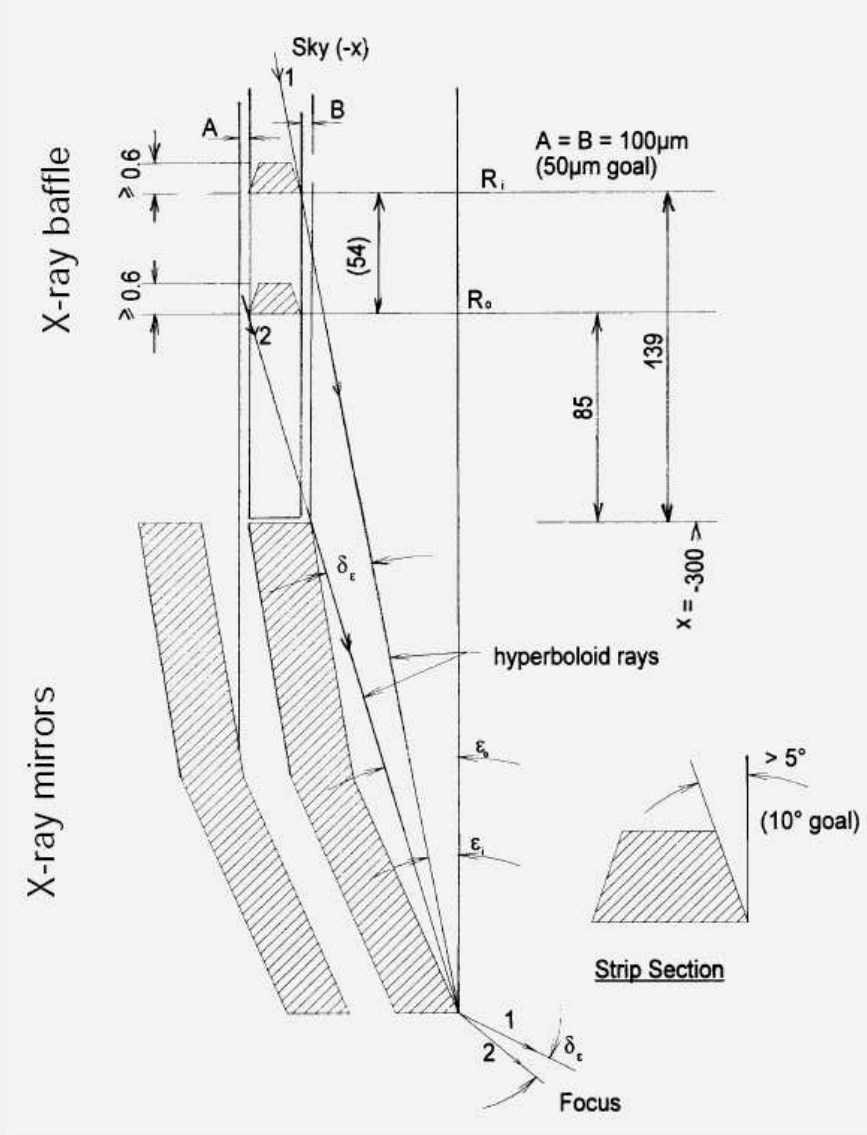
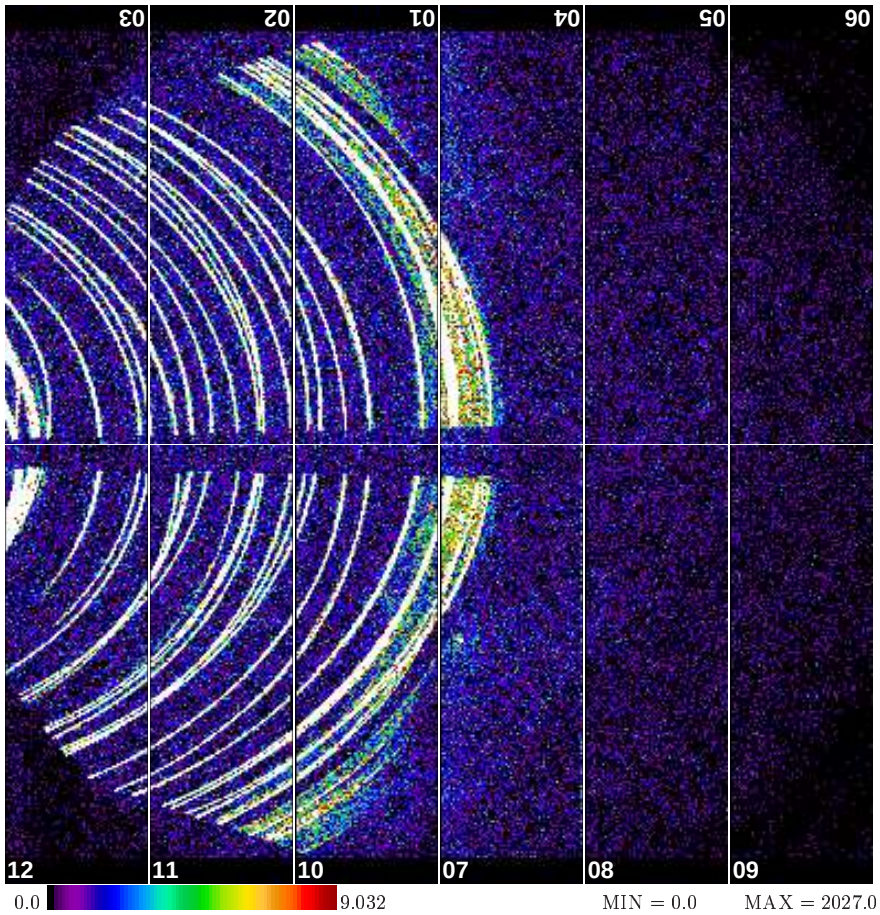
XMM-Newton XRT+EPIC straylight: overview

