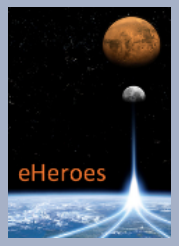



Science with SphinX and RESIK X-ray solar spectrometers within a framework of eHEROES.

Szymon Gburek & SRC-PAS Team

eHEROES First Annual Meeting Leuven - February 5-7, 2013

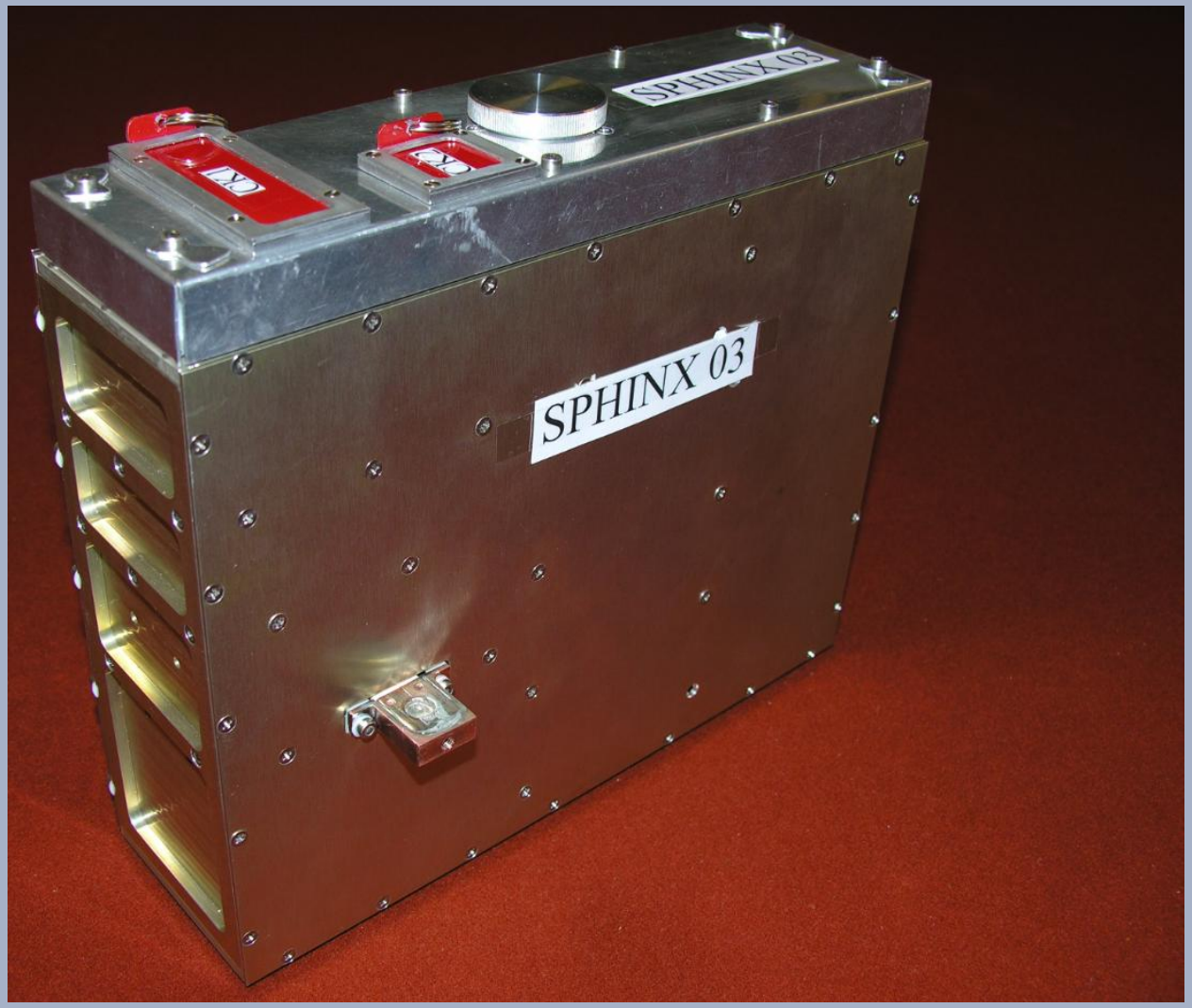
Eheroes tasks in which SRC-PAS is involved

T2.4 Study of the plasma heating and eruptive processes (nanoflares, bright points, micro-dimmings etc.) in small-scale coronal structures and their relevance with transient slow solar wind (Lead – LPI, KUL, ROB, UCL, SRC-PAS)

Task 3.4: Flare plasma: plasma composition, thermal energy, FIP composition bias (Lead - SRC-PAS, participants - UCL, LPI)

Task 4.2 Parameters for spatial-temporal distributions of flares and CMEs (Lead - UOulu, participants - ROB, SRC-PAS)

Task5.5. Particle environmental impacts on space-based instruments on LEO high-latitude orbits.
(Lead - SRC PAS, participants - LPI, ROB and outer partners)



SphinX

Satellite: *CORONAS*-Photon

Data: spectra, lightcurves, 1.0 keV – 15 keV (0.8 Å - 2.4 Å)

