



eROSITA and TIGRE

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Outline:

❖ **eROSITA**

❖ **Stars in eROSITA**

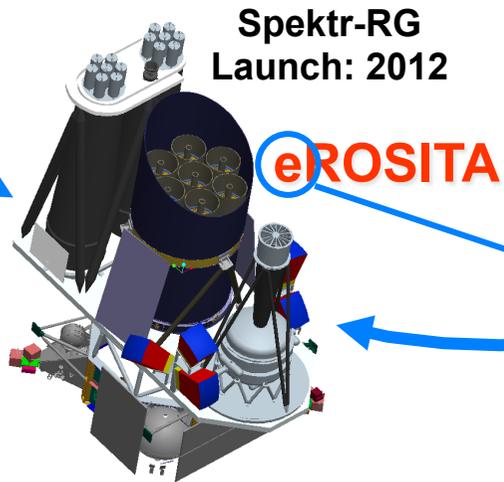
❖ **TIGRE and eROSITA**

Historical Development

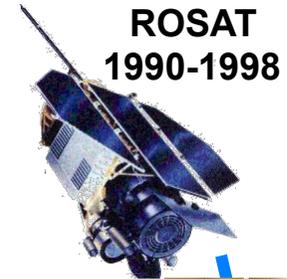


Negotiations between Roskosmos and ESA
on a "new" Spektr-RG mission (2005)

Agreement between Roskosmos and DLR (2007)