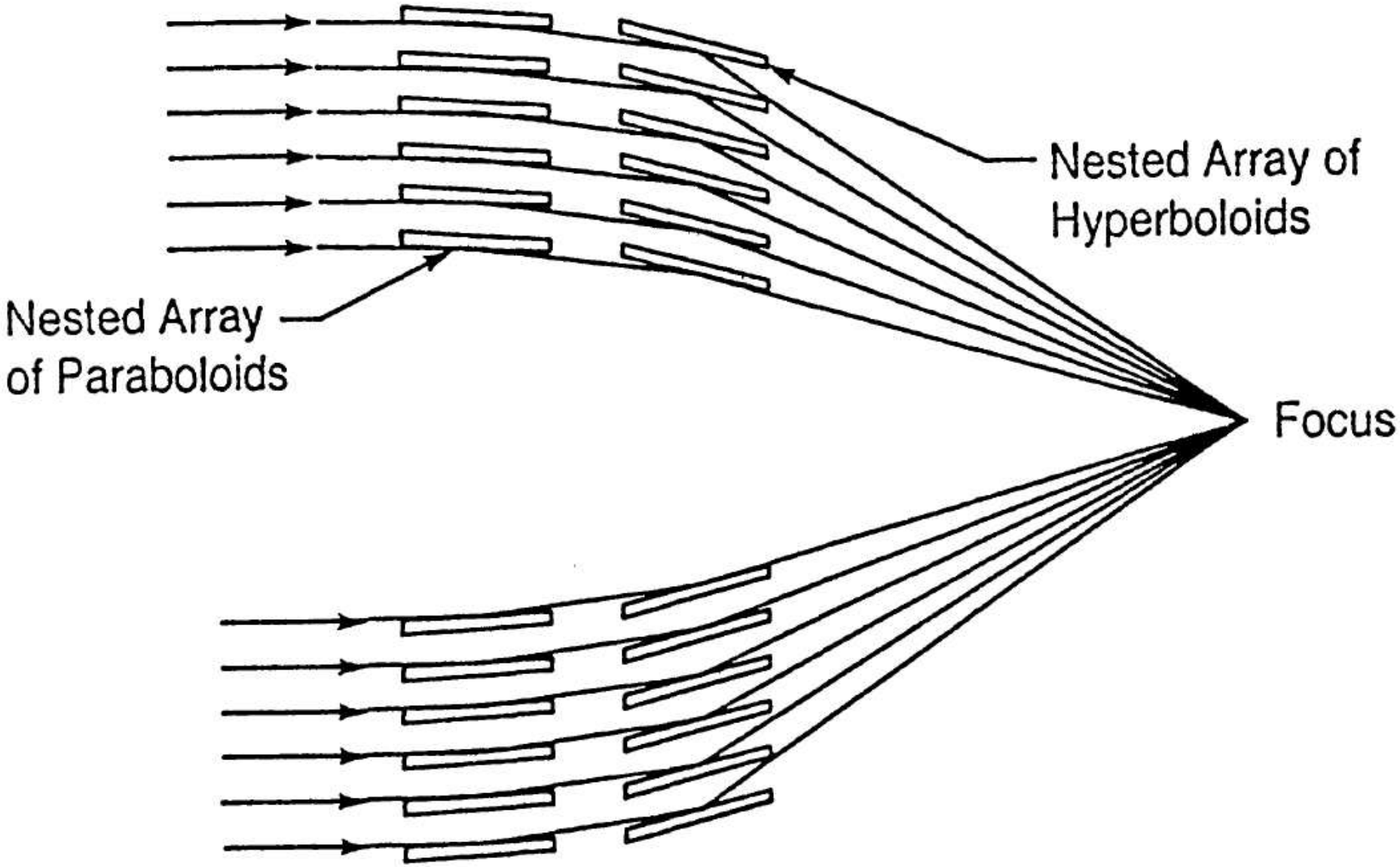


Sco X-1 large offset — 2003-03-04T06:33:08
0592_0153950901_PNS016 — 2003-03-04T07:48:24
Singles, $0.50 - 2.00$ keV — 4516 s

Mode = PrimeFullWindow Filter = Thin1
$\alpha_{2000} = 16\,22\,36.2$ $\delta_{2000} = -15\,43\,51.4$ PA = 101.366°
$l = 359.469°$ $b = 23.229°$ $N_{H,gal} = 16.49 \times 10^{20}\,cm^{-2}$



Wolter type-I grazing incidence X-ray optics



from: Ramsay et al., Sp.Sci.Rev. 69 (1994)

XRT straylight items

- single reflections from parabola: shells too close
- single reflections from hyperbola: typical
- reflections from backside of mirror shell: –

- out-of-FOV → out-of-window: EPIC-pn LW mode
- out-of-time events of "bad" source: EPIC-pn rows 1 – 12
- optical photons: loading, no X-ray counterpart

- X-ray baffle reduces straylight by factor of 5 – 10

EPIC: single reflections: Sco X-1

Sco X-1 large offset
0592_0153950901_PNS016
Singles, $0.50 - 2.00$ **keV**

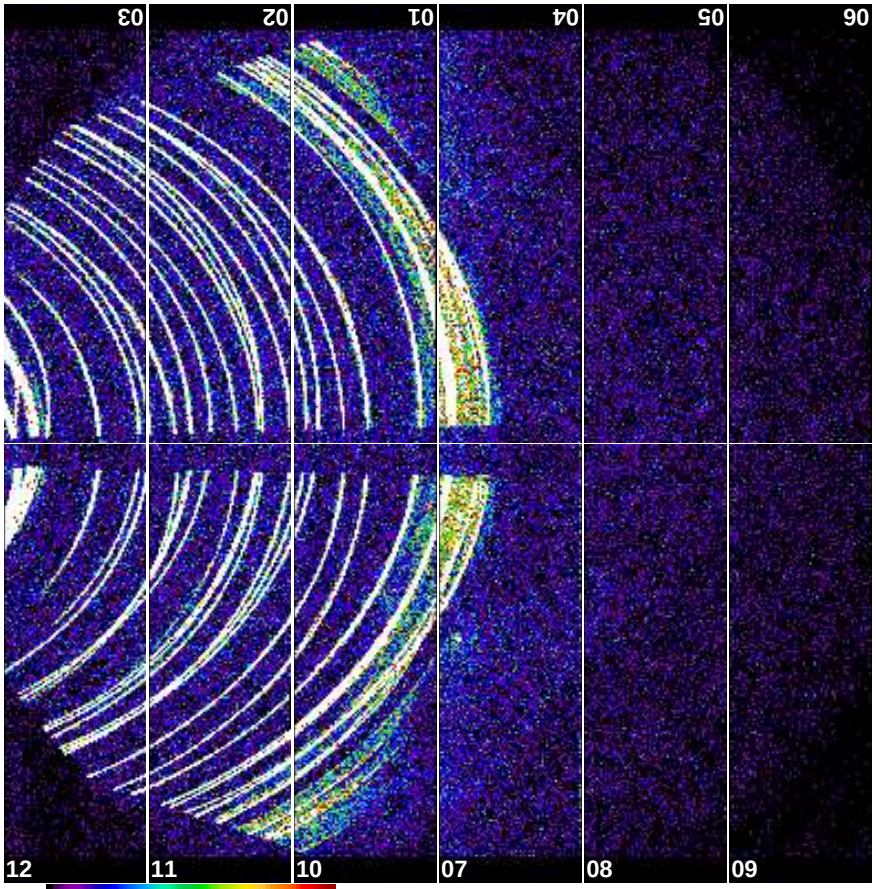
Mode = PrimeFullWindow Filter = Thin1
$\alpha_{2000} = 16\,22\,36.2$ $\delta_{2000} = -15\,43\,51.4$ PA = 101.366°
$l = 359.469°$ $b = 23.229°$ $N_{\mathrm{H,gal}} = 16.49 \times 10^{20}\,\mathrm{cm}^{-2}$