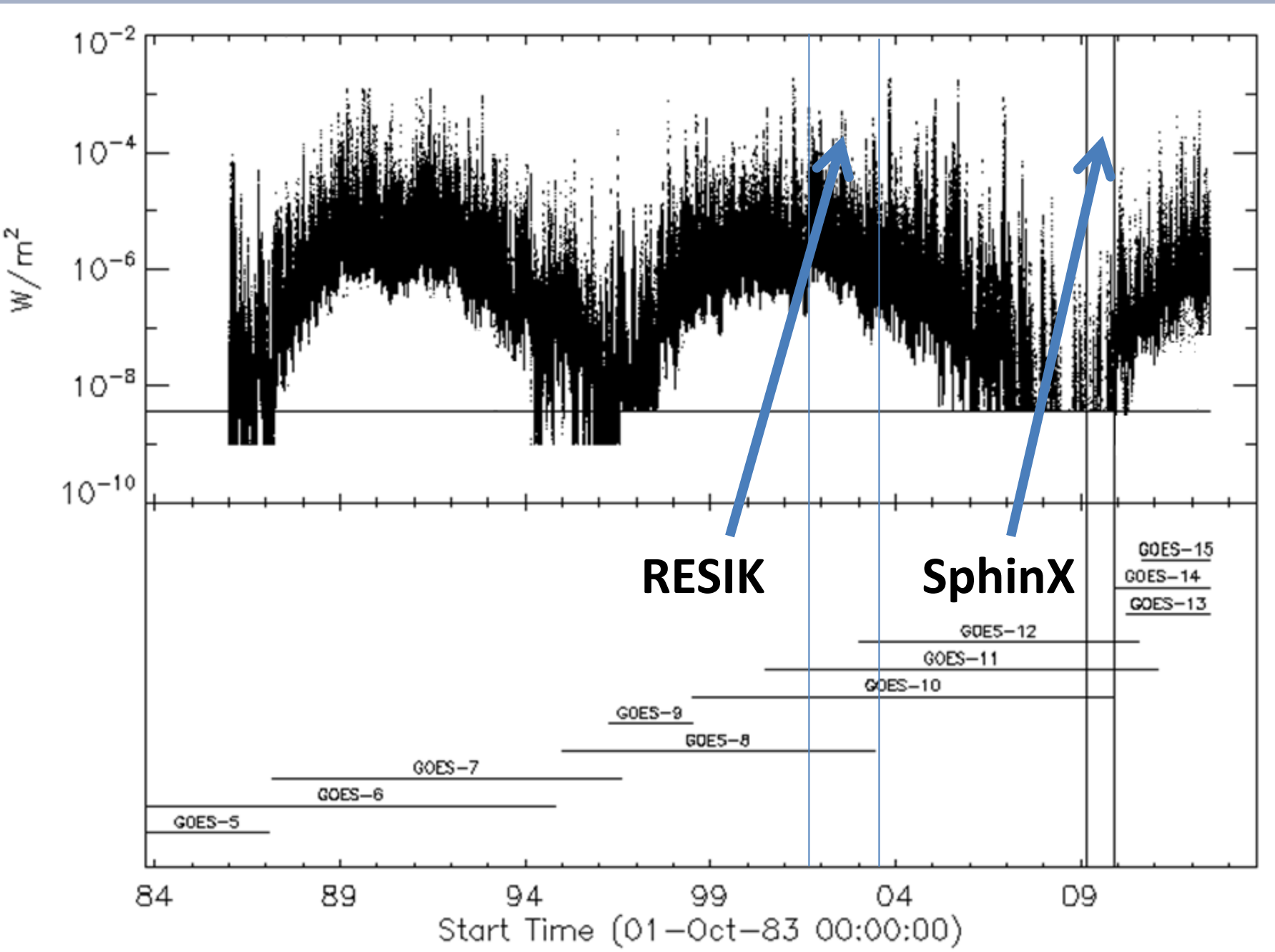
Operation: Feb 20, 2009 - Nov 28, 2009

RESIK – bent crystal spectrometer

Satellite: *CORONAS-F*

Data: spectra, lightcurves, 2.0 keV - 3.8 keV (3.3 Å - 6.1 Å)

Operation: Aug 24, 2001 - May 22, 2003


10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-10}
W/m^2
RESIK
SphinX
GOES-15
GOES-14
GOES-13
GOES-12
GOES-11
GOES-10
GOES-9
GOES-8
GOES-7
GOES-6
GOES-5
84
89
94
99
04
09
Start Time (01-Oct-83 00:00:00)

SphinX small X-ray event catalogue

List of flares and brightenings with their parameters:

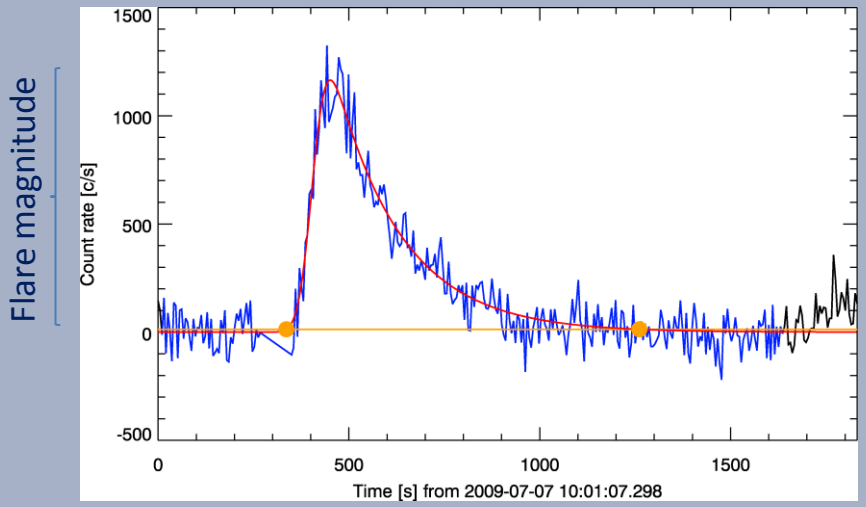
PARAMETERS (determined from formula fitting):

T_{start} time of start
T_{end} time of end
T_{max} time of maximum
Flare magnitude
Two parameters of linear background

