

SphinX mission summary

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OUTLINE

About Sphinx

Sphinx database summary and status

Sphinx data analysis tools

SphinX – team



SRC PAS:

Principal Investigator: **Janusz Sylwester**

Project Manager: **Mirek Kowalinski**

Project Constructor: **Jarek Bakała**

Project Scientist: **Szymon Gburek**

Co-I: **Marek Siarkowski, Barbara Sylwester, Zbigniew Kordylewski, Piotr Podgórski, Witold Trzebiński, Stefan Płoceniak, Anna Kępa**



FIAN:

Sergey Kuzin, TESIS PI, SphinX Co-I



MEPhI:

Yury Kotov, CORONAS-Photon Project Manager, SphinX Co-I



AI CzAS:

Franta Farnik, SphinX Co-I



INAF, Palermo University:

Fabio Reale, SphinX Co-I



UCL, London:

Ken Phillips, SphinX Scientist Co-I



NASA GSFC:

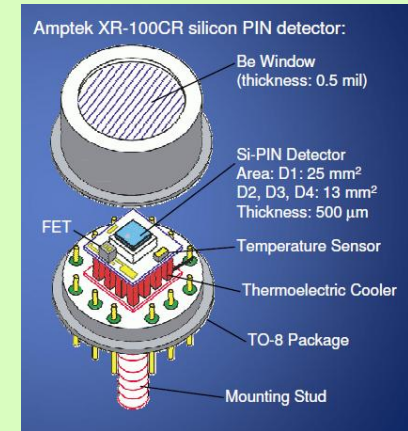
Brian Dennis, SphinX Scientist Co-I

SphinX Solar Photometer in X-rays



~4kg/~10W (peak)
~1 keV - ~15 keV
Time resolution ~6 μ s

DETECTORS

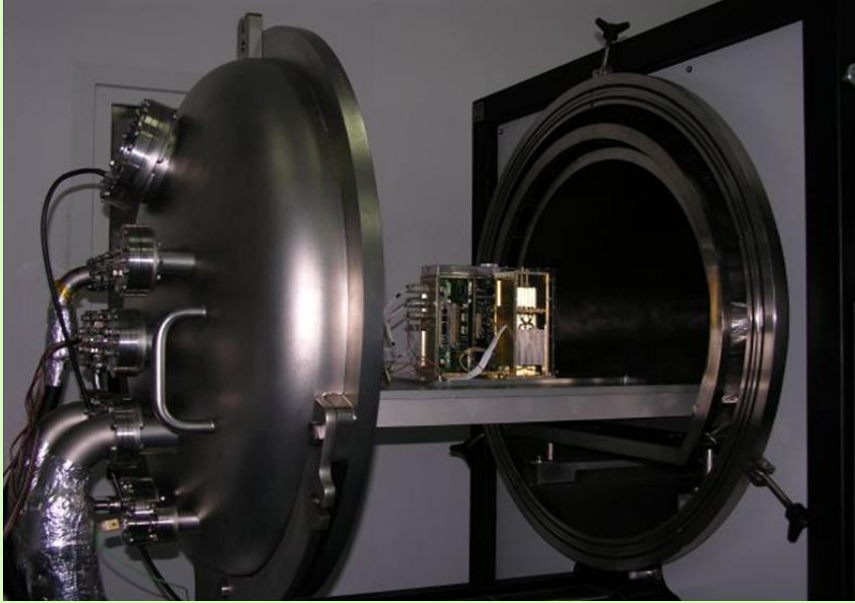


AMPTEK
Si PIN-DIODES
XR-100CR

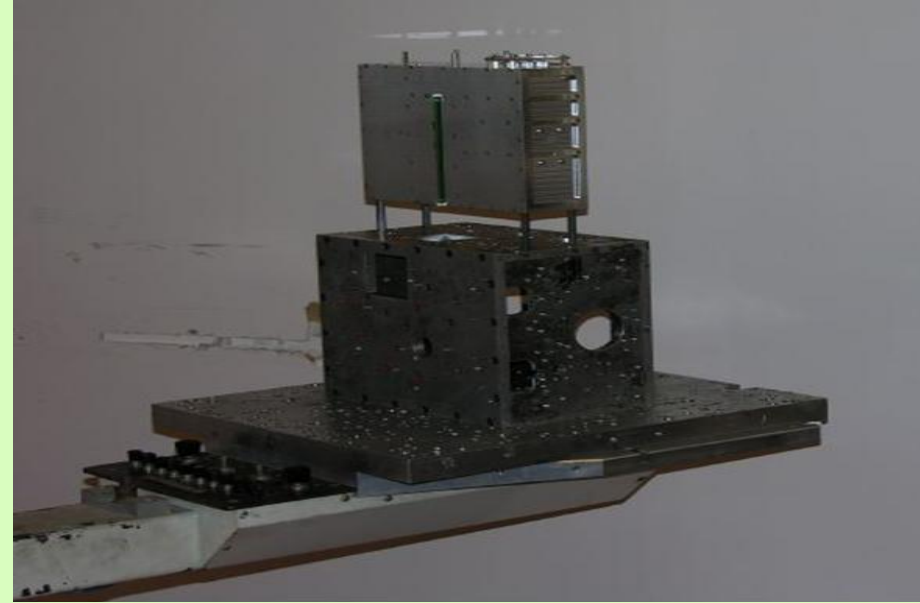
Launch: January 30, 2009 at 13:30 UT, Plesetsk, Russia
Mission duration: February 20, 2009 – November 29, 2009
CORONAS-Photon satellite