First X-ray all-sky survey
with an imaging telescope



To extend the all-sky survey
towards higher energies



ABRIXAS science on the
International Space Station



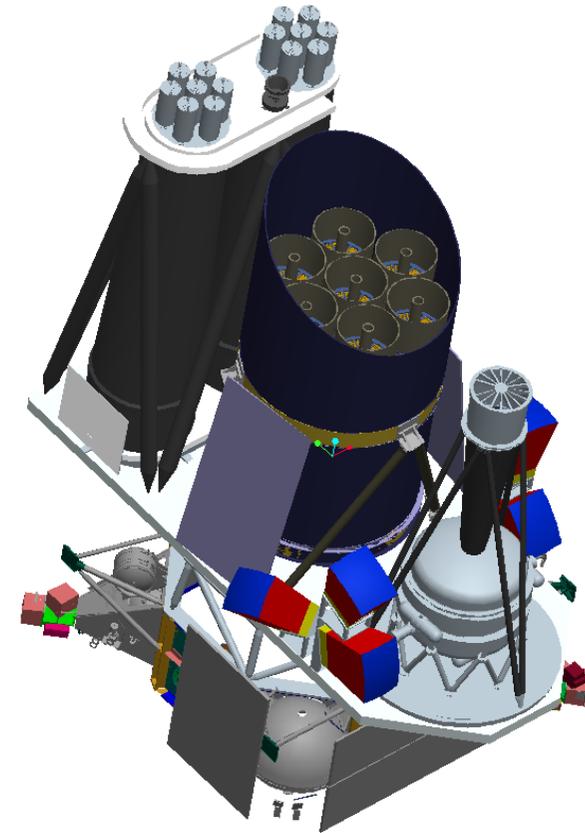
Dark Energy
 10^5 Clusters of Galaxies

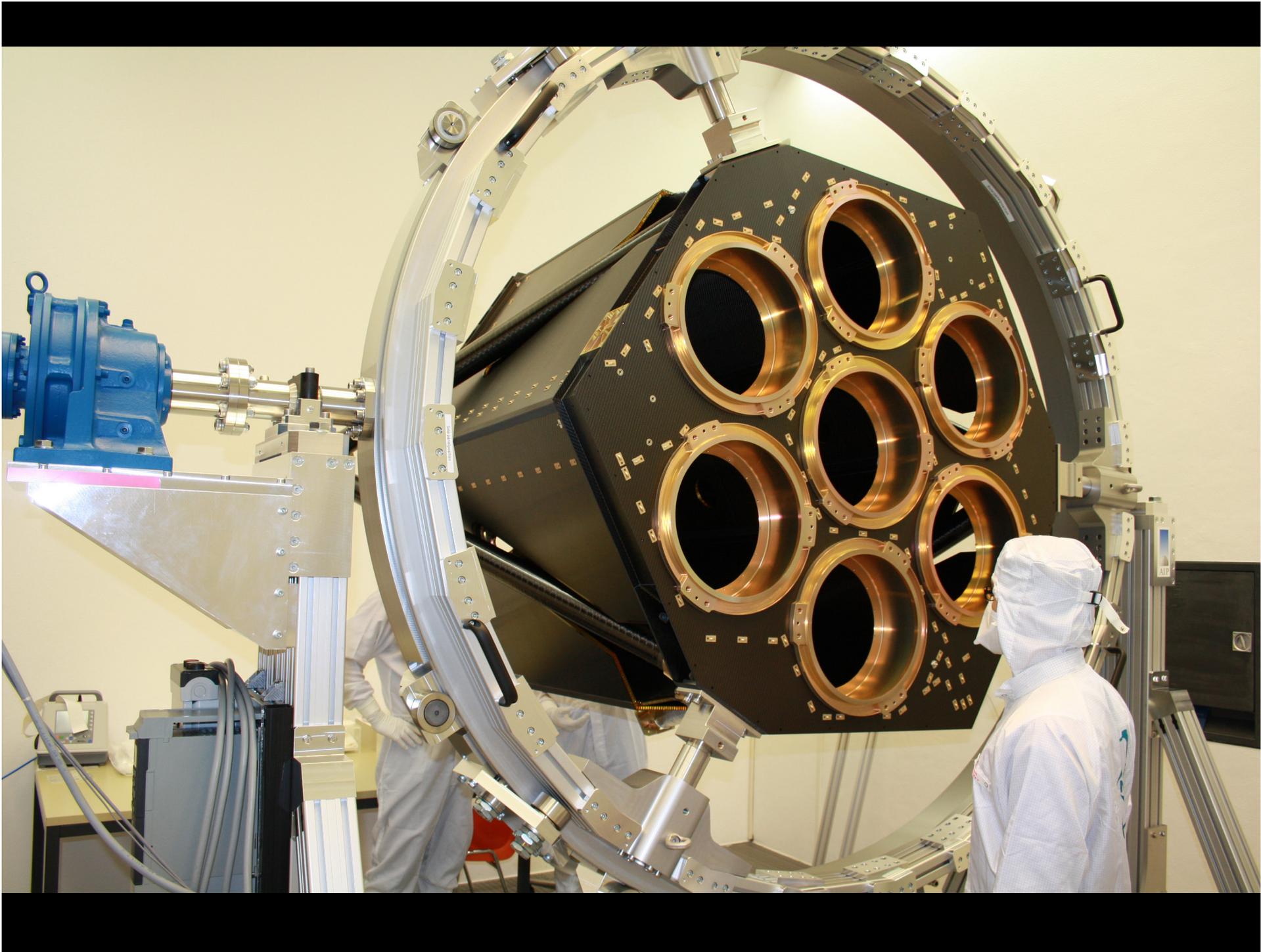
SRG-Mission

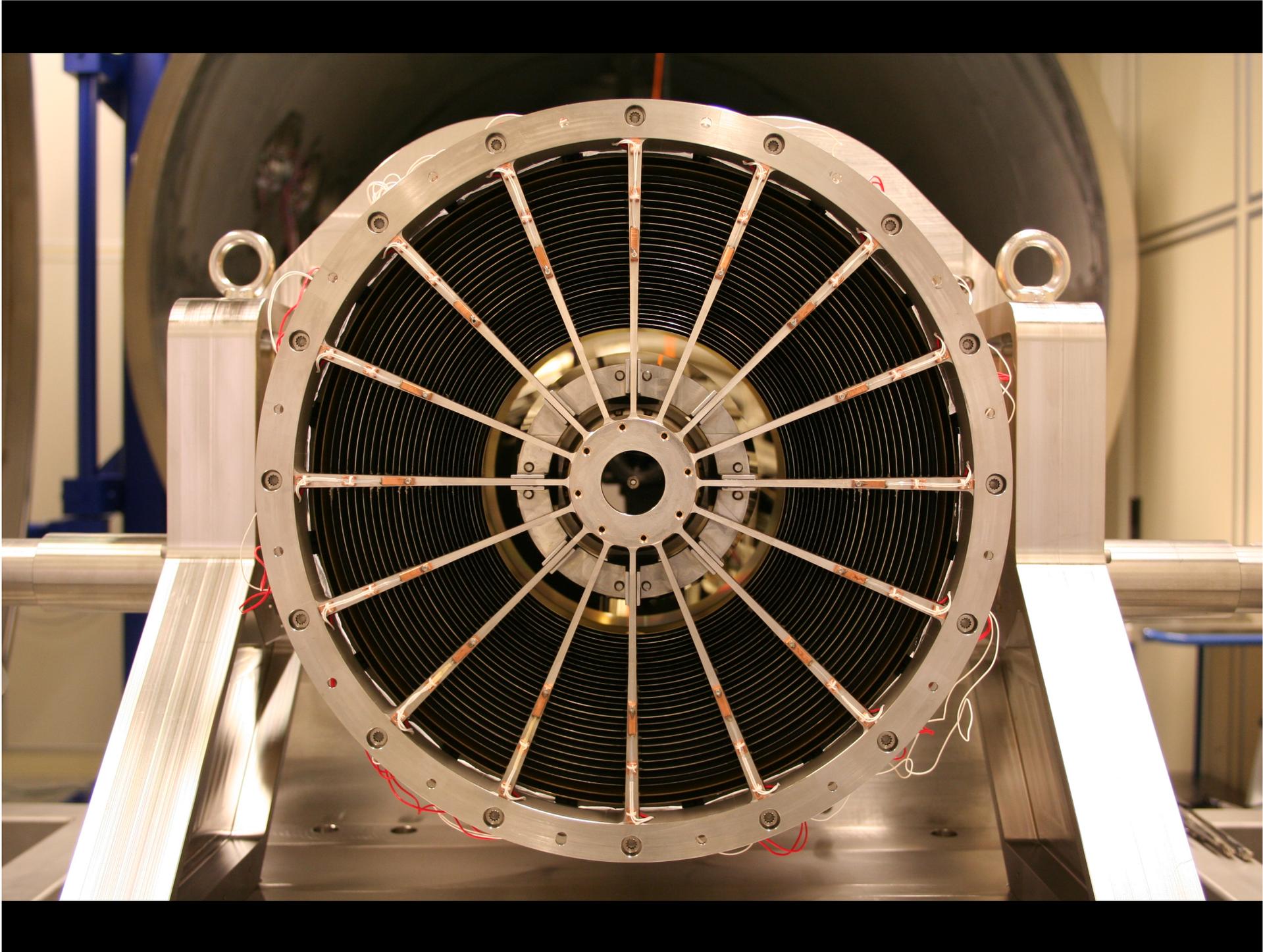
- **Спектр рентген-гамма (SRG)**

- Launch: 2012 from Baikonur
- Launcher: Soyuz-Fregat
- Platform: Navigator (Lavochkin)
- Orbit: L2
- Payload: ART-XC (IKI)
LOBSTER (LU+...)
eROSITA (MPE+...)
SRC (SRON, ISAS,
GSFC,
+MPE)

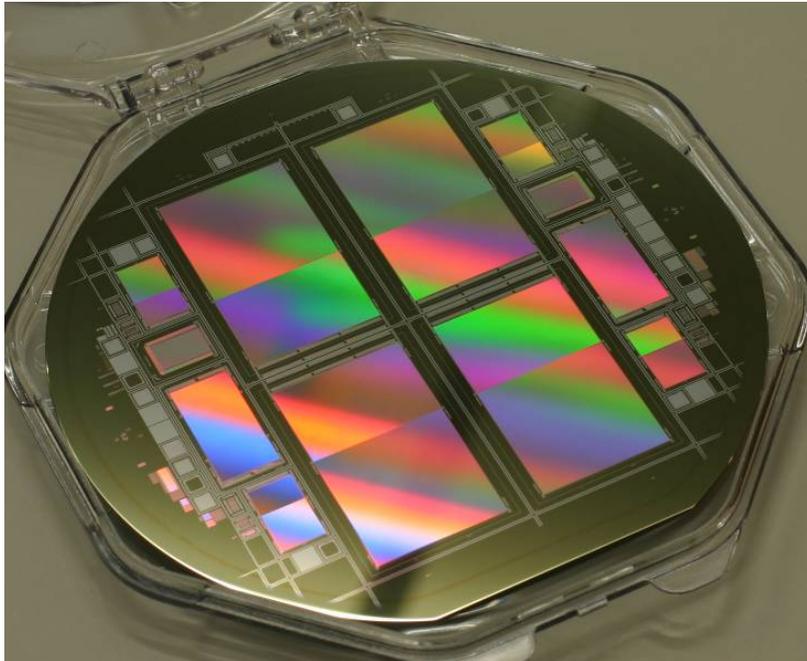
- Mission: 4 yrs survey + 1 yr pointing + ...



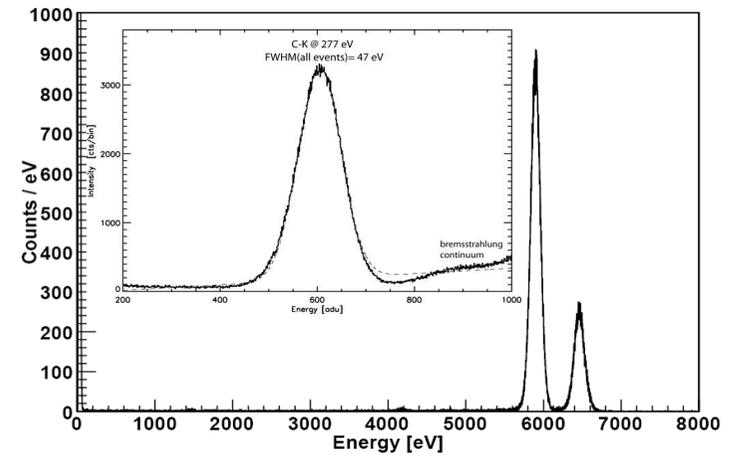
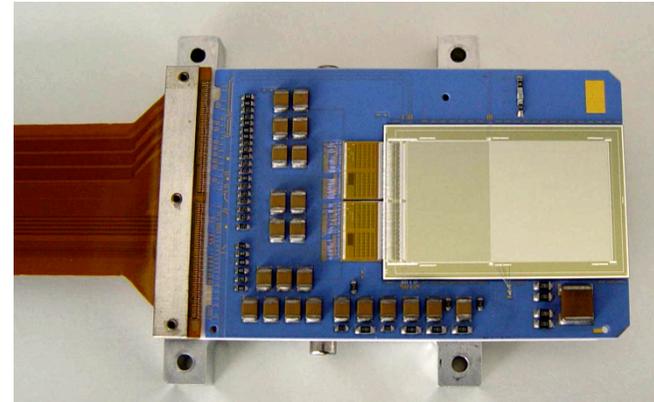




CCD-Module



Four \times 3cm 3cm CCDs still on Si-Wafer.
The CCDs have 384×384 pixels in both
image and framestore area.
Pixelsize: $75\mu\text{m}$.
Cycle time: 50msec

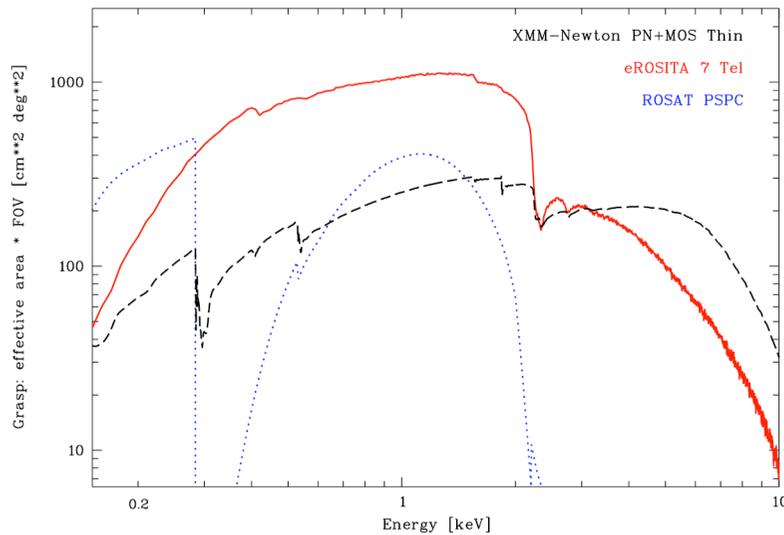


Measurements at C $K\alpha$ (277eV) and Mn $K\alpha$ (5,9 keV) on flight- CCDs (2cm \times 2cm) show the expected energy resolution and low energy response.