2003-03-04T06:33:08
2003-03-04T07:48:24
4516 s

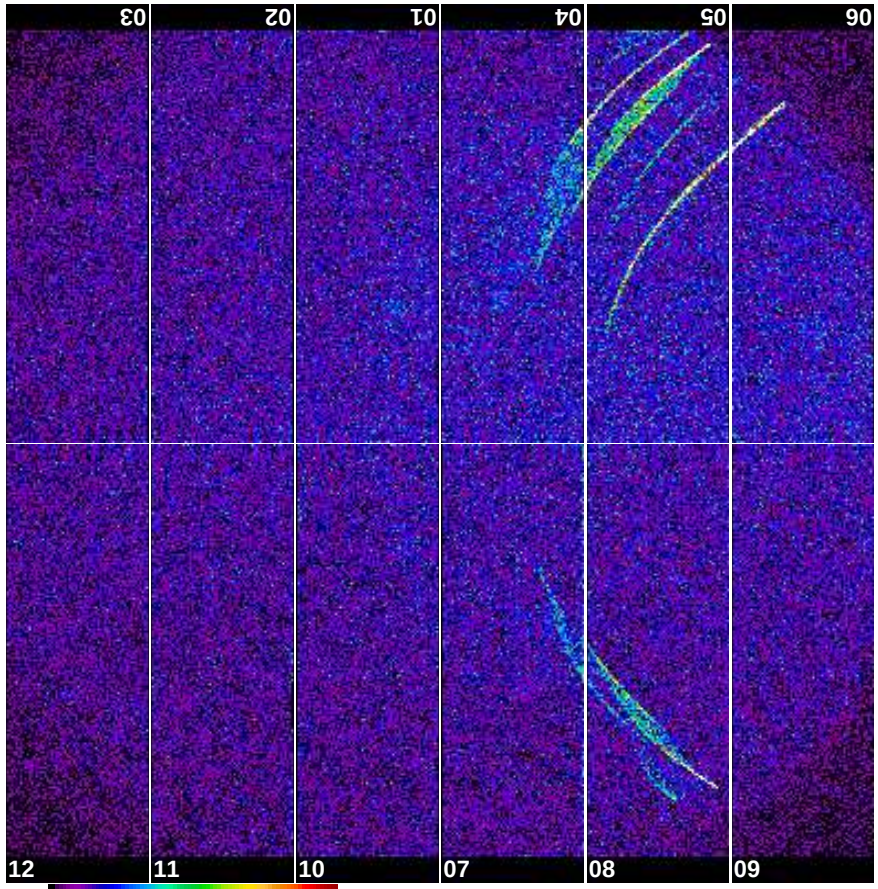
Sco X-1 large offset
0688_0153951001_PNS016
Singles, $0.50 - 2.00$ **keV**

Mode = PrimeFullWindow Filter = Thin1
$\alpha_{2000} = 16\,22\,42.8$ $\delta_{2000} = -15\,46\,56.5$ PA = 281.351°
$l = 359.444°$ $b = 23.176°$ $N_{\mathrm{H,gal}} = 14.99 \times 10^{20}\,\mathrm{cm}^{-2}$

2003-09-12T11:47:13
2003-09-12T14:04:26
8233 s



0.0 9.032 MIN = 0.0 MAX = 2027.0



0.0 16.466 MIN = 0.0 MAX = 2125.0

Sco X-1: off-axis: 40', different roll-angle

EPIC: single reflections: Crab

Crab (off-axis 1)
0054_0121910101_PNS003
Singles, $0.50 - 2.00$ keV
Mode = PrimeFullWindow Filter = Medium
$\alpha_{2000} = 05\,34\,24.2$ $\delta_{2000} = +23\,11\,23.6$ PA = 269.221°
$l = 183.546°$ $b = -5.179°$ $N_{H,gal} = 46.12 \times 10^{20}\,cm^{-2}$

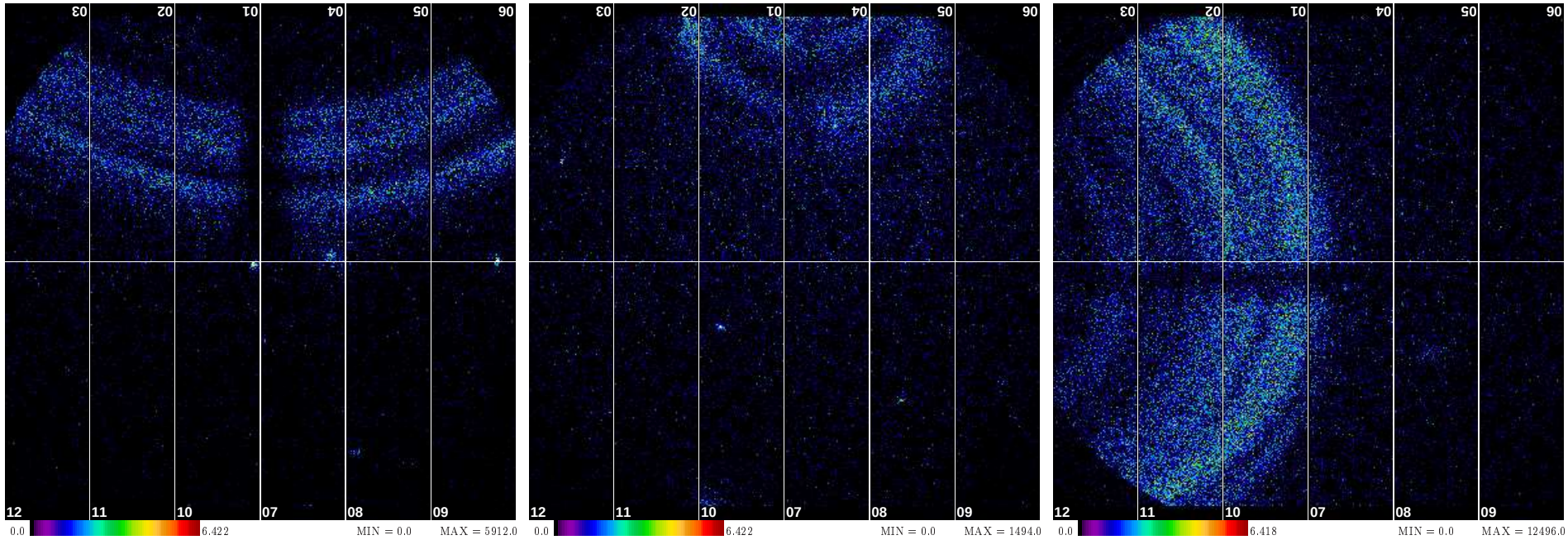
2000-03-26T08:13:13
2000-03-26T09:06:44
3211 s