SphinX tests and calibrations

TV tests in Warsaw 2007



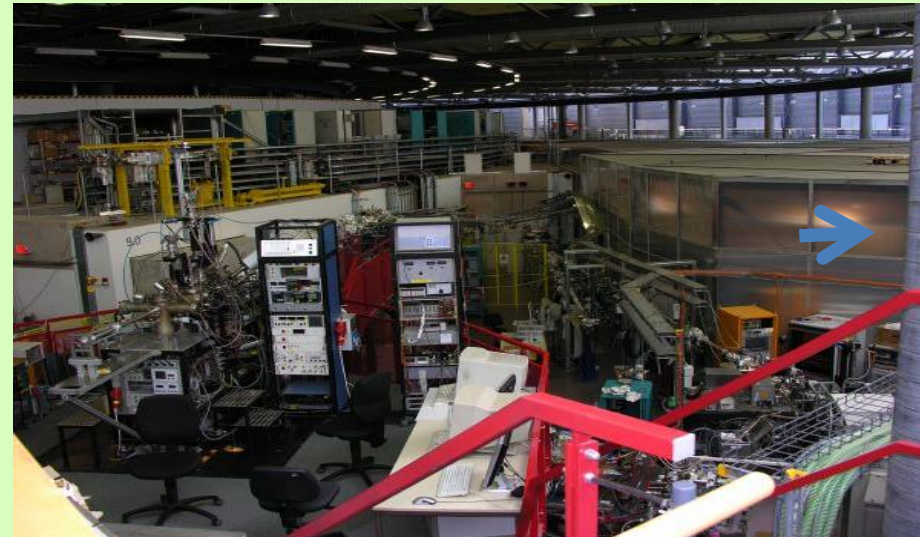
Vibration/Acceleration/Acoustic, Prague 2007



Efficiency and response XACT, Palermo, 2007



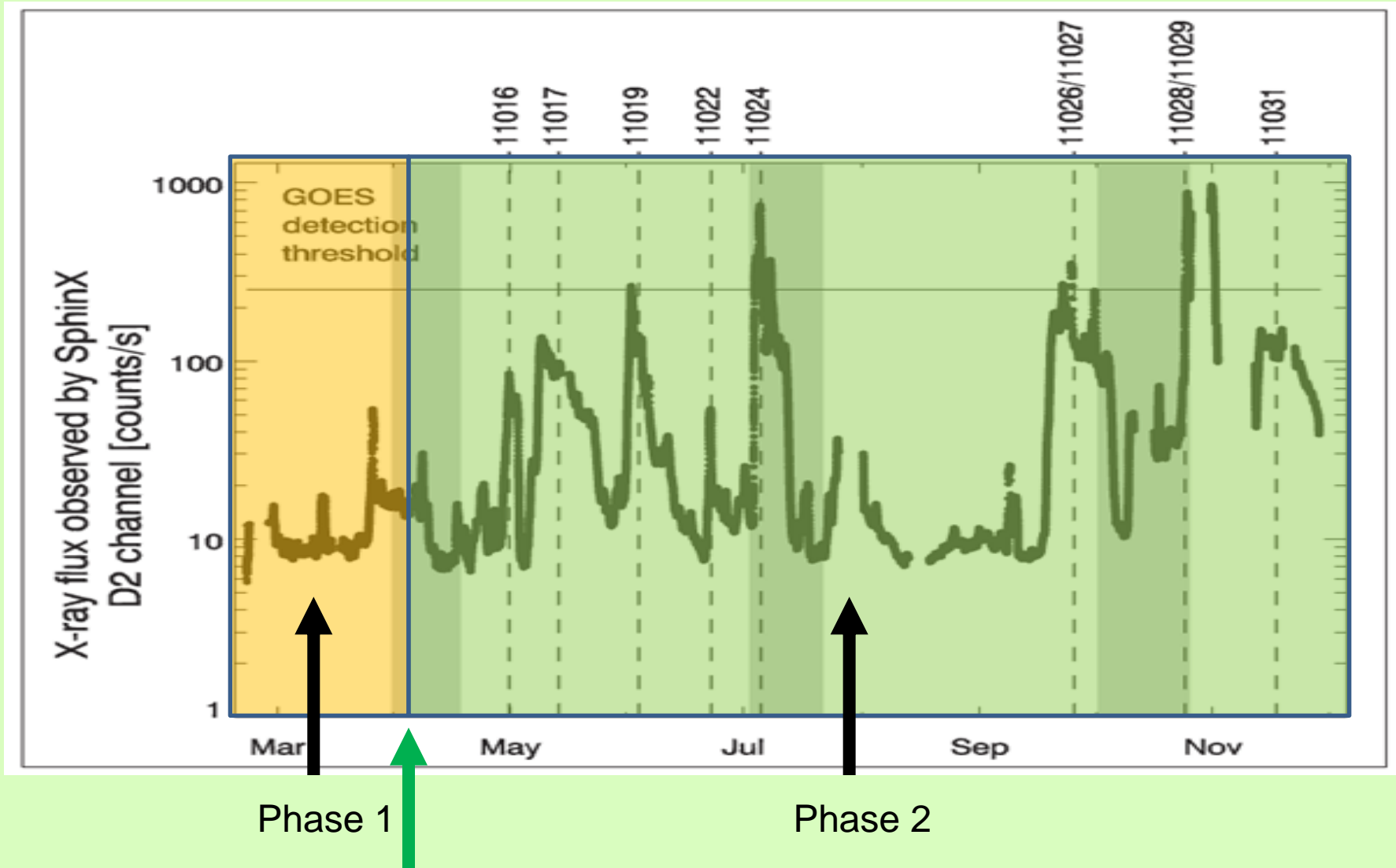
Final calibration experiment BESSY II, Berlin 2008