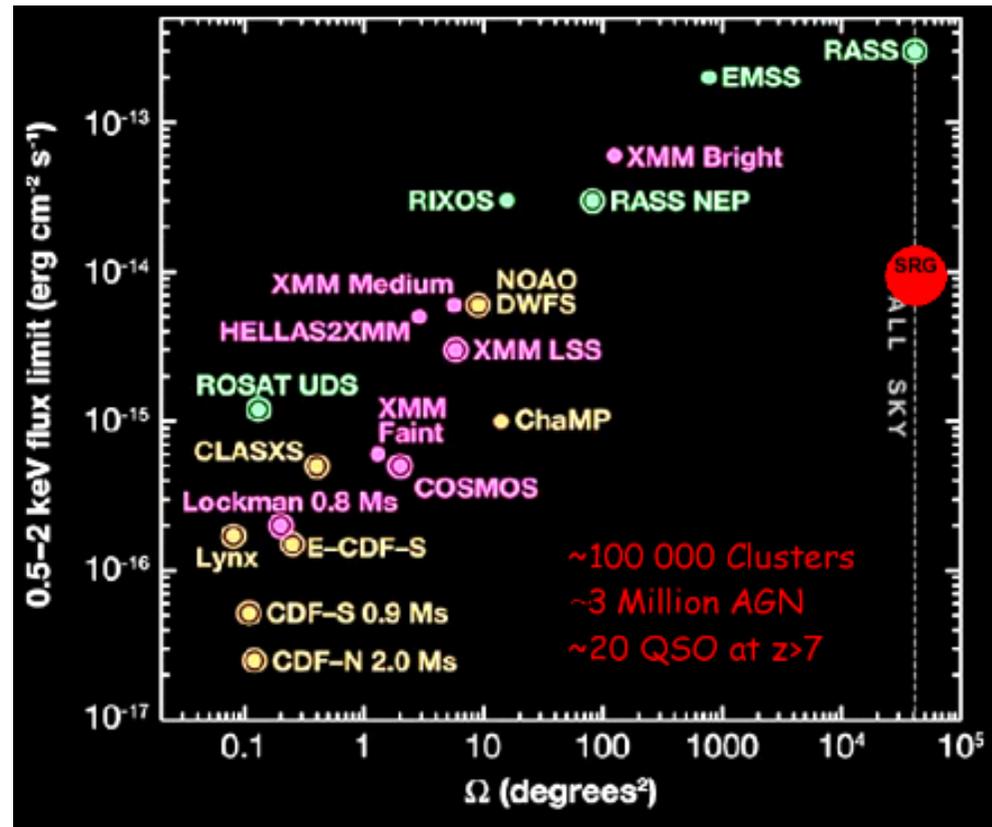
eROSITA Sensitivity

Grasp

F/ Ω



~ 50 x ROSAT
 ~ 2 x XMM-Newton (MOS+PN)

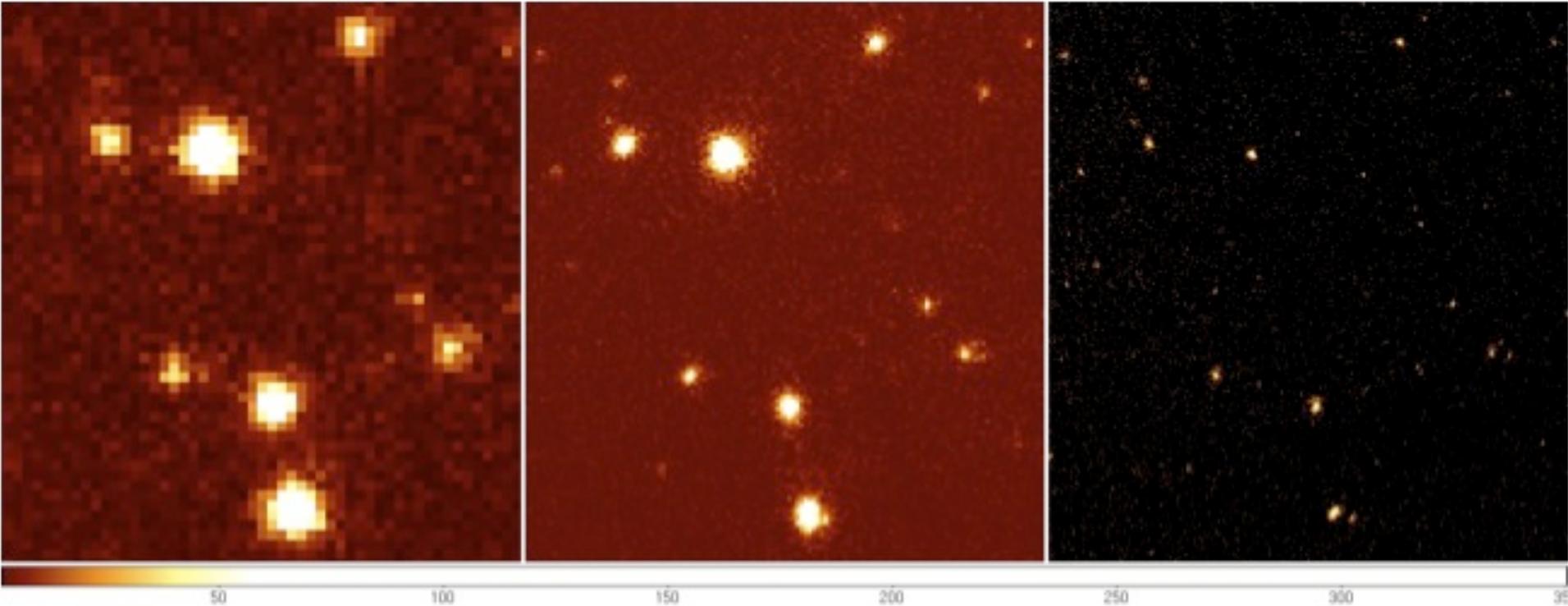


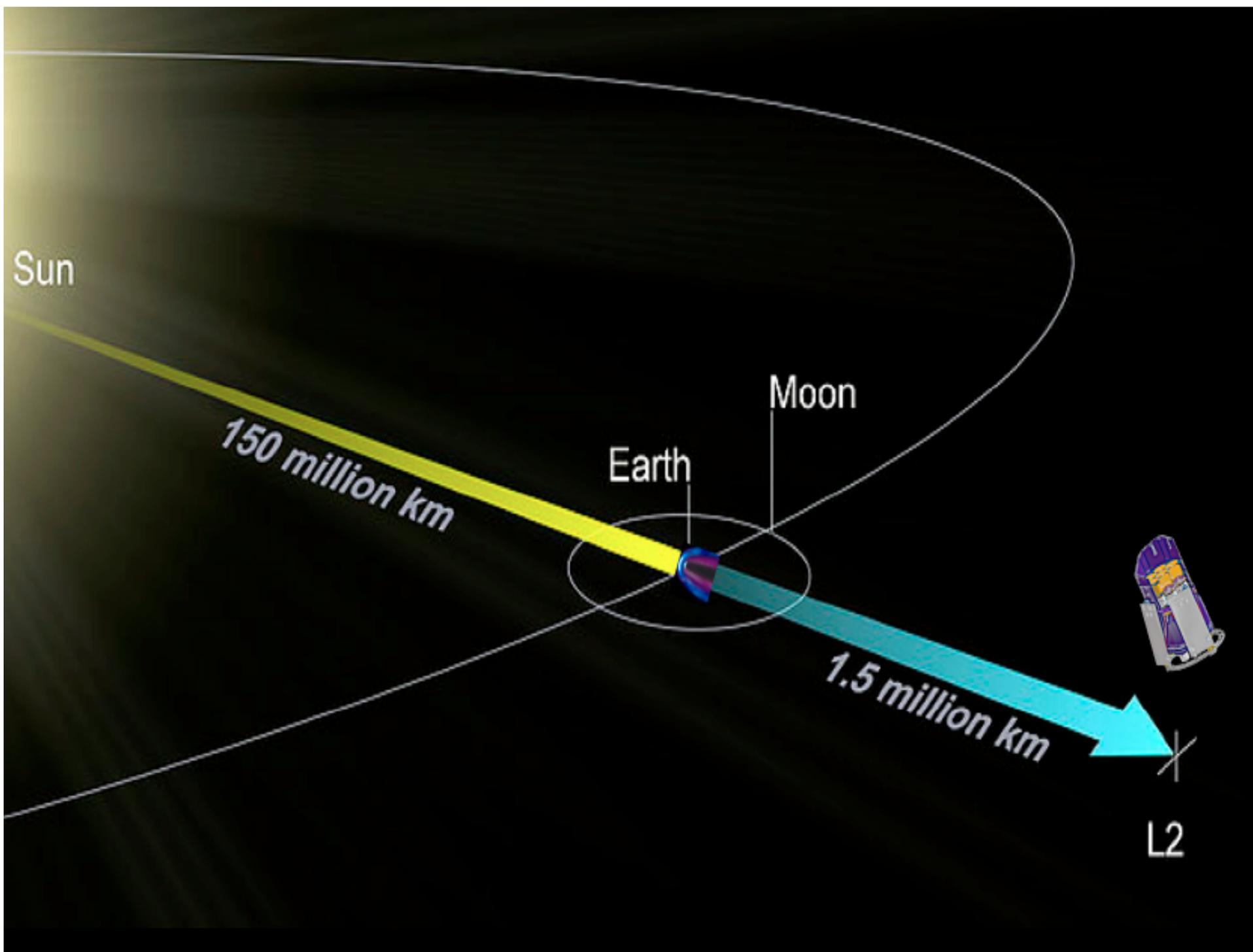
		Energy Range	
		Soft band [0.5-2 keV]	Hard band [2-10 keV]
FoV-averaged Effective Area [cm ²]		1,365 [†]	139 [‡]
Total Background [10 ⁻³ cts/s/arcmin ²]		2.14	0.92
Sensitivity, eRASS:1 Average All-sky [erg/s/cm ²]	Point sources	4.4×10^{-14}	7.1×10^{-13}
	Extended sources	1.1×10^{-13}	-
Sensitivity, eRASS:8 Average All-sky [erg/s/cm ²]	Point sources	1.1×10^{-14}	1.6×10^{-13}
	Extended sources	3.4×10^{-14}	-
Sensitivity, eRASS:8 Poles [~ 140 deg ²] [erg/s/cm ²]	Point sources	2.9×10^{-15}	3.9×10^{-14}
	Extended sources	1×10^{-14}	-

