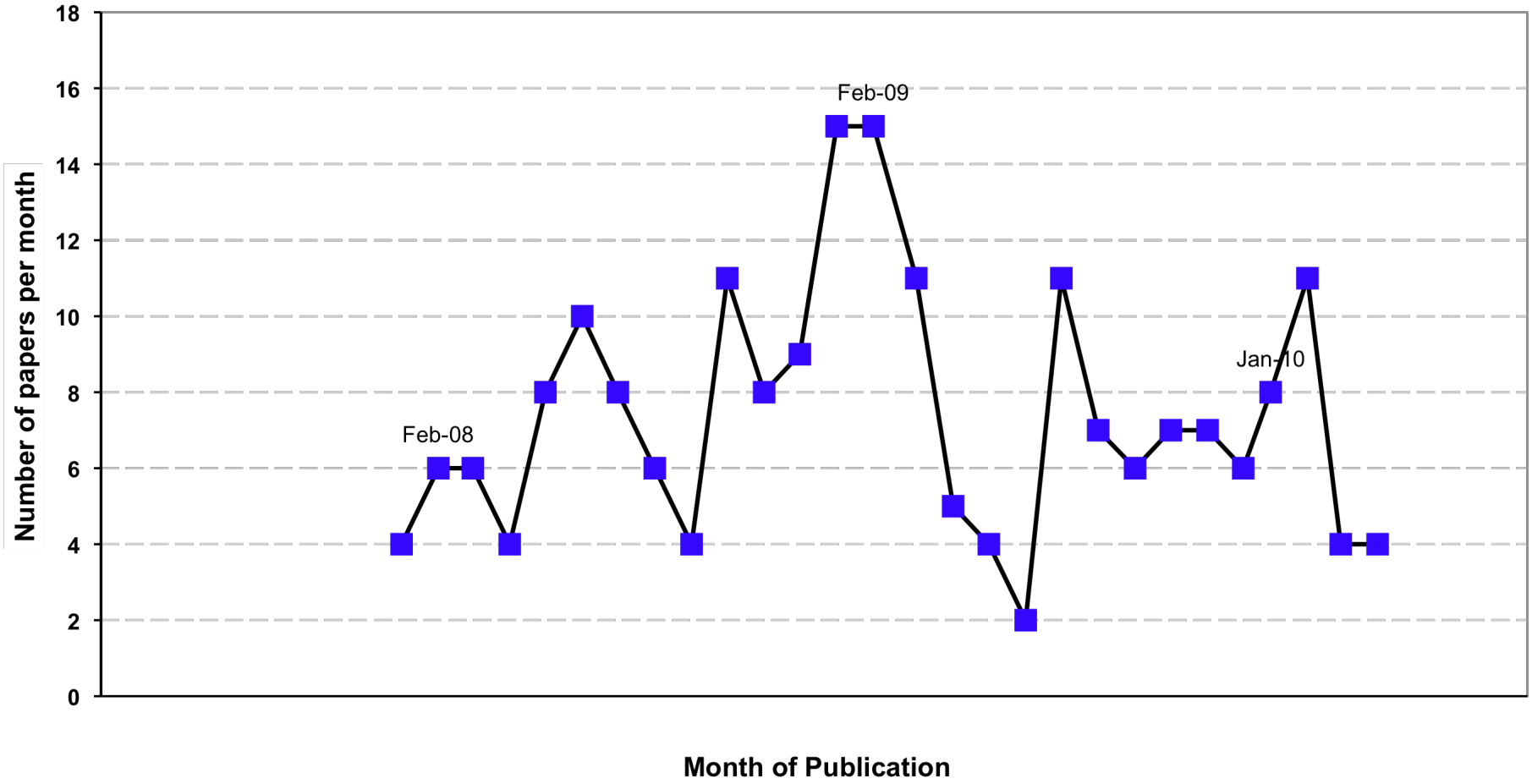
- 4th catalogue (at work),
- GC/Sgr B2 (Goldwurm) (requested),
- Hard X-ray survey (Krivonos) requested)