Crab (off-axis 2)
0054_0121910201_PNS003
Singles, $0.50 - 2.00$ keV
Mode = PrimeFullWindow Filter = Medium
$\alpha_{2000} = 05\,34\,31.2$ $\delta_{2000} = +22\,29\,24.0$ PA = 269.382°
$l = 184.153°$ $b = -5.532°$ $N_{H,gal} = 36.5 \times 10^{20}\,cm^{-2}$

2000-03-26T11:49:27
2000-03-26T12:42:58
3211 s

Crab (off-axis 3)
0056_0122330301_PNS003
Singles, $0.50 - 2.00$ keV
Mode = PrimeFullWindow Filter = Medium
$\alpha_{2000} = 05\,31\,22.2$ $\delta_{2000} = +21\,57\,33.1$ PA = 269.281°
$l = 184.209°$ $b = -6.432°$ $N_{H,gal} = 36.5 \times 10^{20}\,cm^{-2}$

2000-03-30T09:33:20
2000-03-30T10:26:49
3209 s



Crab: off-axis: 70', 28', 45', extended object

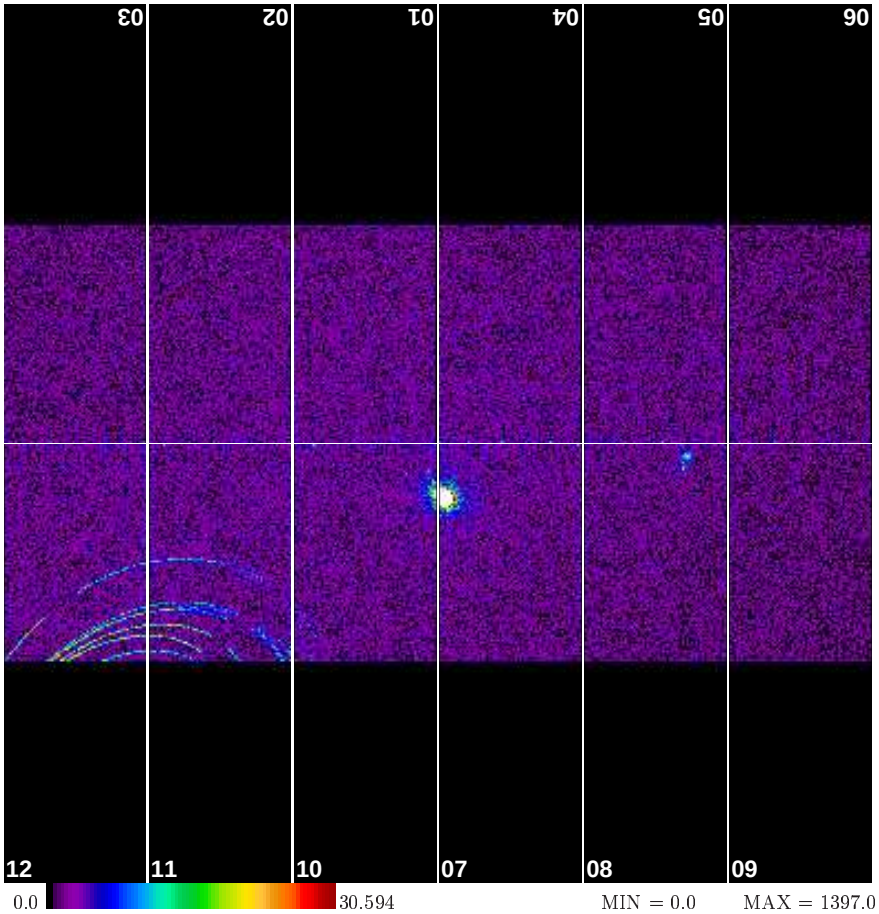
EPIC: single reflections: LW mode

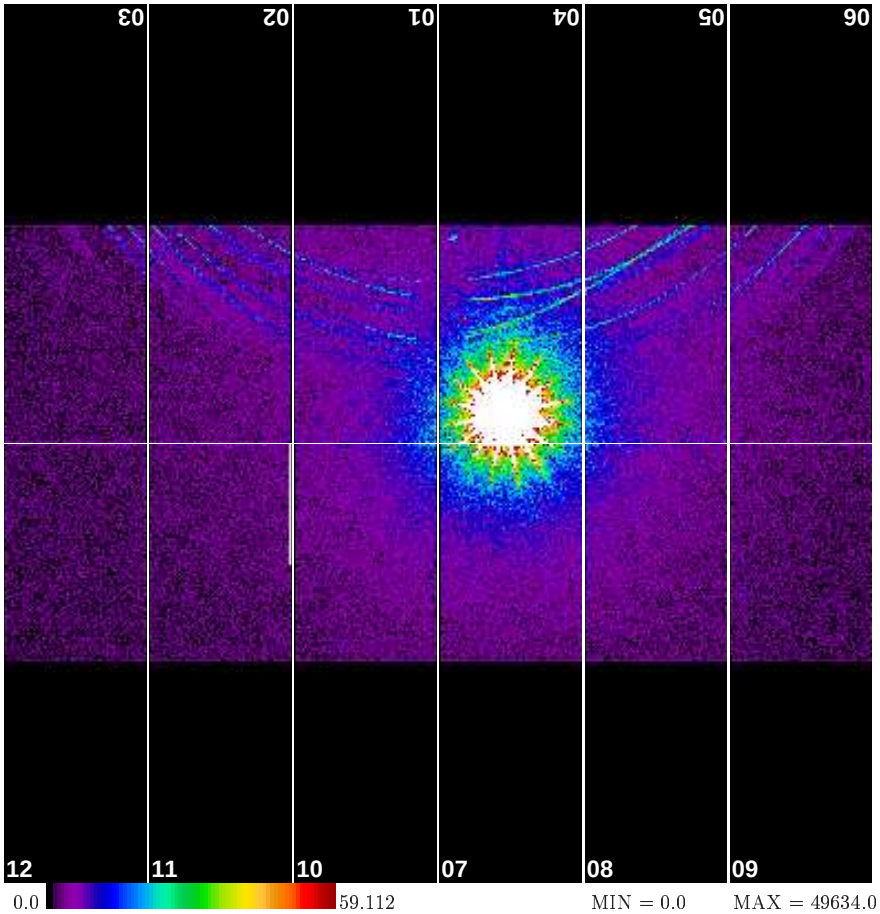
IGR J18029-2016
0792_0206380601_PNS003
Singles, no MIPs, 40 − 1600 adu
Mode = PrimeLargeWindow Filter = Medium
$\alpha_{2000} = 18\,02\,44.9$ $\delta_{2000} = -20\,13\,24.9$ PA = 88.812°
$l = 9.483°$ $b = 1.058°$ $N_{\mathrm{H,gal}} = 101.81 \times 10^{20}\,\mathrm{cm}^{-2}$