[†] At 1 keV

[‡] At 5 keV

Comparison between Chandra/XMM-Newton/eROSITA





eROSITA schedule

Launch: 2018 (?!)

Survey: 2018 (?!) -2022

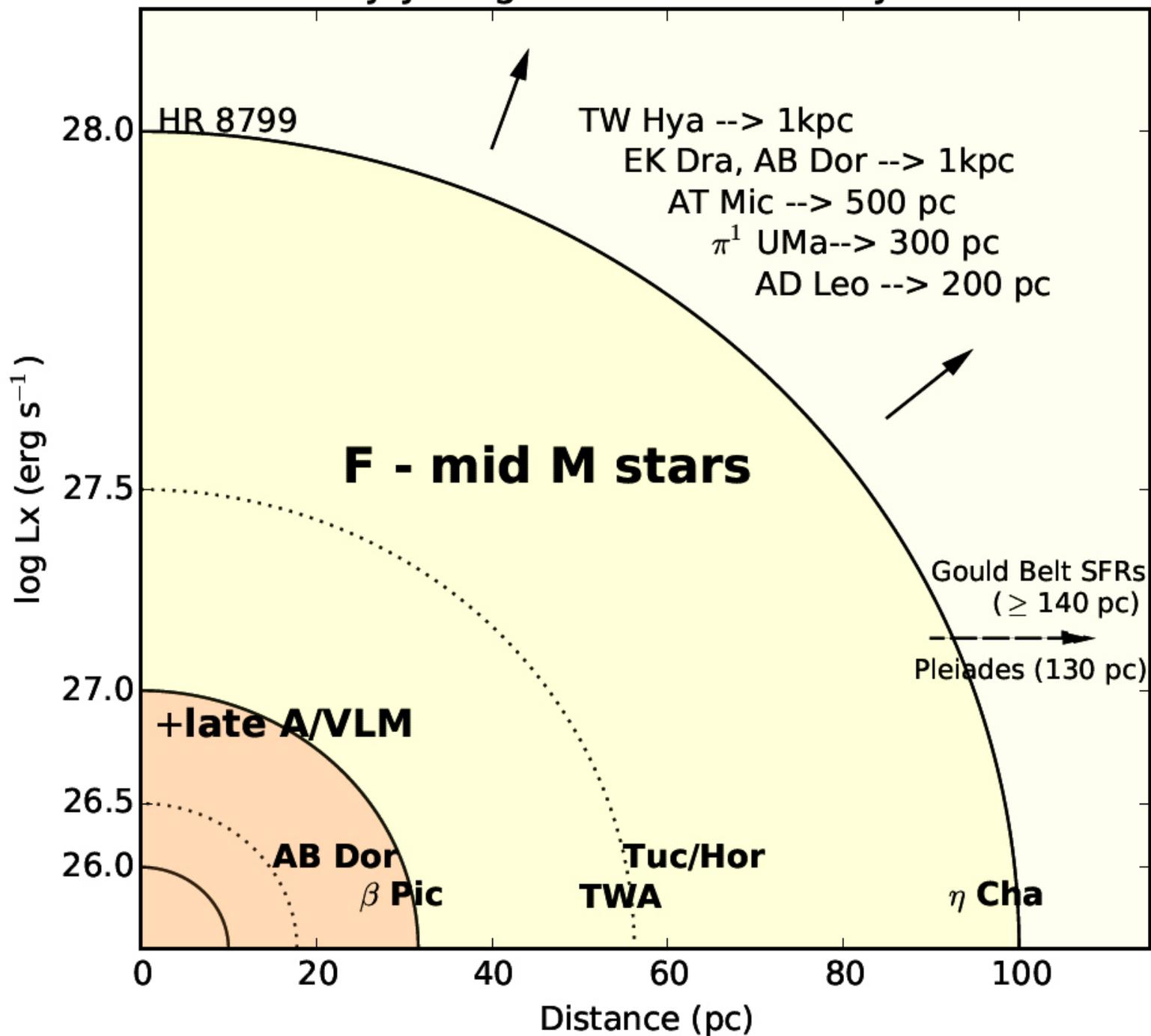
**Science exploitation: ---> 2018 –
2030 (?)**

Data access:

- ❖ Sky divided between Germany and Russia
- ❖ All Co-Is have full data rights
- ❖ Science working groups for various subject areas
- ❖ International collaborations possible thru science working groups

eROSITA and stars

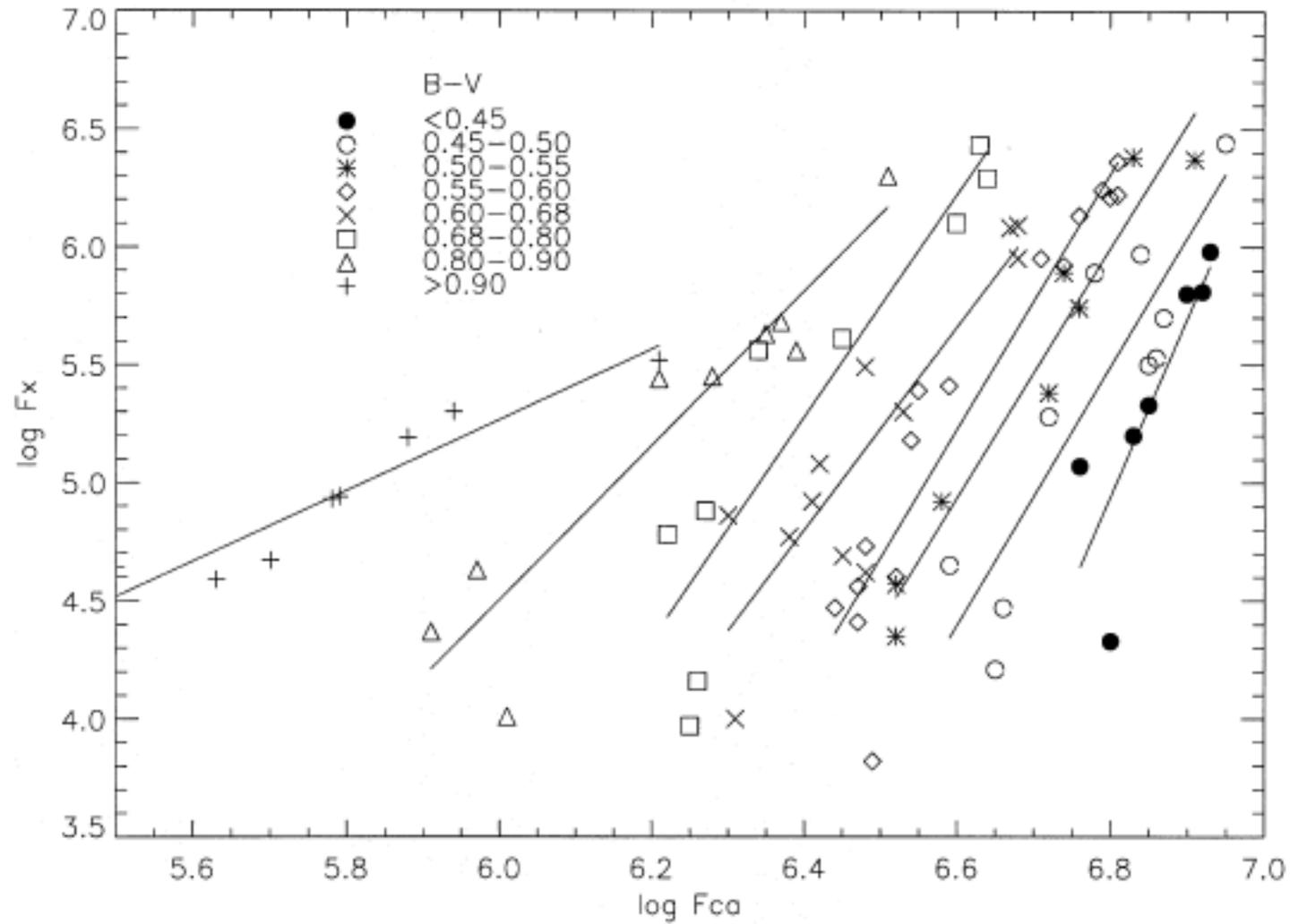
Nearby young stars - eRASS X-ray horizon