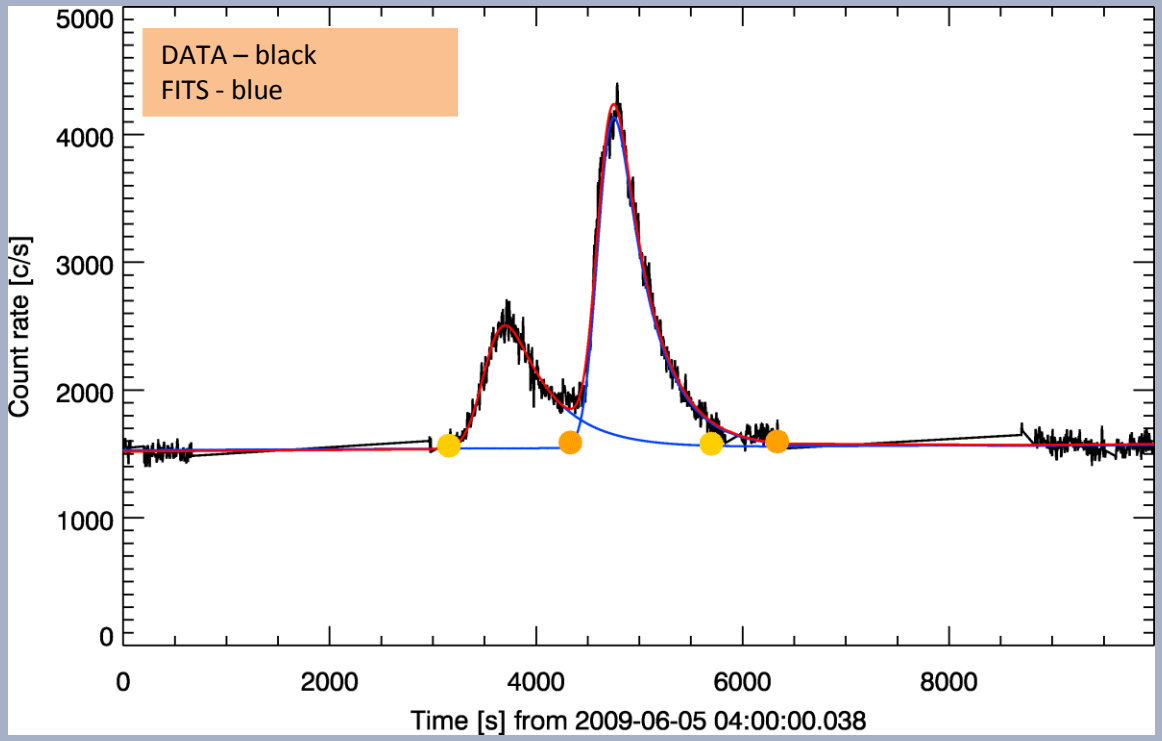
PHYSICAL PARAMETERS:

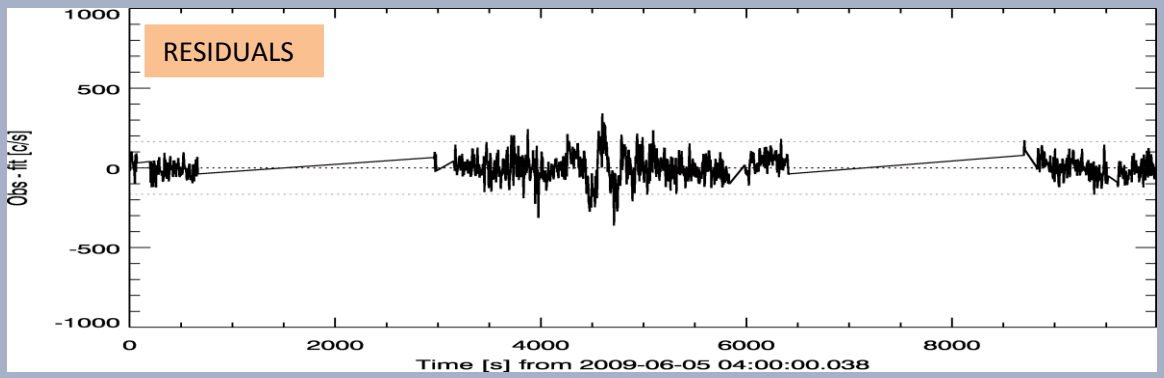
Temperature
Emission Measure
Flux

FLARE AFTER BACKGROUND SUBTRACTION

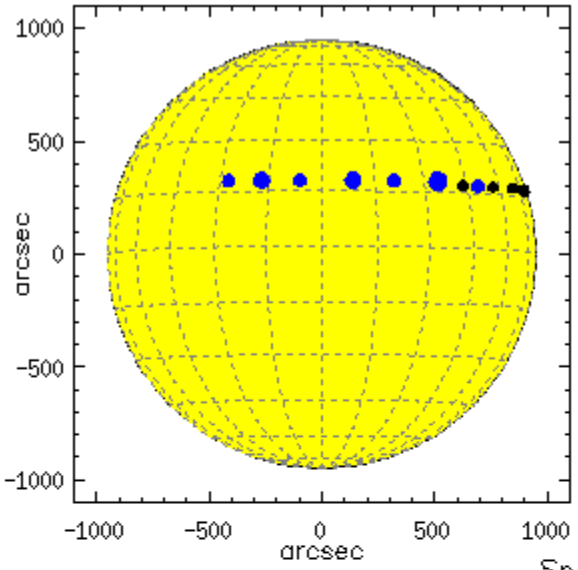


SphinX Event Catalogue
Decomposition into elementary energy releases



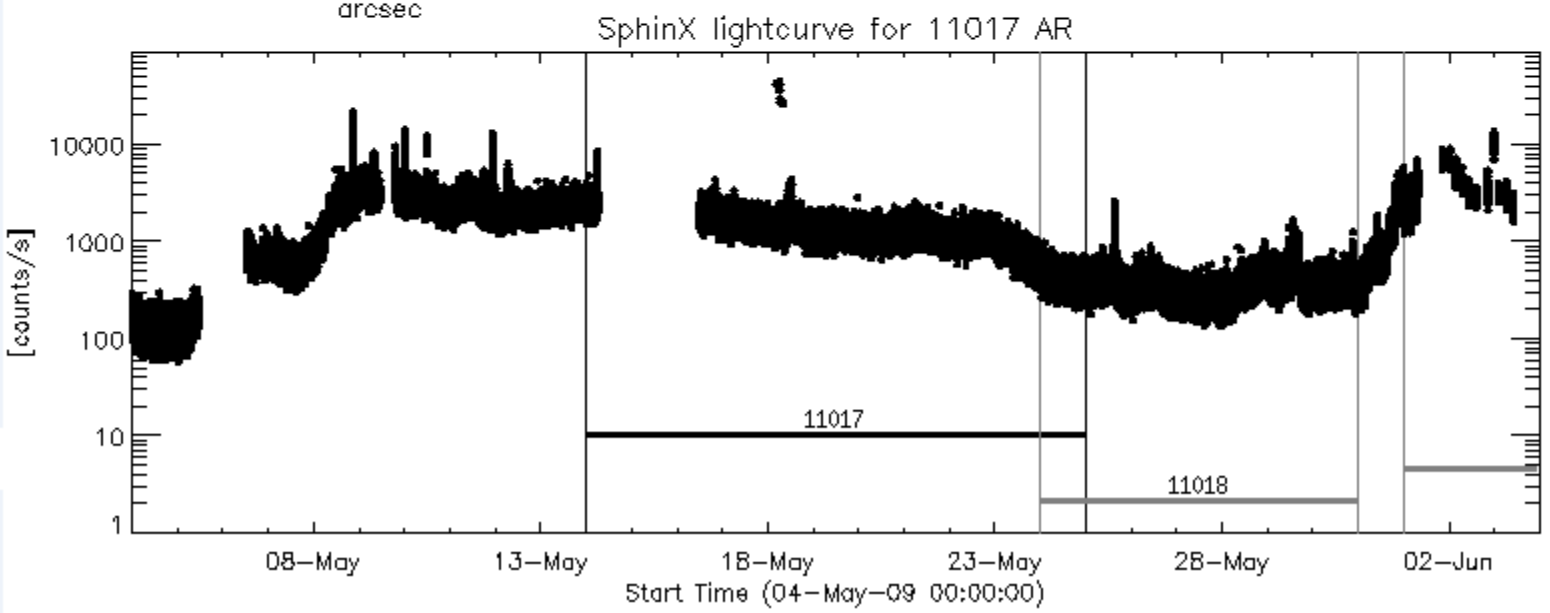


Active region investigation with SphinX data



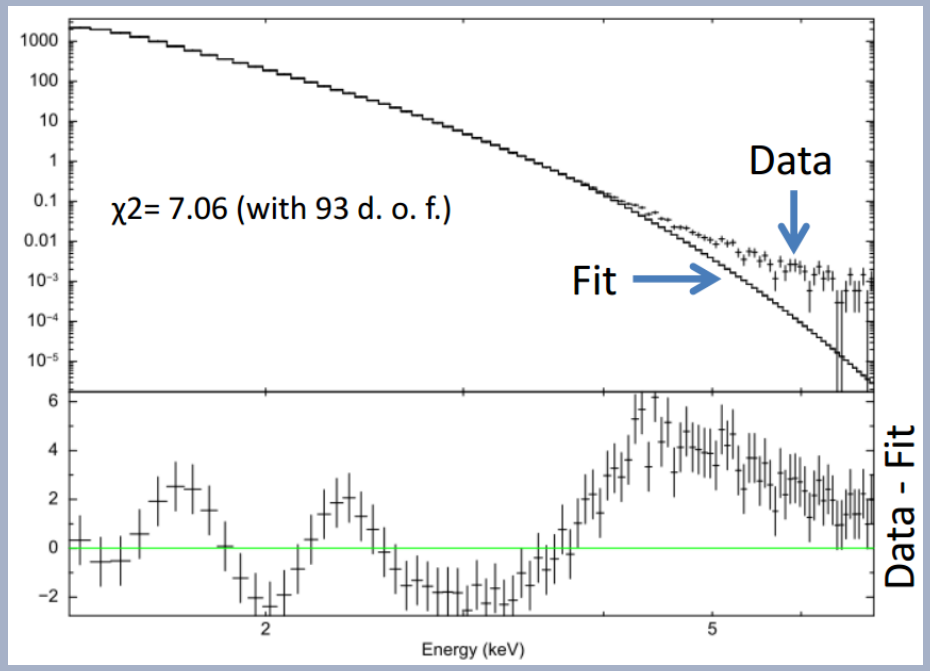
AR 11017 USAF/NOAA report

Id	Loc. date	Loc.	L0	Area	Z	LL	NN	Type	Mag. Type
1	2009-05-14	N18E27	190	0010	Bxo	06	02	ARS	β
2	2009-05-15	N18E17	186	0020	Bxo	07	08	ARS	β
3	2009-05-16	N18E06	184	0010	Axx	01	02	ARS	α
4	2009-05-17	N18W09	186	0020	Bxo	03	05	ARS	β
5	2009-05-18	N18W21	185	0010	Bxo	03	03	ARS	β
6	2009-05-19	N18W35	185	0030	Bxo	03	04	ARS	β
7	2009-05-20	N17W50	187	0010	Hrx	00	01	ARS	α
8	2009-05-21	N17W44	187					HaP	
9	2009-05-22	N17W57	187					HaP	
10	2009-05-23	N17W70	187					HaP	
11	2009-05-24	N17W83	187					HaP	
12	2009-05-25	N17W96	187					HaP	

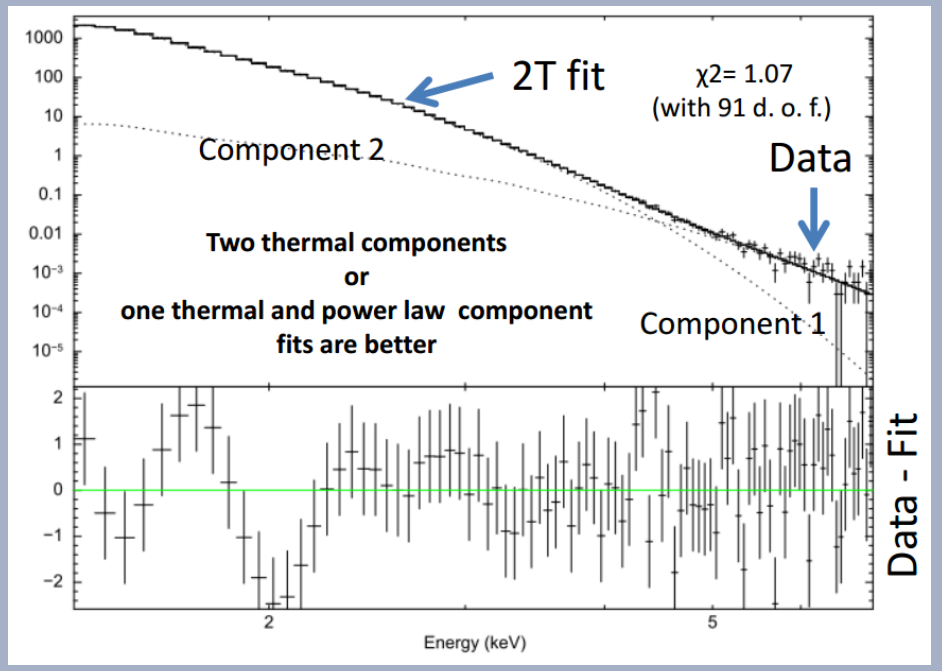


Active of region plasma properties with SphinX spectra
Search for hot component in AR spectra