2004-04-06T06:54:40
2004-04-06T09:44:38
10198 s

GRS 1758-258
0235_0136140201_PNS001
Singles, no MIPs, 40 − 1600 adu
Mode = PrimeLargeWindow Filter = Thin1
$\alpha_{2000} = 18\,01\,7.9$ $\delta_{2000} = -25\,43\,19.8$ PA = 91.261°
$l = 4.519°$ $b = -1.336°$ $N_{\mathrm{H,gal}} = 92.58 \times 10^{20}\,\mathrm{cm}^{-2}$

2001-03-22T10:21:37
2001-03-22T15:50:01
19704 s

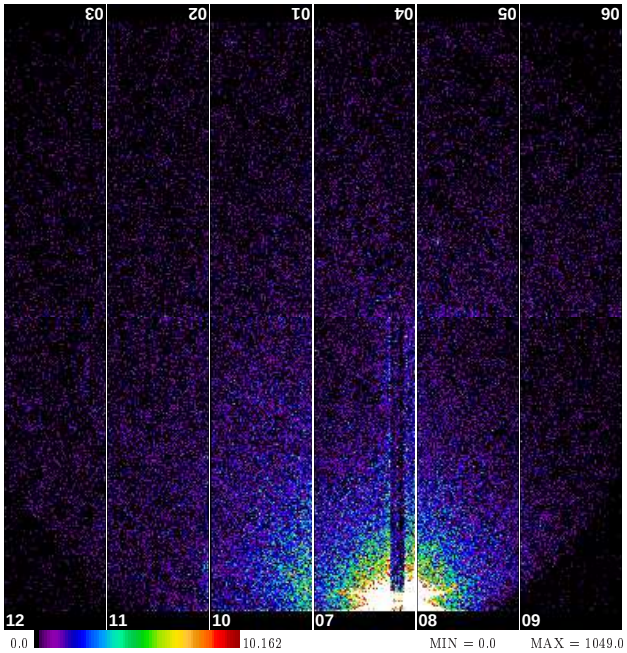




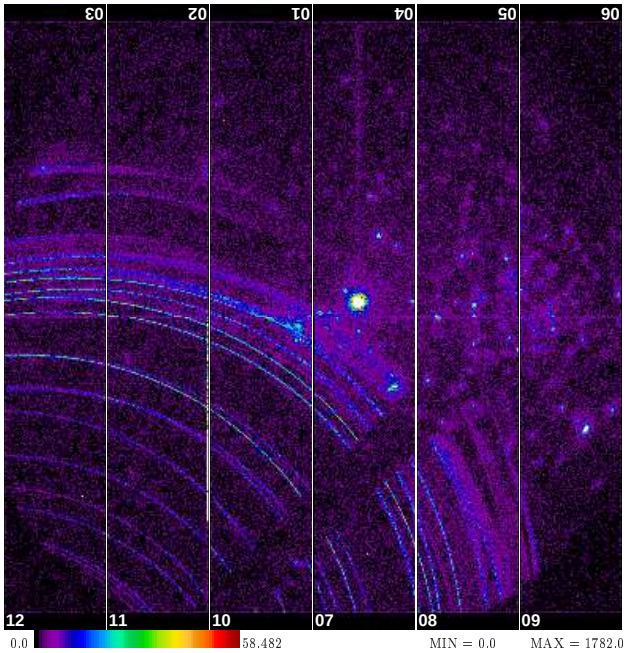
GX 9+1 (25'), GX 5-1 (39')

EPIC: single reflections: GX 5-1

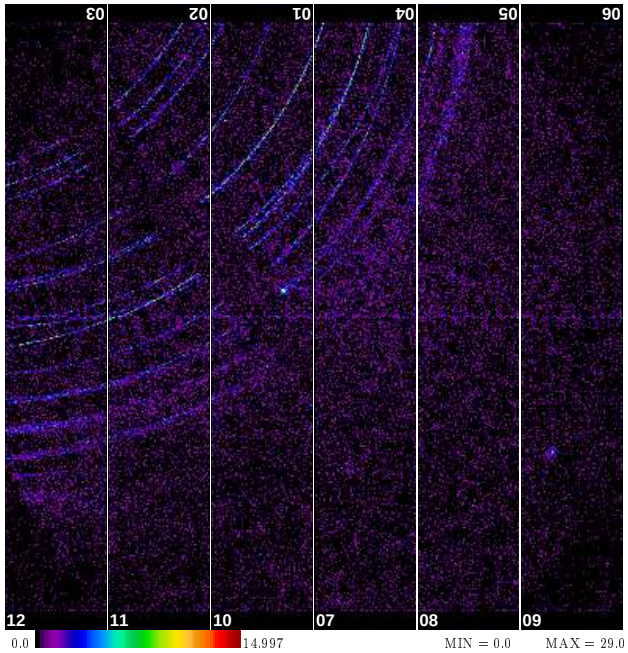
PSR B1757-24
0415_0103261901_PNS003
Singles, 0.50 – 2.00 keV
Mode = PrimeFullWindow Filter = Medium
$\alpha_{2000} = 18\,00\,56.2$ $\delta_{2000} = -24\,50\,2.8$ PA = 89.791°
$l = 5.269°$ $b = -0.858°$ $N_{H,gal} = 92.58 \times 10^{20}$ cm^{-2}



2002-03-16T21:26:28 HD164794
2002-03-16T22:51:09 0228_0008820101_PNU002
5081 s Singles, no MIPs, 40 – 1600 adu
Mode = PrimeFullWindow Filter = Thick
$\alpha_{2000} = 18\,03\,48.0$ $\delta_{2000} = -24\,20\,9.9$ PA = 91.135°
$l = 6.023°$ $b = -1.178°$ $N_{H,gal} = 86.26 \times 10^{20}$ cm^{-2}



2001-03-08T12:17:05 PSR J1757-2421
2001-03-08T17:41:59 0504_0112201501_PNS001
19494 s Singles, no MIPs, 40 – 1600 adu
Mode = PrimeFullWindow Filter = Medium
$\alpha_{2000} = 17\,57\,45.3$ $\delta_{2000} = -24\,23\,23.7$ PA = 270.034°
$l = 5.294°$ $b = -0.009°$ $N_{H,gal} = 152.72 \times 10^{20}$ cm^{-2}