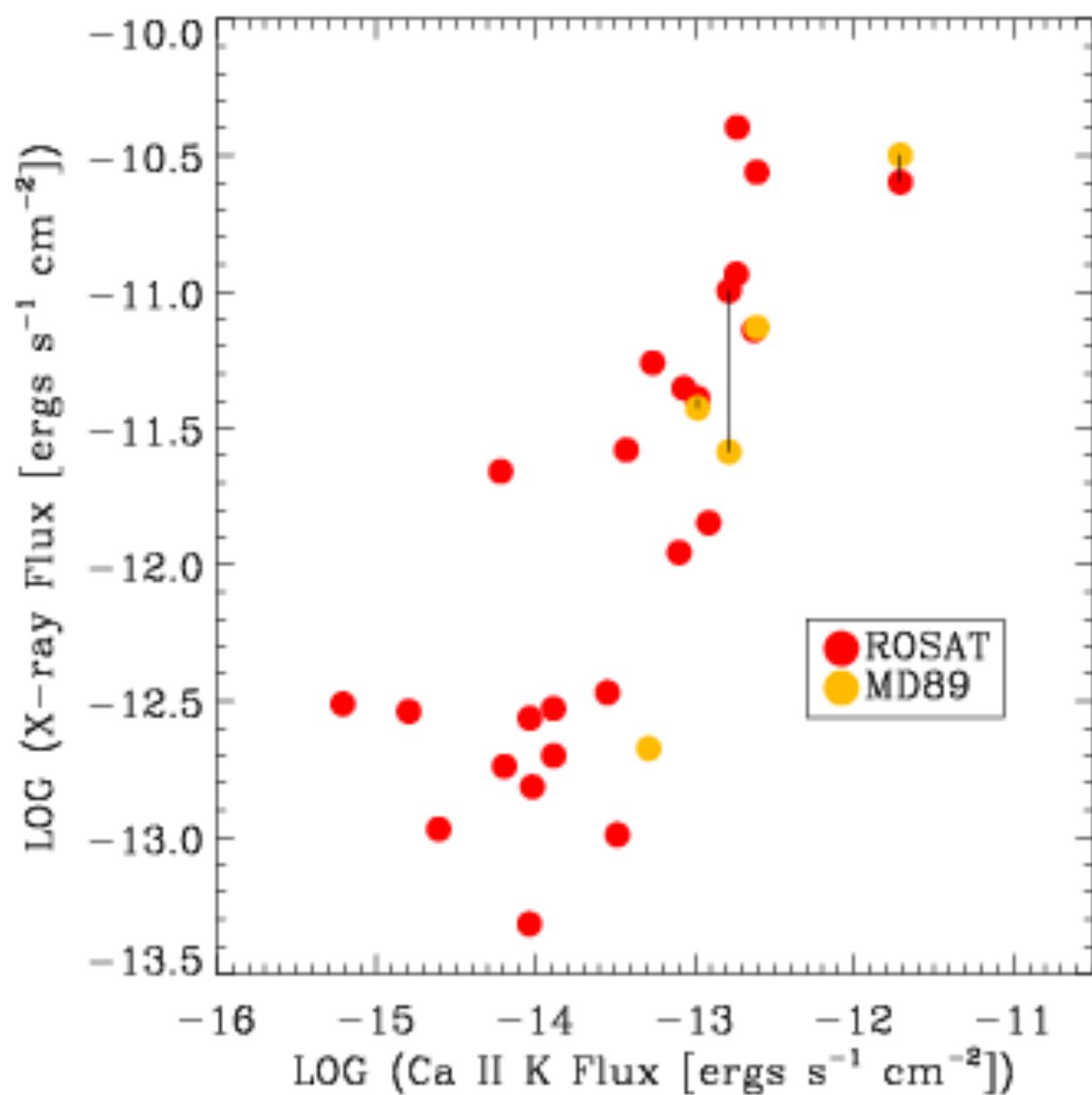


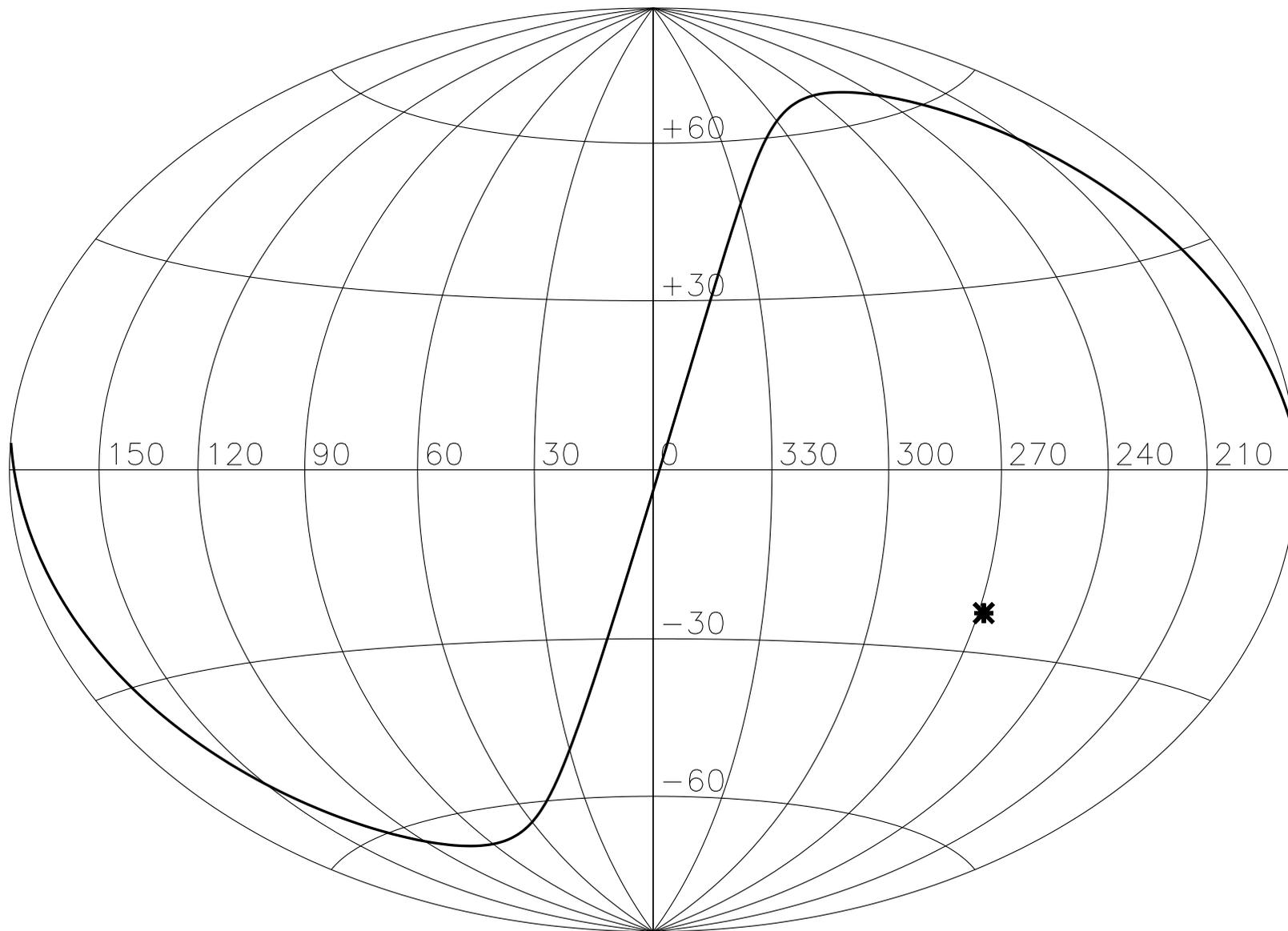
How does TIGRE come into the game ?