AR 11017 spectrum – isothermal XSPEC fit



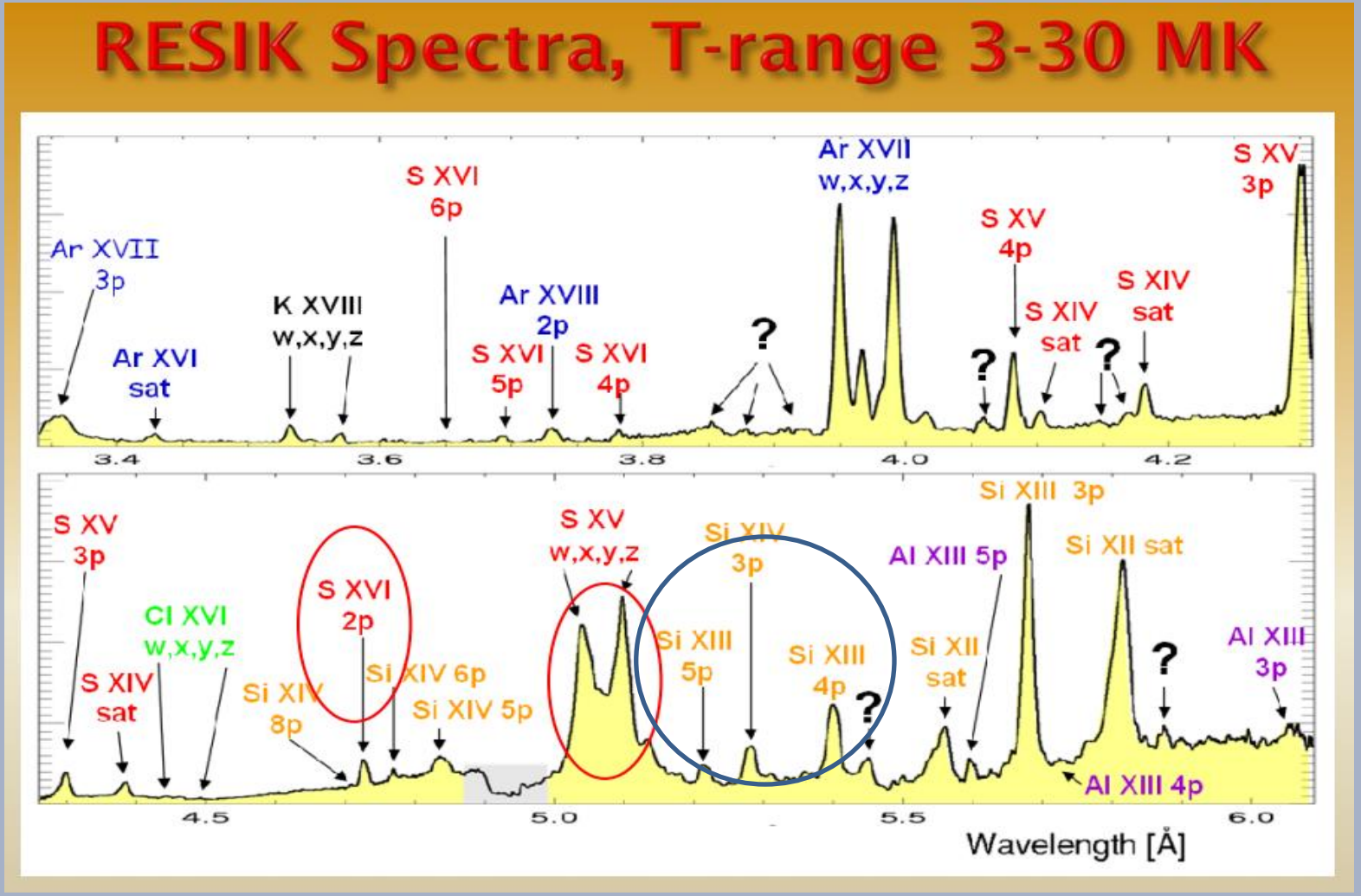
AR 11017 spectrum – multicomponent XSPEC fit