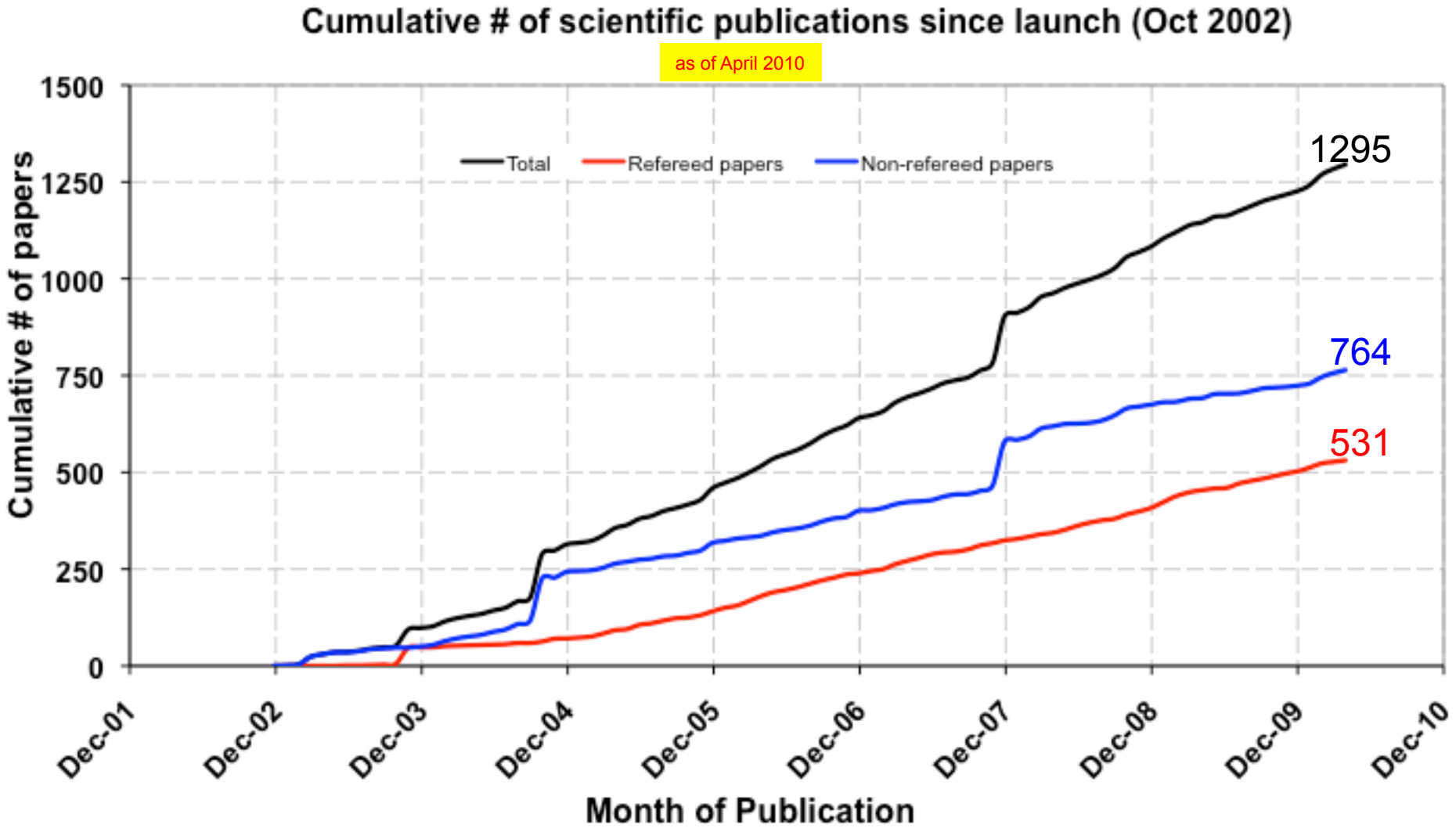
Monthly publication rate

INTEGRAL

Refereed publications per month over last two years using INTEGRAL scientific data

http://adsabs.harvard.edu/abstract_service.html




Cumulative # of scientific publications since launch (Oct 2002)
as of April 2010
Cumulative # of papers
1500
1250
1000
750
500
250
0
Total
Refereed papers
Non-refereed papers
1295
764
531
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Month of Publication

Top 10 citations to papers

INTEGRAL

Author	Title	Reference	Number of citations
N. Arkani-Hamed et al.	A theory of dark matter	2009, PhRvD 79, 5014	326
C. Boehm et al.	MeV dark matter: has it been detected ?	2004, PhRvL 92, 1301	206
A.J. Bird et al.	The 3rd IBIS/ISGRI soft gamma-ray survey catalogue	2007, ApJS 170, 175	166
P. Jean et al.	Early SPI/INTEGRAL measurements of 511 keV line emission from the 4th quadrant of the Galaxy	2003, A&A 407, 55	160
J. Knödlseder et al.	The all-sky distribution of 511 keV electron-positron annihilation emission	2005, A&A 441, 513	150
J. Knödlseder et al.	Early SPI/INTEGRAL constraints on the morphology of the 511 keV line emission in the 4th galactic quadrant	2003, A&A 411, 457	125
R. Diehl et al.	Radioactive ^{26}Al from massive stars in the Galaxy	2006, Nature 439, 45	124
J.F. Beacom & H. Yüksel	Stringent Constraint on Galactic Positron Production	2006, PhRvL 97, 1102	97
P. Jean et al.	Spectral analysis of the Galactic e^+e^- annihilation emission	2006, A&A 445, 579	94
A.J. Bird et al.	The 2nd IBIS/ISGRI soft gamma-ray survey catalogue	2006, ApJ 636, 765	93

as of 7 June 2010