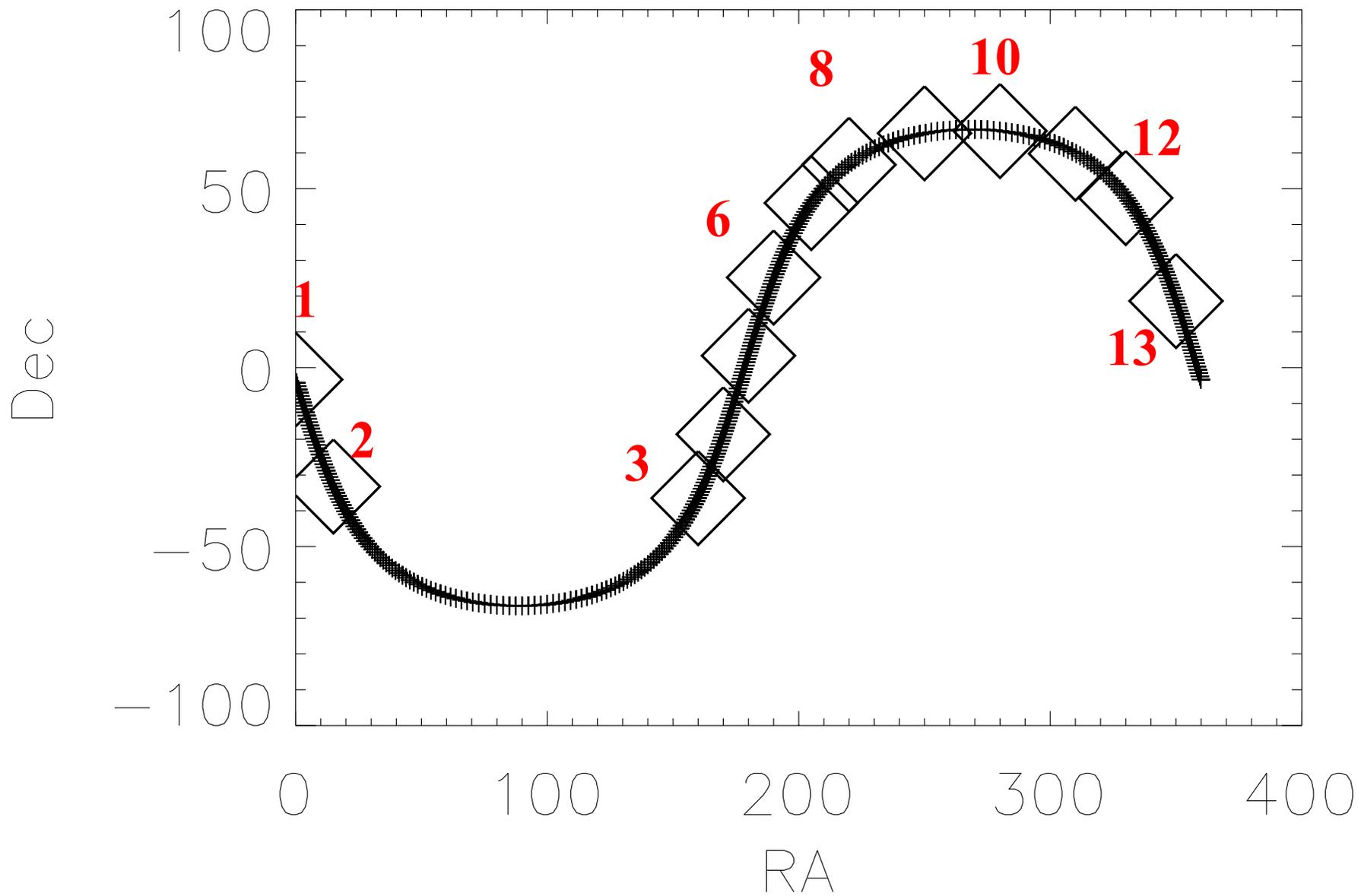
Hempelmann et al. (1996)

A. Hempelmann et al.: Coronal X-ray emission of cool stars in relation to chromospheric activity and magnetic cycles









Altitudes, La Luz Observatory

259.0000E 21.0000N, 2435 m above sea level

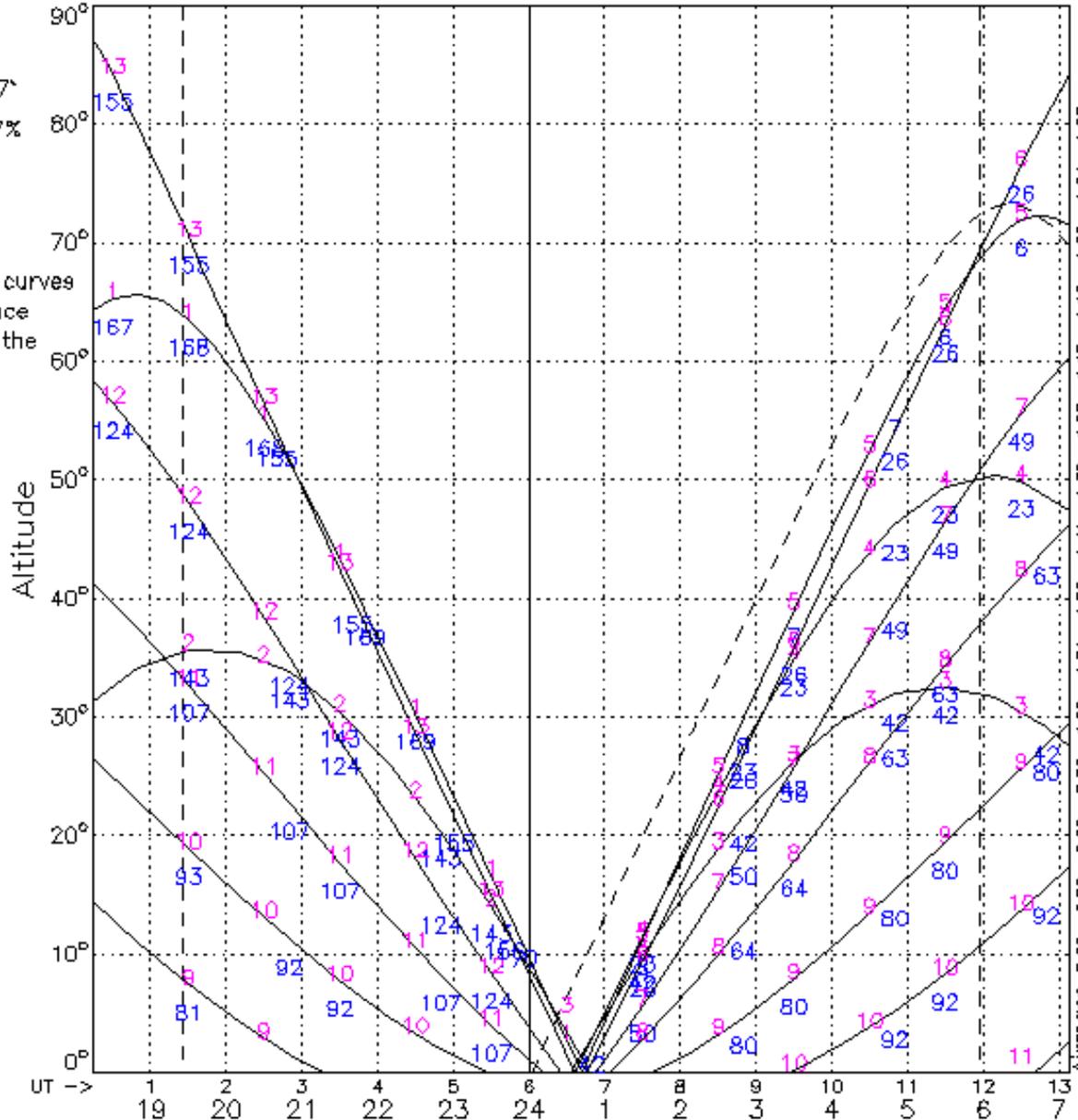
LST ----> 1^h12^m 2^h12^m 3^h12^m 4^h12^m 5^h13^m 6^h13^m 7^h13^m 8^h13^m 9^h13^m 10^h13^m
 S.set Twil S.rise
 UT -> 0^h14^m 1^h28^m 11^h56^m 13^h 8^m

Moon (dashed):
 Coordinates:
 11^h26^m + 4°57'
 Illumination: 57%
 Quarter: 3

Numbers below curves
 are Moon distance
 (in degrees) at the
 corresponding
 times.