2002-09-09T20:23:05
2002-09-09T21:46:24
4999 s

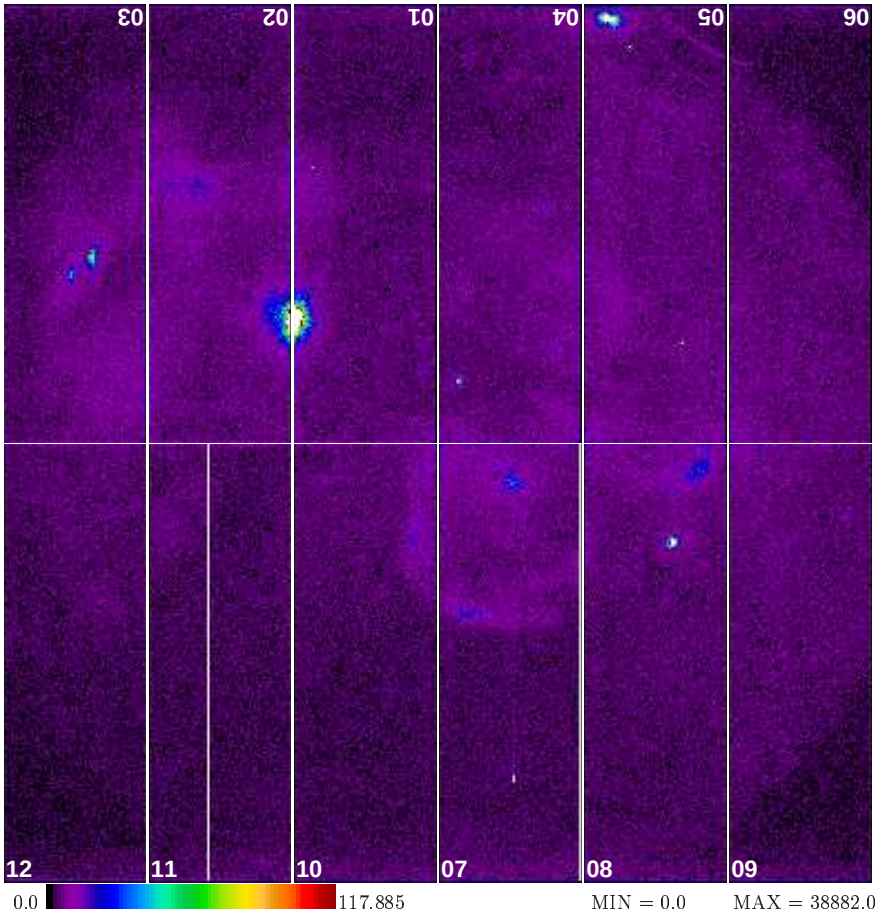
GX 5-1: 13.8', 57', 63'

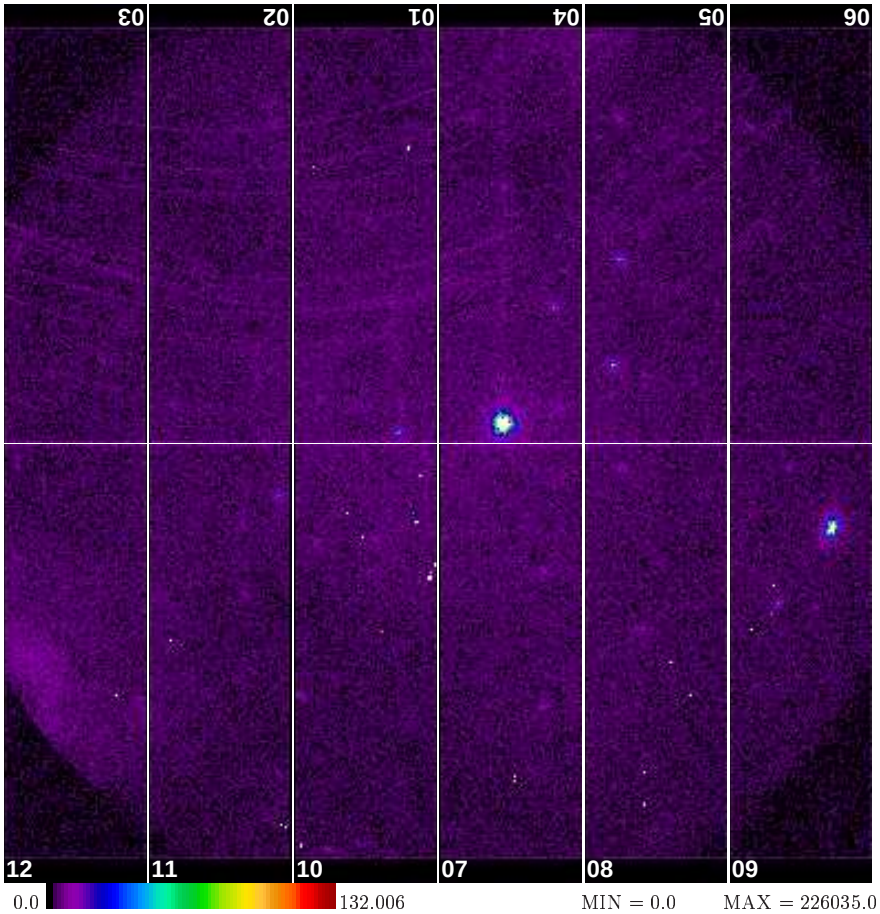
EPIC: single reflections: LMC X-1

First Light
0021_0115690201_PNU015
Singles, no MIPs, 40 – 1600 adu
Mode = PrimeFullWindow Filter = Medium
$\alpha_{2000} = 05\,36\,57.0$ $\delta_{2000} = -69\,13\,46.9$ PA $= -147.099°$
$l = 279.638°$ $b = -31.812°$ $N_{\mathrm{H,gal}} = 6.24 \times 10^{20}\,\mathrm{cm}^{-2}$

2000-01-19T17:30:04 N LMC 1995
2000-01-20T04:24:59 0189_0086770101_PNS002
39295 s Singles, no MIPs, 40 – 1600 adu
Mode = PrimeFullWindow Filter = Thin1
$\alpha_{2000} = 05\,27\,9.0$ $\delta_{2000} = -70\,00\,32.8$ PA $= 186.051°$
$l = 280.697°$ $b = -32.541°$ $N_{\mathrm{H,gal}} = 6.22 \times 10^{20}\,\mathrm{cm}^{-2}$

2000-12-19T17:32:38
2000-12-20T05:46:00
44002 s





LMC X-1: source in rows 1 – 12, 67'