SphinX

The first fully
tested and calibrated
solar spectrometer

SphinX mission phases



April 6, 2009 optimum on-board operation and data collection strategy achieved

SphinX data – summary status

- Measurements for very low solar activity
- February 20, 2009 – November 29, 2009
- Mission phase II reduced to Level -1
- Level -1 data available in FITS format
- All data available as event lists

EVENT = (Tphot, Ephot)
~ 5×10^9 EVENTS registered

SphinX data distribution map

SphinX dedicated
data servers
at PI, Co-is institutions
All data

Moscow LPI

SRC PAS, Wrocław, Poland

AI ASCR Ondrejov,
Czech Republic

UNIGRATZ, Austria
SphinX event catalog

DSFA, University of Palermo

Synchronized SphinX data servers

http://156.17.94.1/sphinx_catalogue/SphinX_cat_main.html

http://147.231.104.188/catalog/SphinX_cat_main.html

<http://www-sphinx.astro.unipa.it/>

in Wrocław, Poland

in Ondrejov, Czech Republic

in Palermo, Italy

SphinX data catalog website

SphinX data catalogue

All SphinX data available here are Level_1 data.



2009																															
January	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
February	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
March	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
April	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
May	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
July	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
August	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
September	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
October	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
November	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
December	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Last update: Wed May 25 21:23:23 2011 (UTC+2)

contact:

[Szymon Gburek](#) - Any questions concerning content of data from SphinX catalogue.

[Piotr Podgorski](#) - Report any technical problems with SphinX data catalogue.