List of objects:

- 1 Object 0.00° - 3.34°
- 2 Object 15.00° -33.20°
- 3 Object 160.00° -36.46°
- 4 Object 170.00° -18.62°
- 5 Object 180.00° + 3.34°
- 6 Object 190.00° +25.19°
- 7 Object 205.00° +48.01°
- 8 Object 220.00° +56.70°
- 9 Object 250.00° +65.50°
- 10 Object 280.00° +66.14°
- 11 Object 310.00° +59.79°
- 12 Object 330.00° +47.41°
- 13 Object 350.00° +18.62°



Altitudes, Rozhen Observatory

24.7383E 41.6947N, 1759 m above sea level

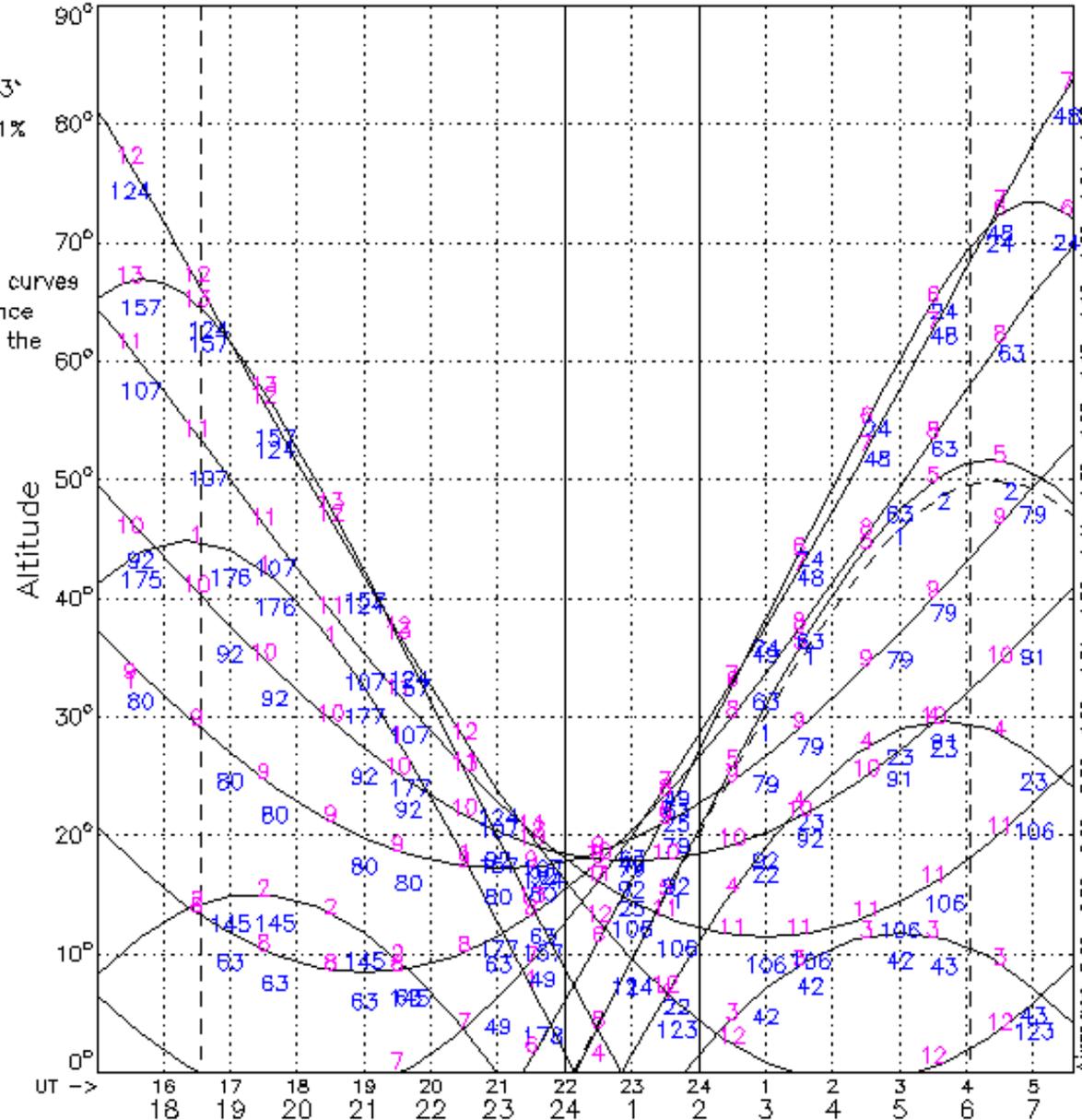
LST ----> 0^h37^m 1^h37^m 2^h38^m 3^h38^m 4^h38^m 5^h38^m 6^h38^m 7^h38^m 8^h39^m 9^h39^m 10^h39^m 1^h39^m
 S.set Twil S.rise
 UT -> 15^h 1^m 16^h 33^m 4^h 3^m 5^h 35^m

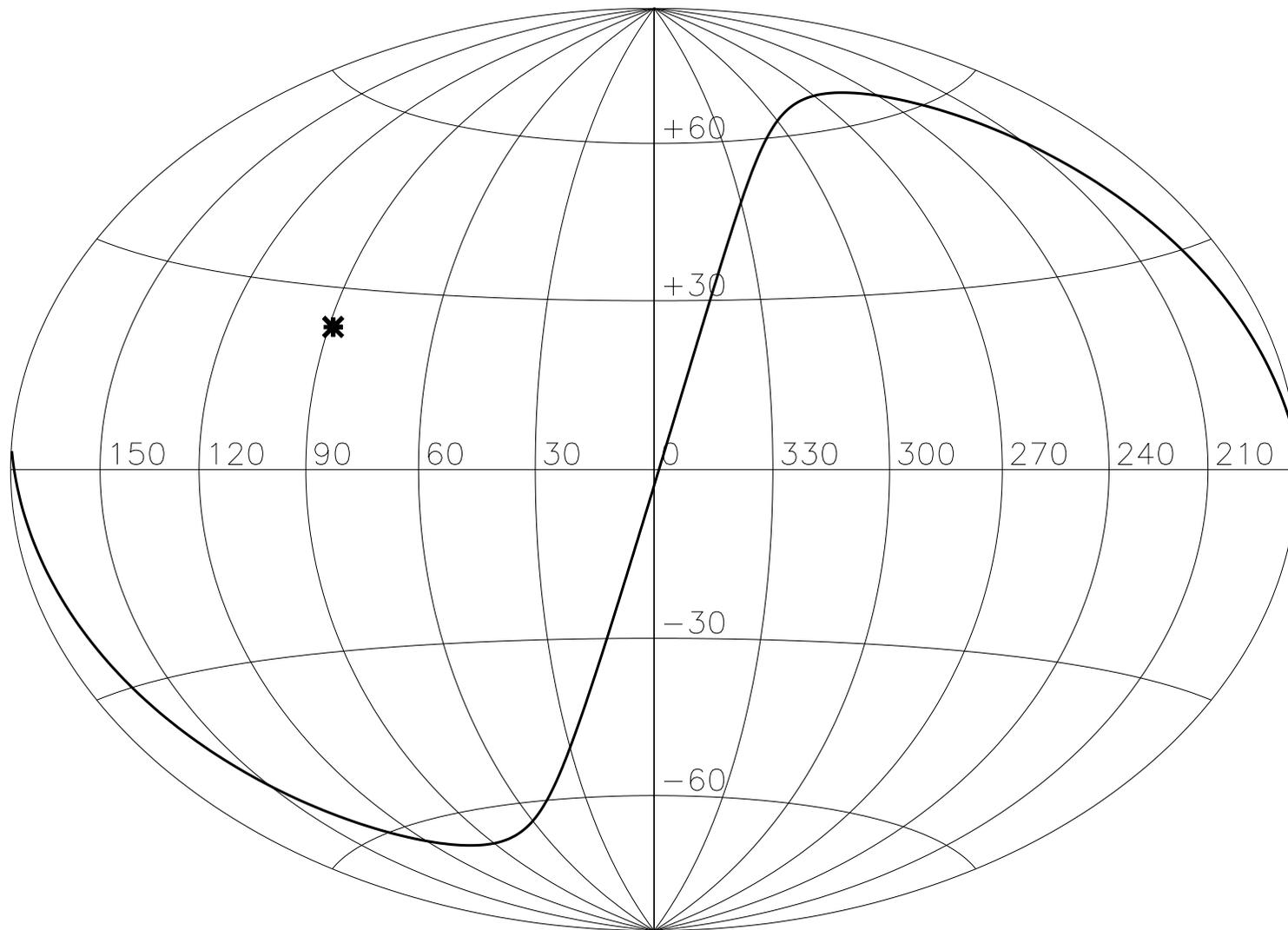
Moon (dashed):
 Coordinates:
 11^h57^m + 2°23'
 Illumination: 51%
 Quarter: 3