EPIC: single reflections: N132D + LMC X-1

N132D
0991_0137551301_PNS001
Singles, $0.50 - 2.00$ **keV**

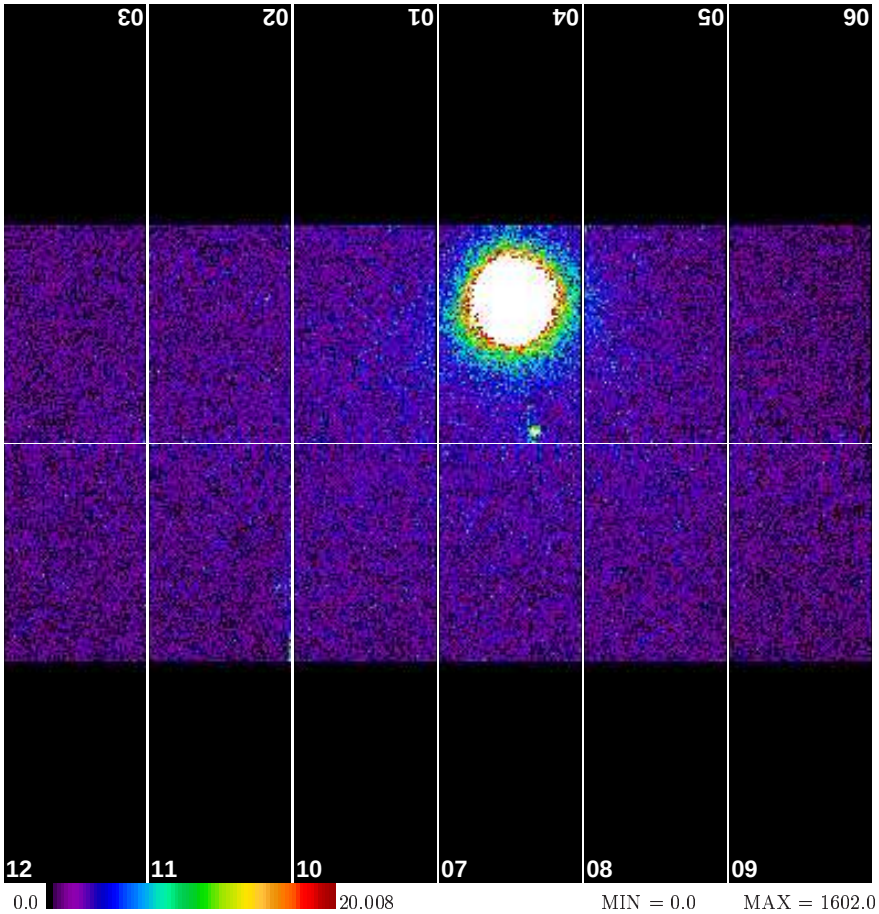
Mode = PrimeLargeWindow Filter = Thin1
$\alpha_{2000} = 05\,25\,34.8$ $\delta_{2000} = -69\,38\,27.0$ PA = 325.747°
$l = 280.294°$ $b = -32.738°$ $N_{\mathrm{H,gal}} = 6.22 \times 10^{20}\,\mathrm{cm}^{-2}$

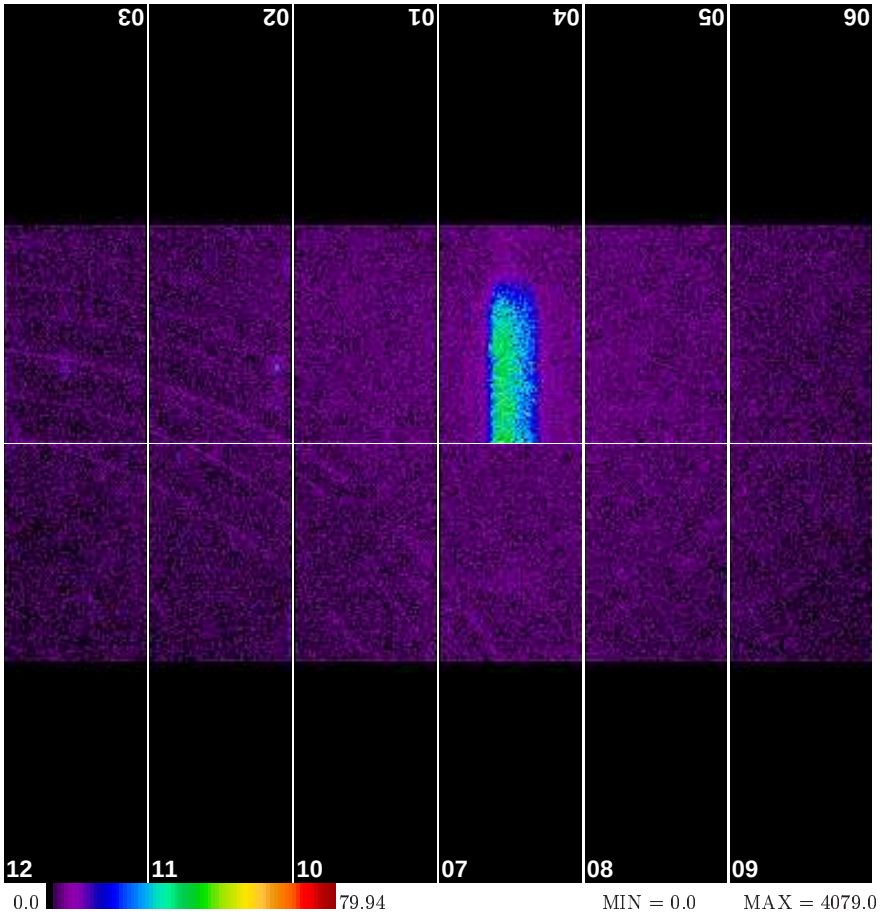
2005-05-07T12:53:13
2005-05-07T15:39:57
10004 s

N132D
0991_0137551401_PNS001
Singles, $0.50 - 2.00$ **keV**

Mode = PrimeLargeWindow Filter = Thin1
$\alpha_{2000} = 05\,26\,40.7$ $\delta_{2000} = -69\,34\,31.5$ PA = 325.737°
$l = 280.198°$ $b = -32.655°$ $N_{\mathrm{H,gal}} = 6.22 \times 10^{20}\,\mathrm{cm}^{-2}$