New update
till the end of the mission

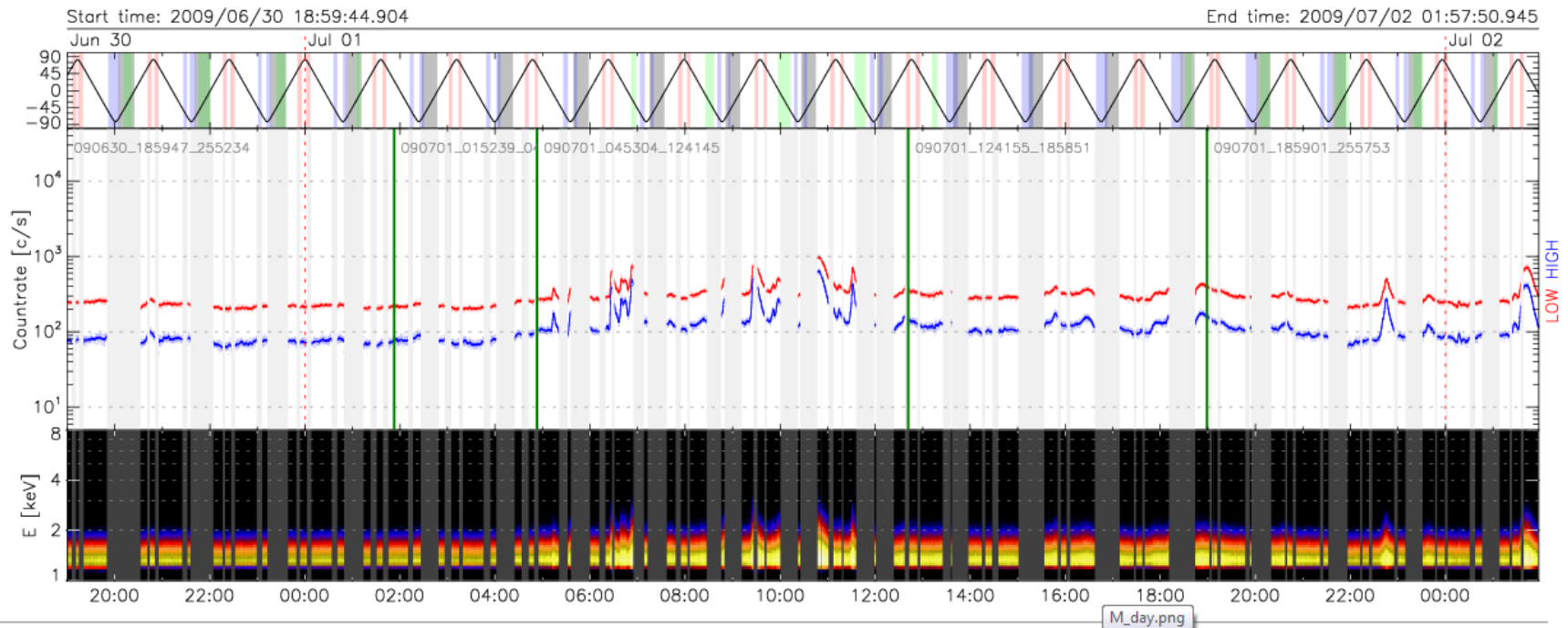


http://156.17.94.1/sphinx_l1_catalogue/SphinX_cat_main.html

Example of SphinX daily summary page

SphinX data catalogue

< 01 July 2009 >



SphinX Level_1 data:

[090630_185947_255234](#) (152.94 MB) [090701_015239_045254](#) (70.109 MB) [090701_045304_124145](#) (184.49 MB) [090701_124155_185851](#) (150.19 MB) [090701_185901_255753](#) (169.01 MB)

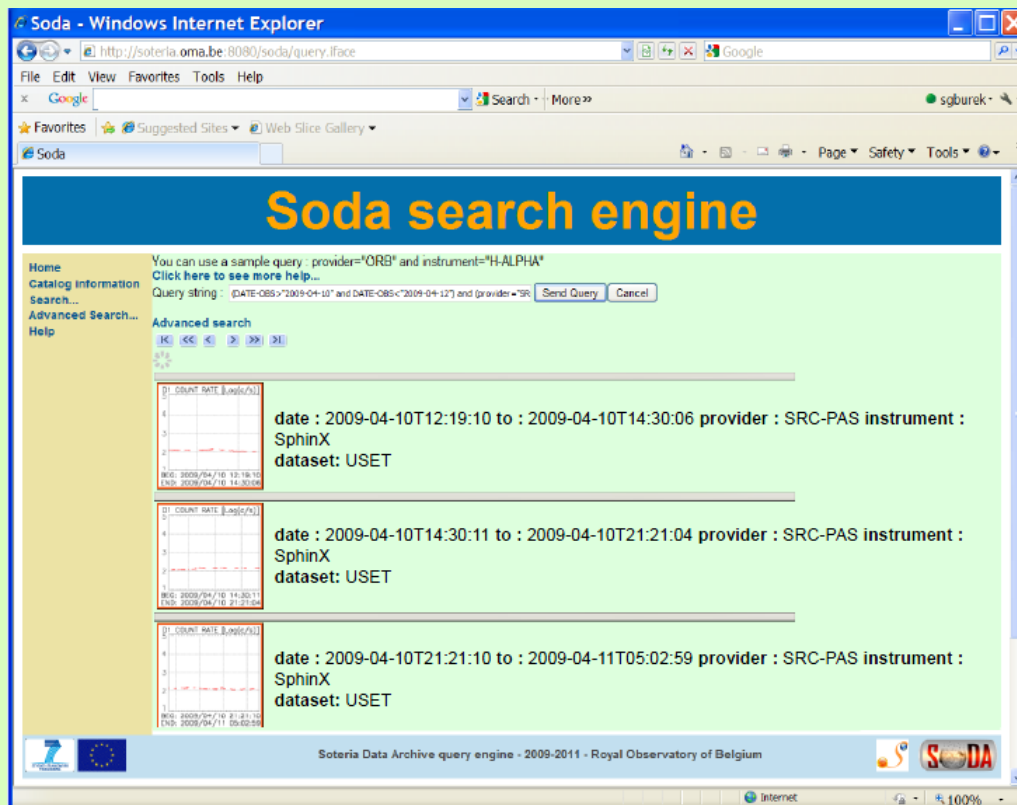


Download FITS files (OGIP format)