First ionization potential – FIP

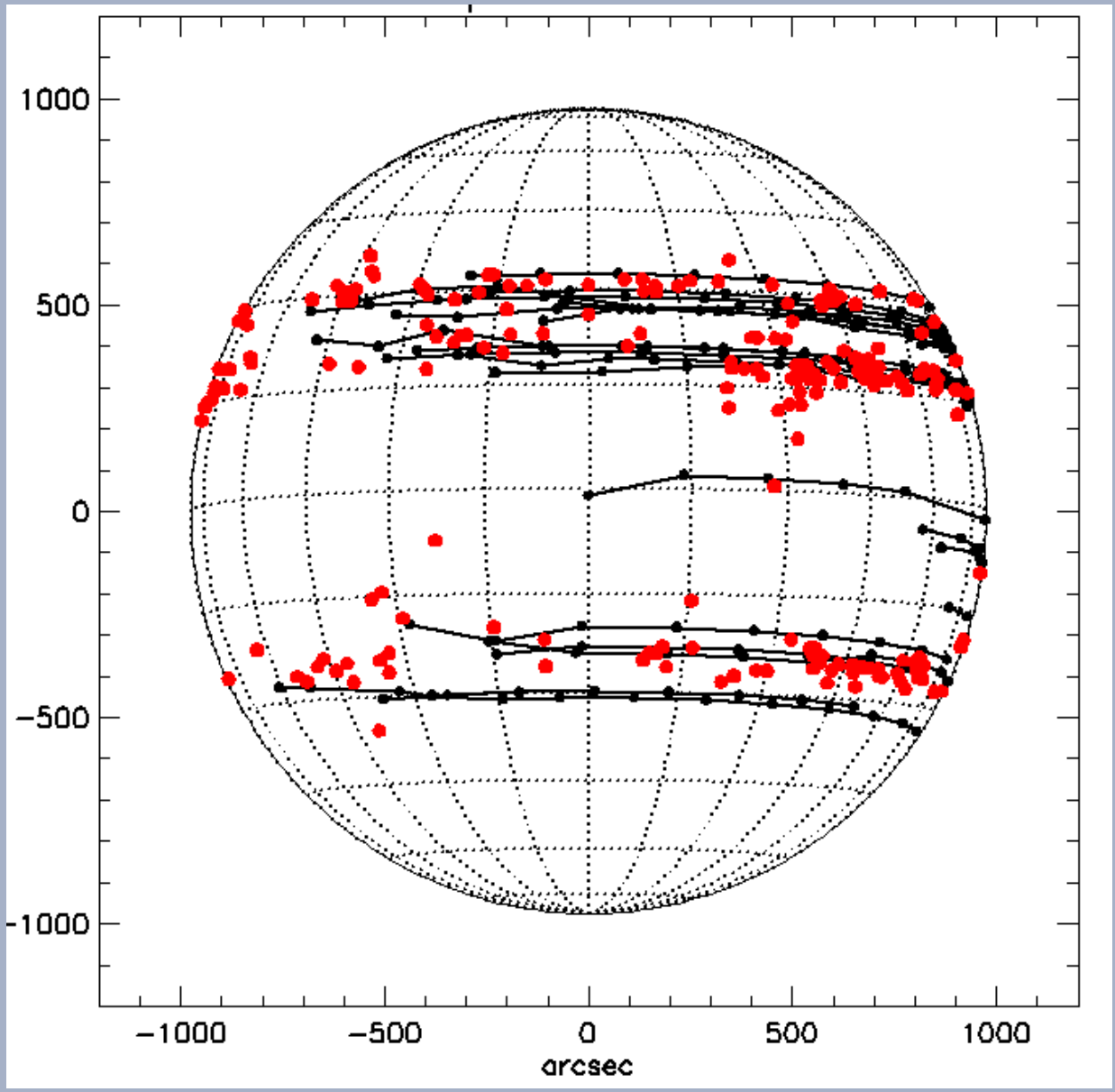
Low-FIP elements have abundances that are enhanced by as much as a factor of four in the corona over their photospheric abundances.

Spectroscopy with RESIK
New results on S and Si abundances and FIP effect.



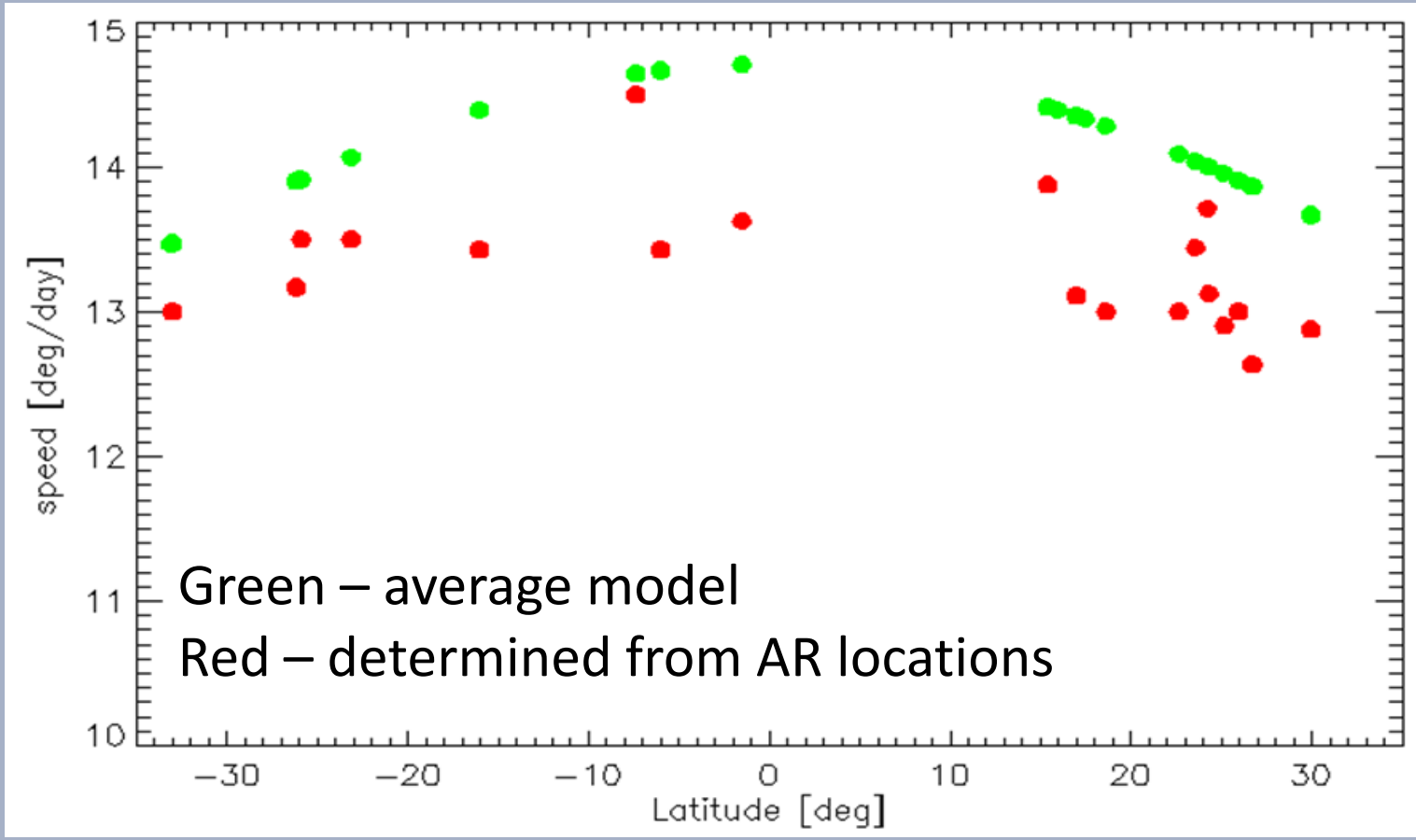
Two new publications for eHEROES on abundances of S, and Si