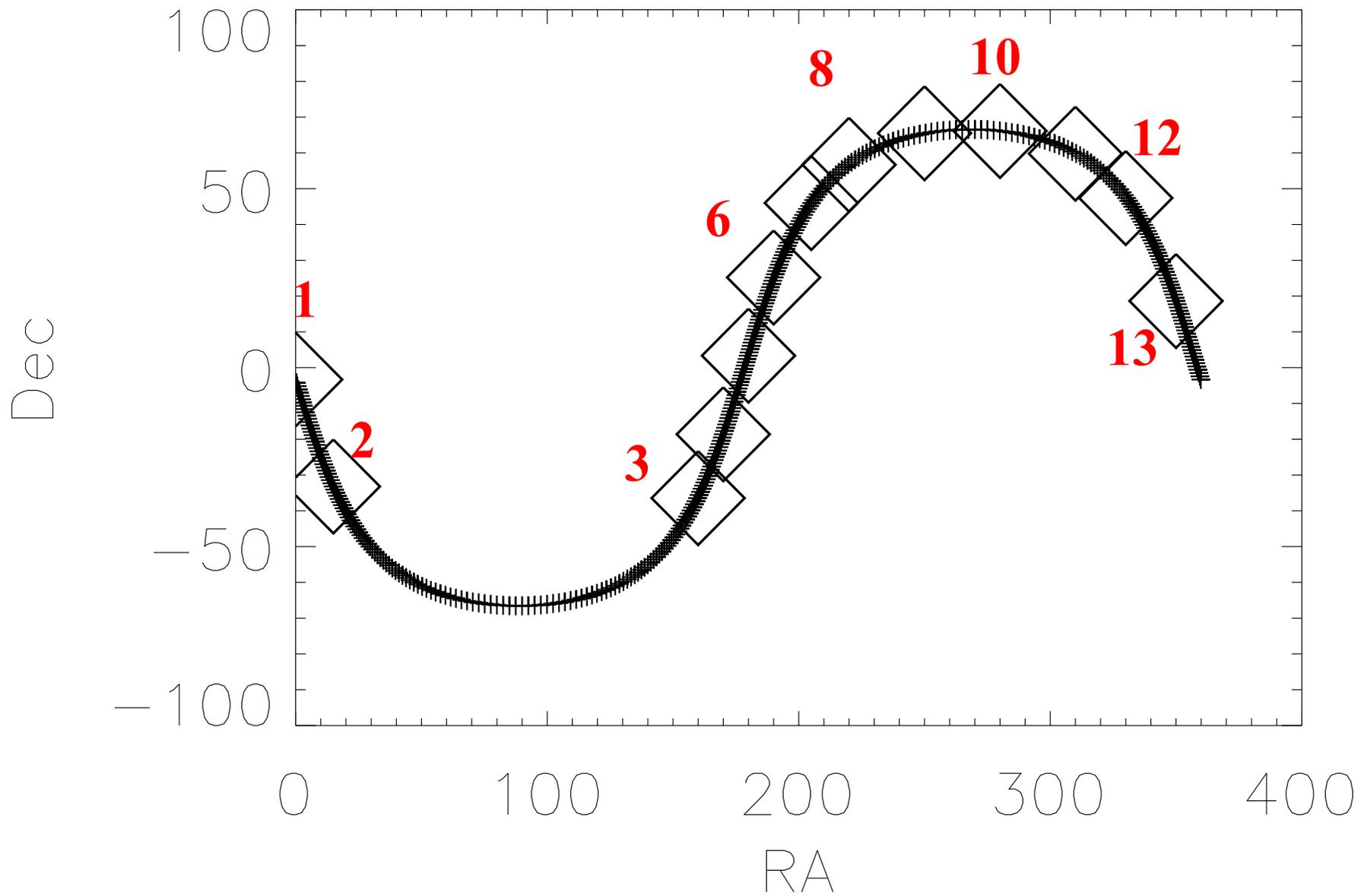
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- 12 Object 330.00° + 47.41°
- 13 Object 350.00° + 18.62°







Altitudes, La Luz Observatory

259.0000E 21.0000N, 2435 m above sea level

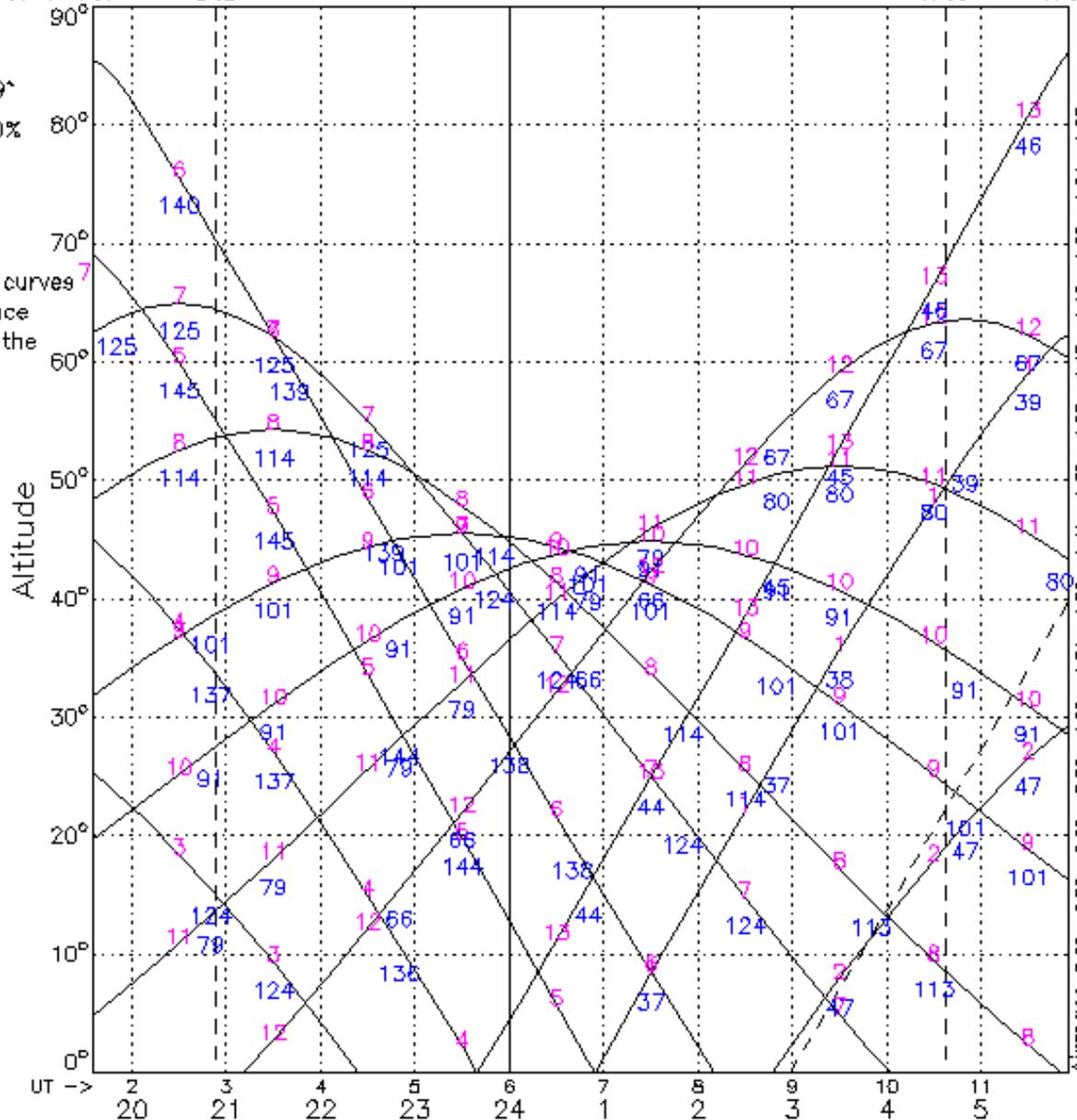
LST ----> 14^h10^m 15^h10^m 16^h10^m 17^h10^m 18^h10^m 19^h10^m 20^h11^m 21^h11^m
 S.set Twil Twil S.rise
 UT -> 1^h35^m 2^h52^m 10^h38^m 11^h55^m

Moon (dashed):
 Coordinates:
 2^h21^m + 8^o59[^]
 Illumination: 20%
 Quarter: 4

Numbers below curves
 are Moon distance
 (in degrees) at the
 corresponding
 times.

List of objects:

- 1 Object 0.00° - 3.34°
- 2 Object 15.00° - 33.20°
- 3 Object 160.00° - 36.46°
- 4 Object 170.00° - 18.62°
- 5 Object 180.00° + 3.34°
- 6 Object 190.00° + 25.19°
- 7 Object 205.00° + 48.01°
- 8 Object 220.00° + 56.70°
- 9 Object 250.00° + 65.50°
- 10 Object 280.00° + 66.14°
- 11 Object 310.00° + 59.79°
- 12 Object 330.00° + 47.41°
- 13 Object 350.00° + 18.62°



What can/should TIGRE do ?

Quasi-simultaneity: What does this mean ?

How many stars ?

How many data points per star ?

Which stars ?

What are the implications for the scheduler/
program ?