SphinX data goes to Virtual Observatories

SODA – SOTERIA DATA ARCHIVE European VSO maintained at ROB

Proposed layout of SphinX interface in SODA



The screenshot shows a web browser window titled "Soda - Windows Internet Explorer" with the address bar displaying "http://soteria.oma.be:8080/soda/query.iface". The page content includes a navigation menu on the left with links for Home, Catalog information, Search..., Advanced Search..., and Help. The main area features a search interface with a "Soda search engine" header, a sample query instruction, a query string input field containing "(DATE-OBS>'2009-04-10' and DATE-OBS<'2009-04-12') and (provider='SRC'", and a "Send Query" button. Below the search area, three search results are displayed, each with a small plot of "COUNT RATE [log(1/s)]" and associated metadata:

- Result 1: date : 2009-04-10T12:19:10 to : 2009-04-10T14:30:06 provider : SRC-PAS instrument : SphinX dataset: USET
- Result 2: date : 2009-04-10T14:30:11 to : 2009-04-10T21:21:04 provider : SRC-PAS instrument : SphinX dataset: USET
- Result 3: date : 2009-04-10T21:21:10 to : 2009-04-11T05:02:59 provider : SRC-PAS instrument : SphinX dataset: USET

The footer of the page reads "Soteria Data Archive query engine - 2009-2011 - Royal Observatory of Belgium" and includes logos for the Royal Observatory of Belgium and SODA.

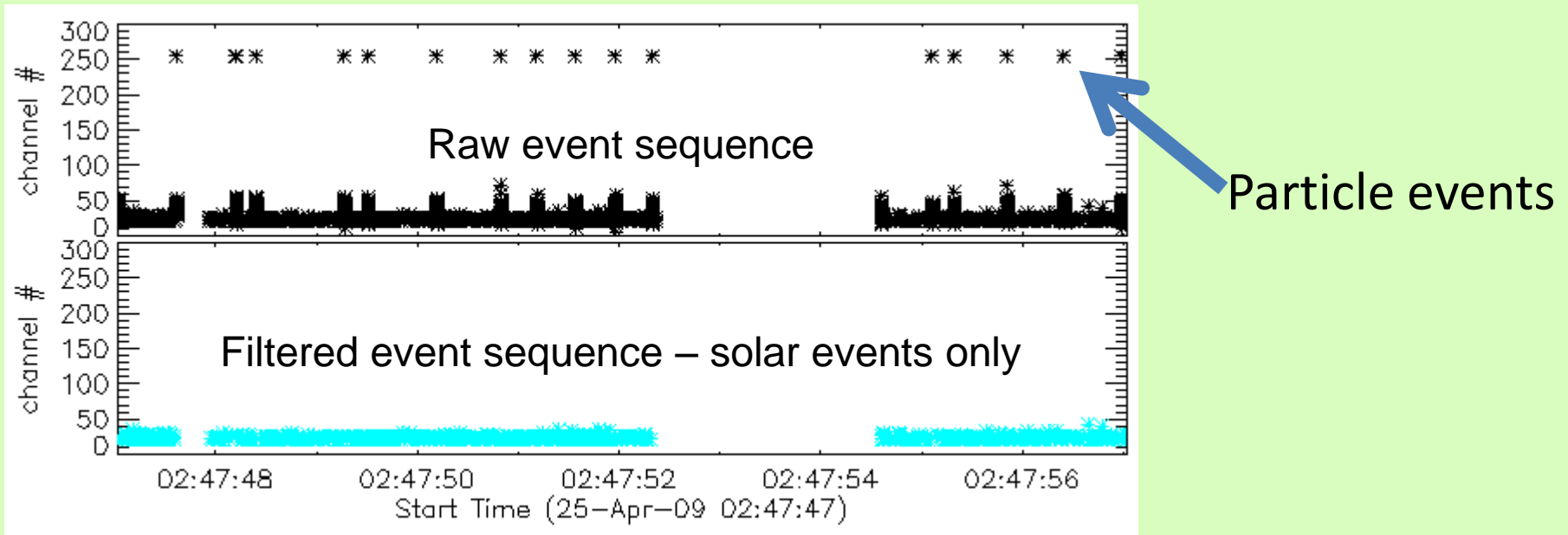
SphinX - SODA READY

- SphinX Level-1 FITS
- Visualisations – LC
- Server & software

Contribution to D6.2

US VSO for SphinX – in preparation

SphinX data analysis strategy



- Filter out/select events of interest using **FLAGS**
- Construct higher level data products (spectra, lightcurves)
- Add calibration information (detector response matrix)
- Perform analysis with spectral analysis packages.