SphinX – small events, brightenings and AR observations



Preparations for determining optimum rotation parameters

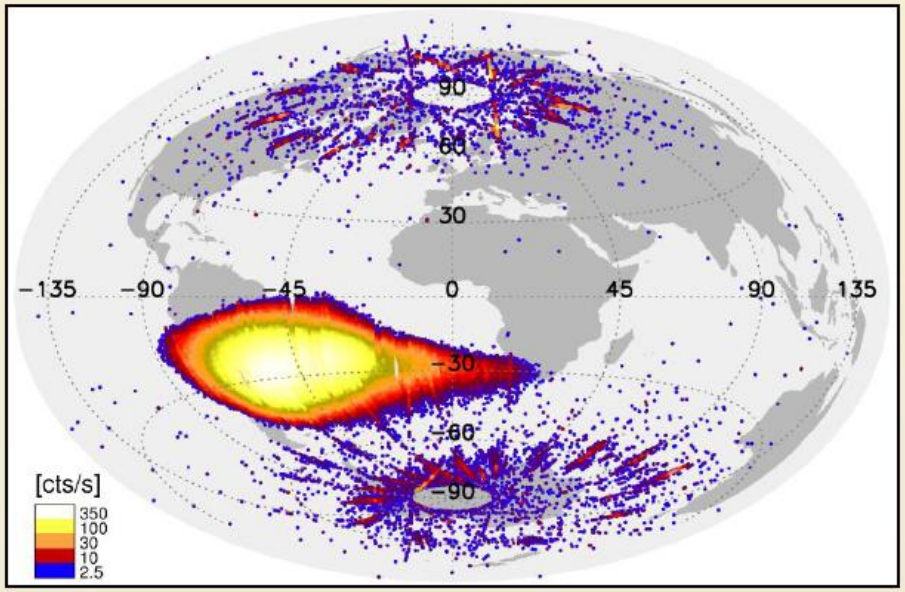
Differential Rotation
Angular velocity during SphinX mission



More accurate locations of flares and brightenings are necessary HRT, STEREO

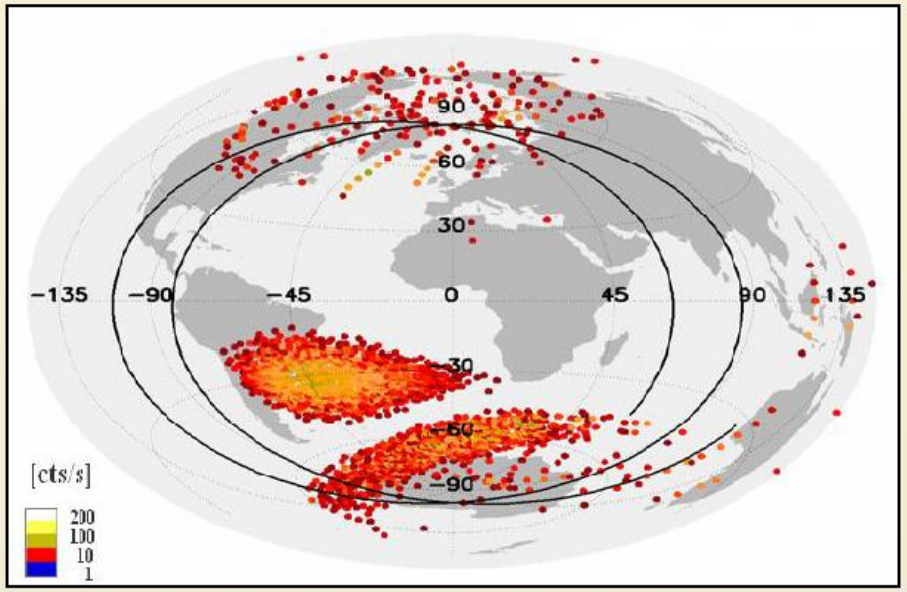
Comparison of earth particle map as seen by RESIK and SphinX