SphinX tools

Existing data analysis tools. For example FTOOLS ...

<http://heasarc.gsfc.nasa.gov/docs/software.html>

The screenshot shows the HEASARC website interface. At the top left, it displays the NASA logo and the text "GODDARD SPACE FLIGHT CENTER" and "Smithsonian Astrophysical Observatory". To the right, there are links for "Help/FAQ", "What's New", "Site Map", and "NASA Homepage". A search bar is present with the text "Search enter search terms" and a link to "Advanced Search". Below this is a "HEASARC Quick Links" dropdown menu showing "--Quick Links--".

The main navigation bar includes: HEASARC HOME, OBSERVATORIES, ARCHIVE, CALIBRATION, SOFTWARE (highlighted), TOOLS, and STUDENTS / TEACHERS / PUBLIC.

The central banner features a table of data, the text "NASA's HEASARC: Software", and the word "Xanadu" in a stylized font. The table data is as follows:

Chi-Squared	Lvl	Fit param #	1	2	3
924.178	-2	5.087	5.076	0.4056	
305.507	-2	4.525	3.791	0.1249	
140.460	-2	2.930	3.367	6.5553E-02	
			2.244	1.4635E-02	
			1.2279E-02		

Below the banner is a row of software tool links: FITSIO, FTOOLS, FV, HEASOFT, HERA, MAKI, PIMMS, PROFIT, XANADU, XSELECT, XSTAR, ASTRO-Update, and FITS.

... or SphinX IDL dedicated software provided by the instrument team

SphinX IDL software components developed at SRC-PAS

sphinx_select.pro – filtering tool

sphinx_lightcurve – event list to lightcurve conversion tool

sphinx_spectrum – event list to spectra conversion tool

Detector Response Matrix DRM is provided in a FITS file

```
data = mrdfits(filename, i, hdr, status=status)
```

↑
IDL structure

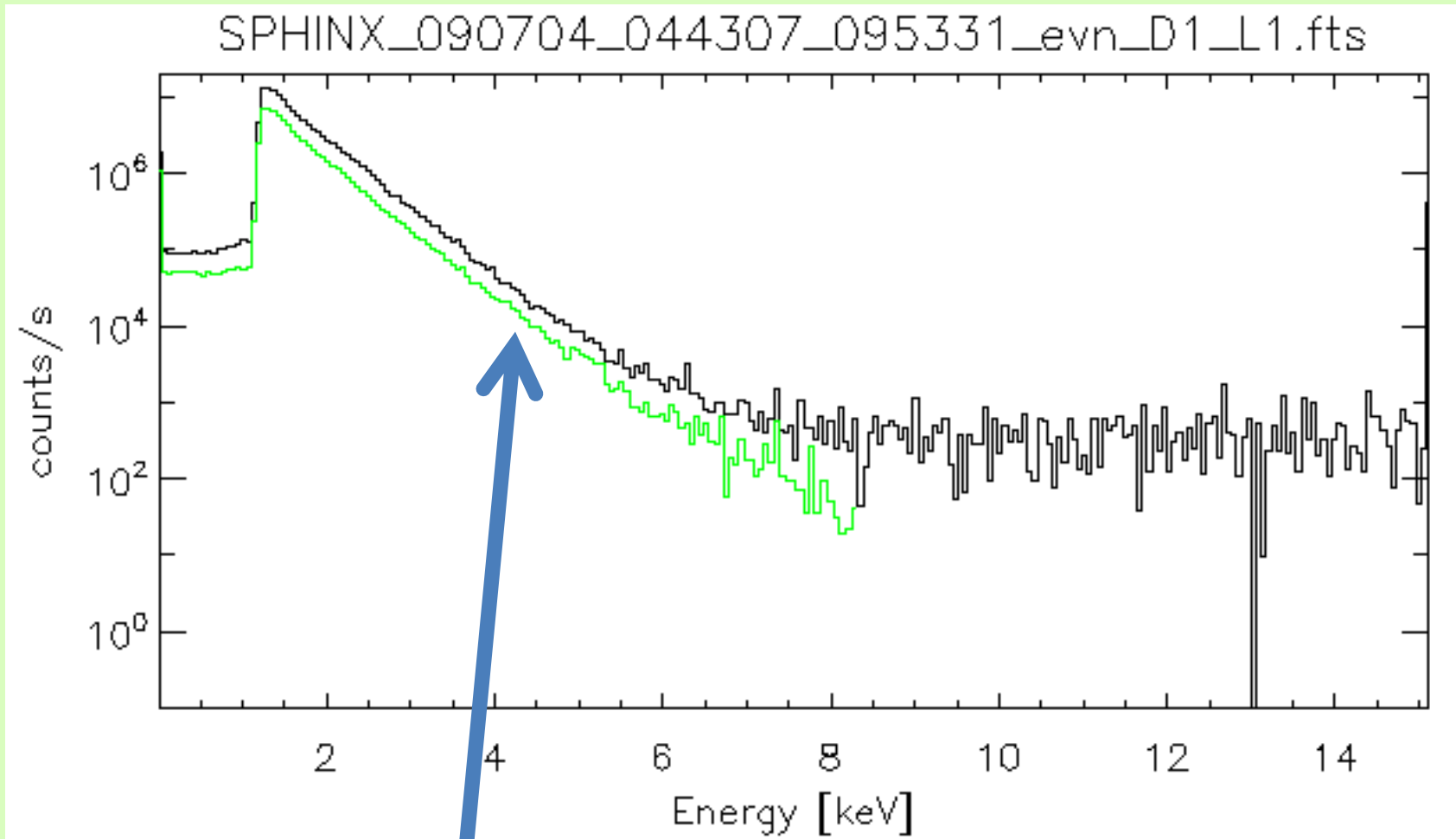
↗
Header – string array with
description of data

i=0 - primary header, data =0
i=1 – events HDU
i=2 – exposure HDU
i=3 – GTI HDU

```
IDL> pm, hdr
```

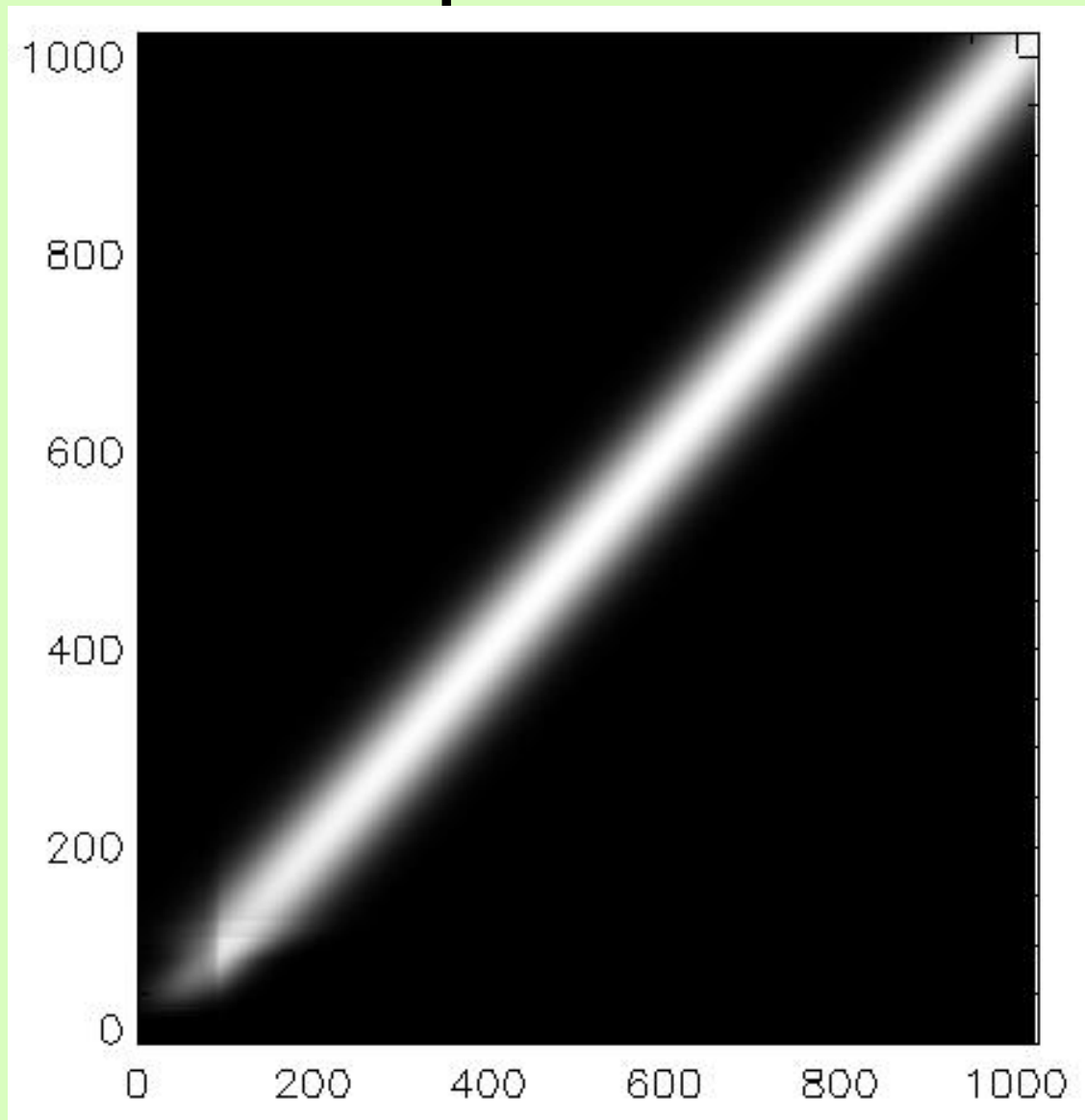
```
IDL> help, data, /st
```

SphinX data filtering and analysis - example



Clean filtered spectrum of solar origin

Add Sphinx DRM



Analysis in OSPEX

SPEX Main Window

File Plot_Control Window_Control Help

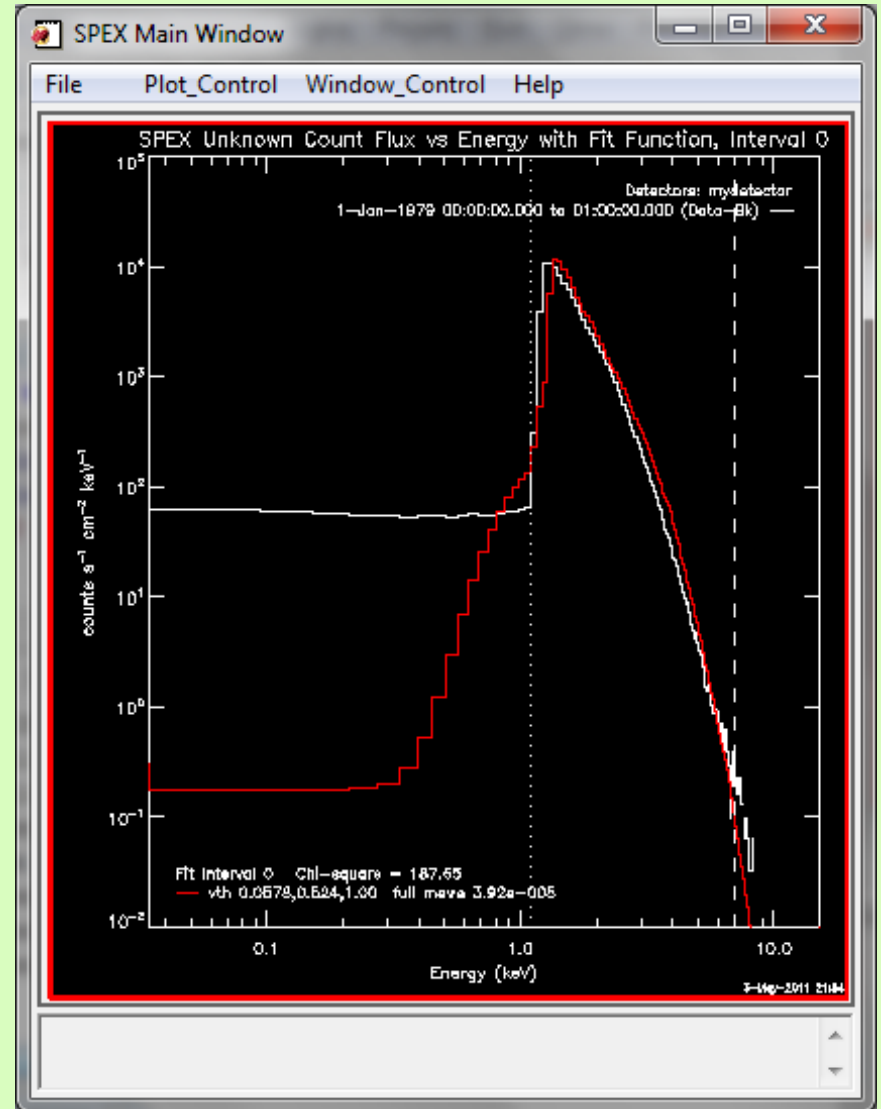
OSPEX

Spectral Data Analysis Package

Use the buttons under File to:

1. Select Input Data Files
2. Define Background and Analysis Interval and Select Fit Function Components
3. Fit data
4. View Fit Results
5. Save Session and Results

Use Plot_Control buttons to change display of current plot.
Use Window_Control buttons to redisplay previous plots.



SphinX database & environment

- Database - D3.5 finished
- Dedicated software developed
- Tools for data processing
- Spectral analysis package OSPEX
- FTOOLS, XSPEC, XMM Newton SAS TOOLS works as well

SphinX – scientific analysis areas

Quiet Sun analysis in X-rays (observed as a star)

Investigations of active regions

Small events investigations (GOES A-C class)

Determination of T, EM

Relationship between solar X-ray flux variability and CME

Identification and analysis of very small solar flares/brightenings

Monitoring of Earth energetic particle distribution

Cross-comparison with other instruments measurements

Determine upper limits for coupling constant - Axions

THANK YOU