May 2009



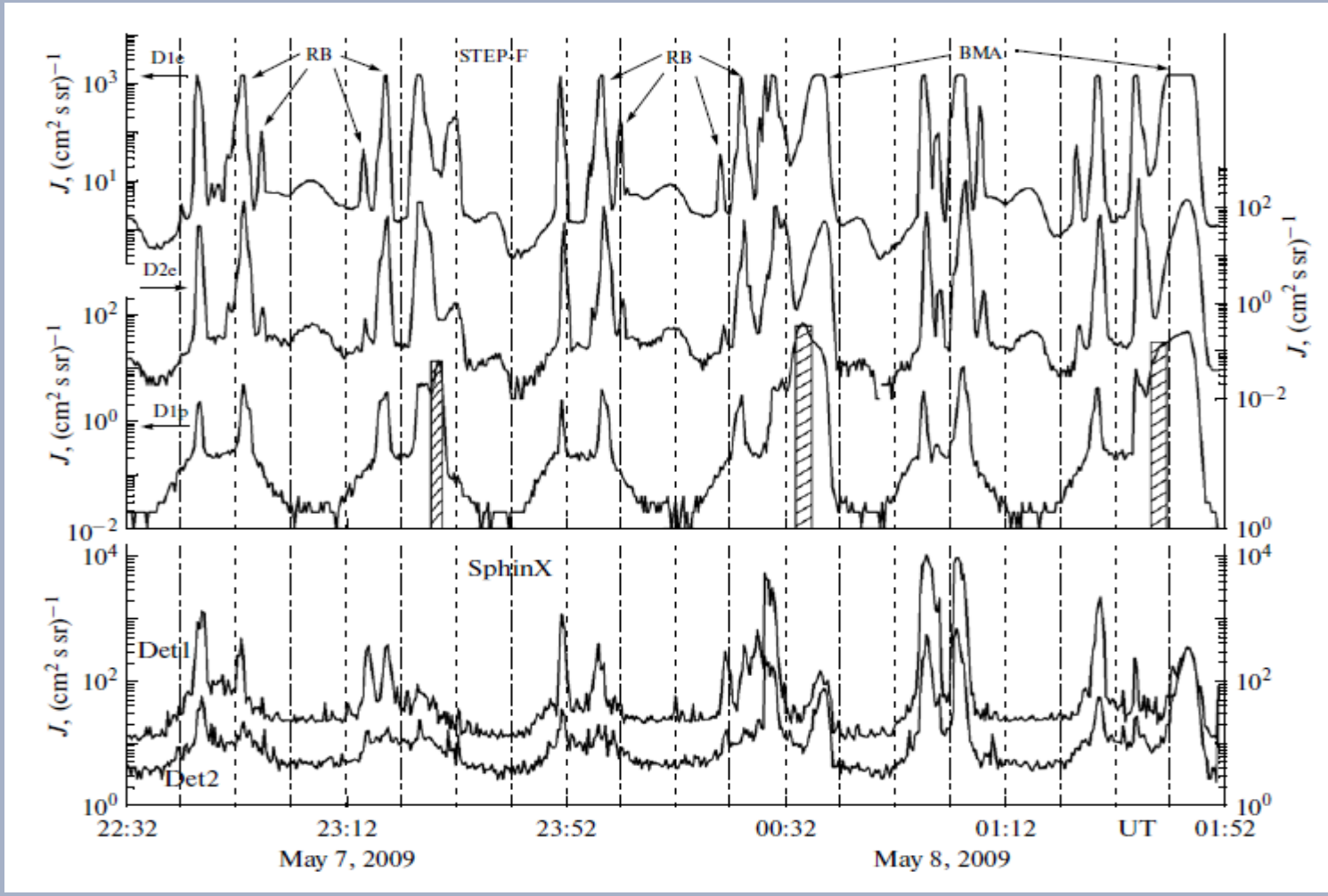
SphinX D1 particle rate

May 2002



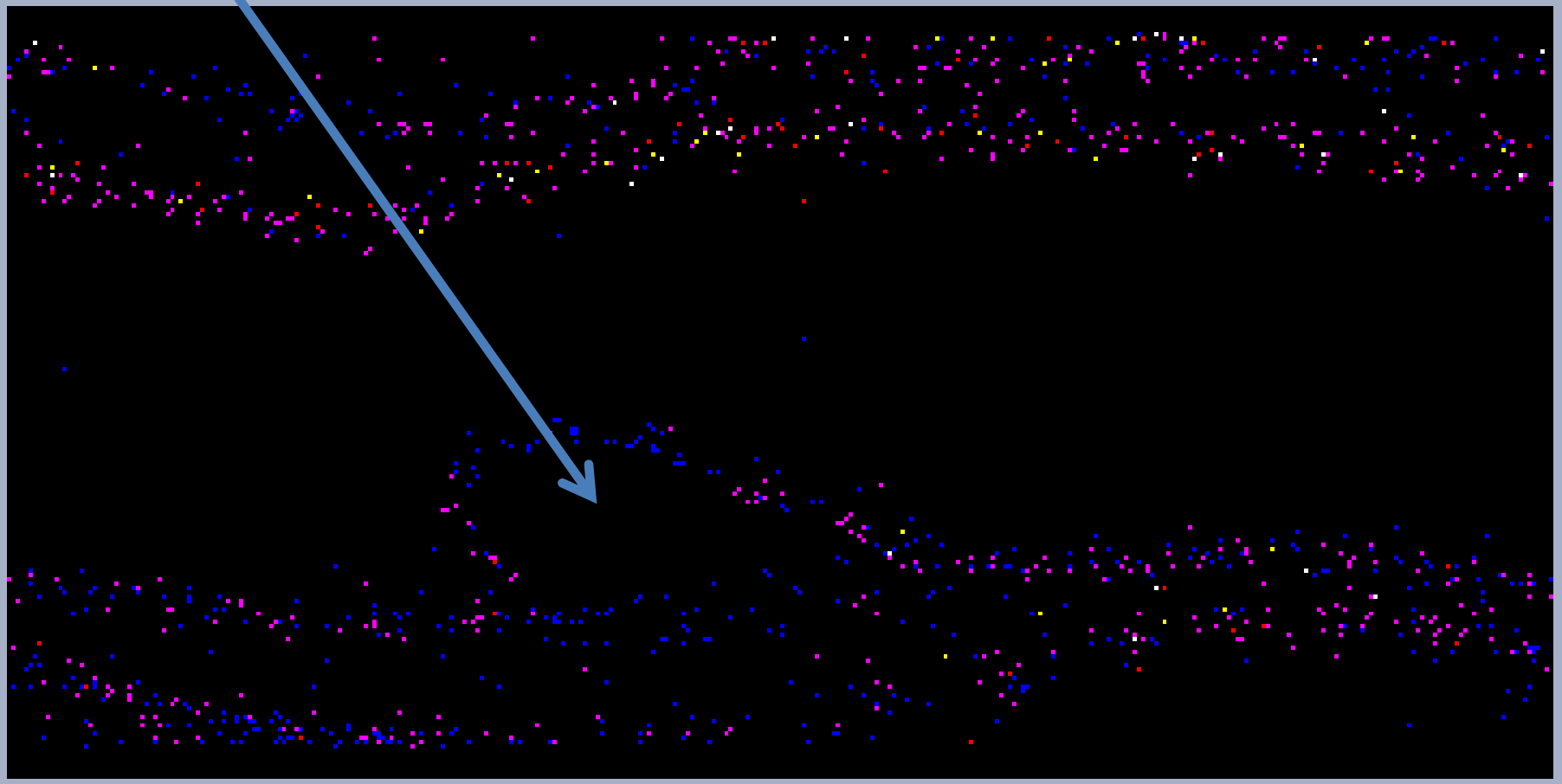
RESIK PIN particle rate

SphinX saw mainly electrons (E> ~500 keV) and secondary gamma radiation



Particle flux measurement
RESIK gas–filled detectors

HV - off



Thank you