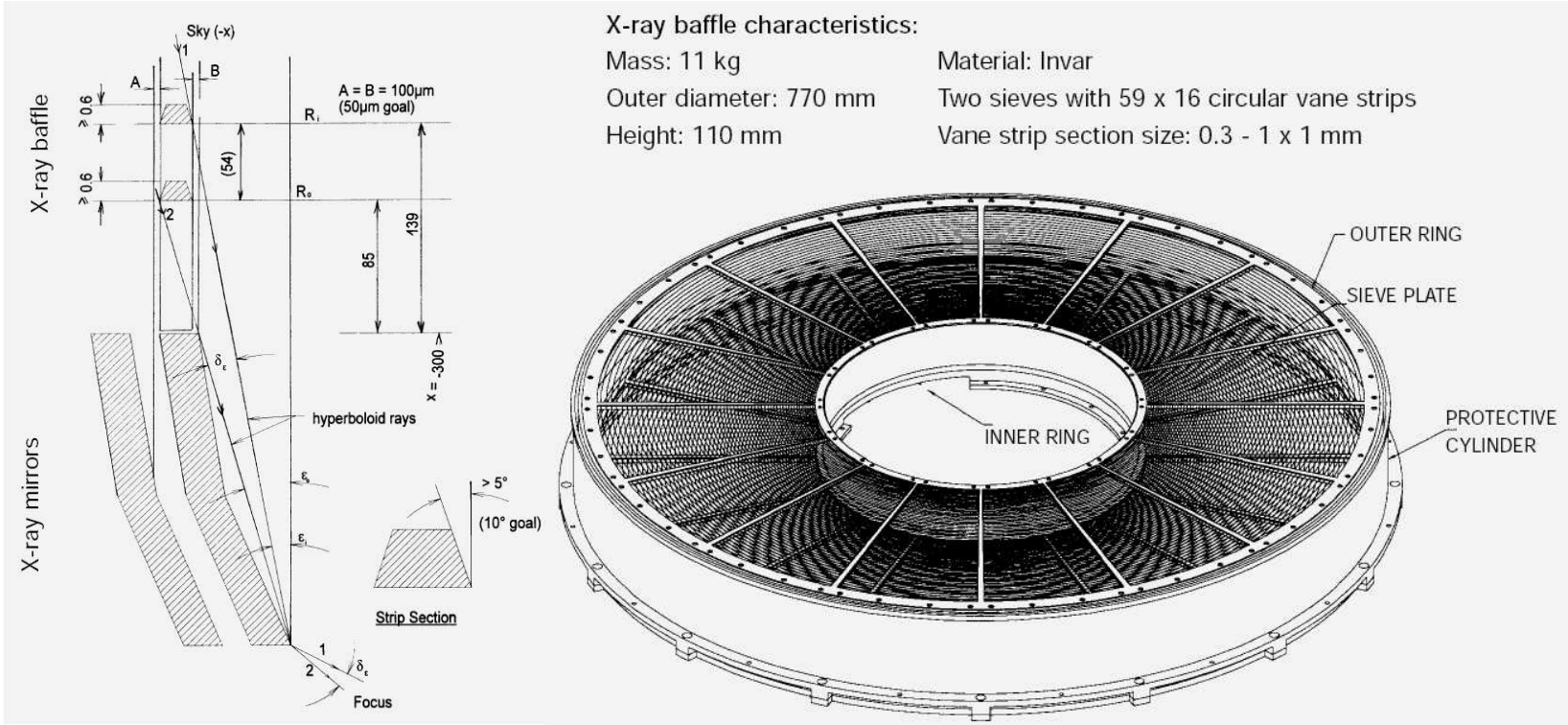
2005-05-07T16:55:23
2005-05-08T04:01:33
39970 s





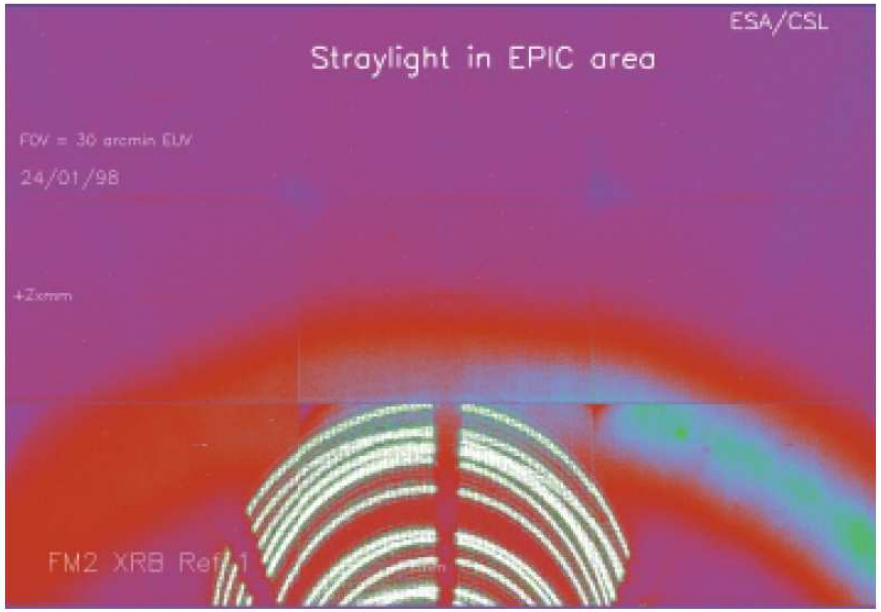
N132D out-of-window, LMC X-1: 74', 69'

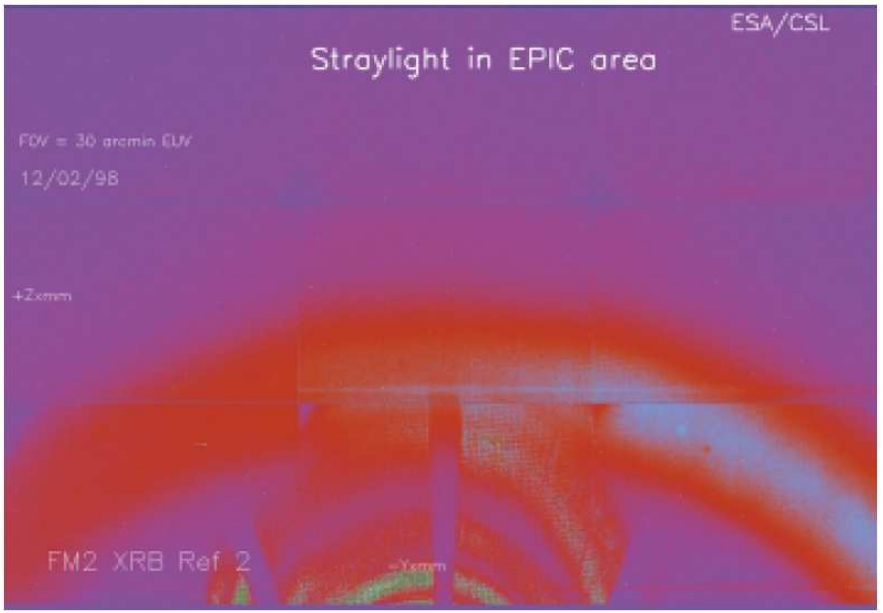
XRT: X-ray baffle: design



from: de Chambure et al., ESA bulletin 100 (Dec.1999), Fig.6

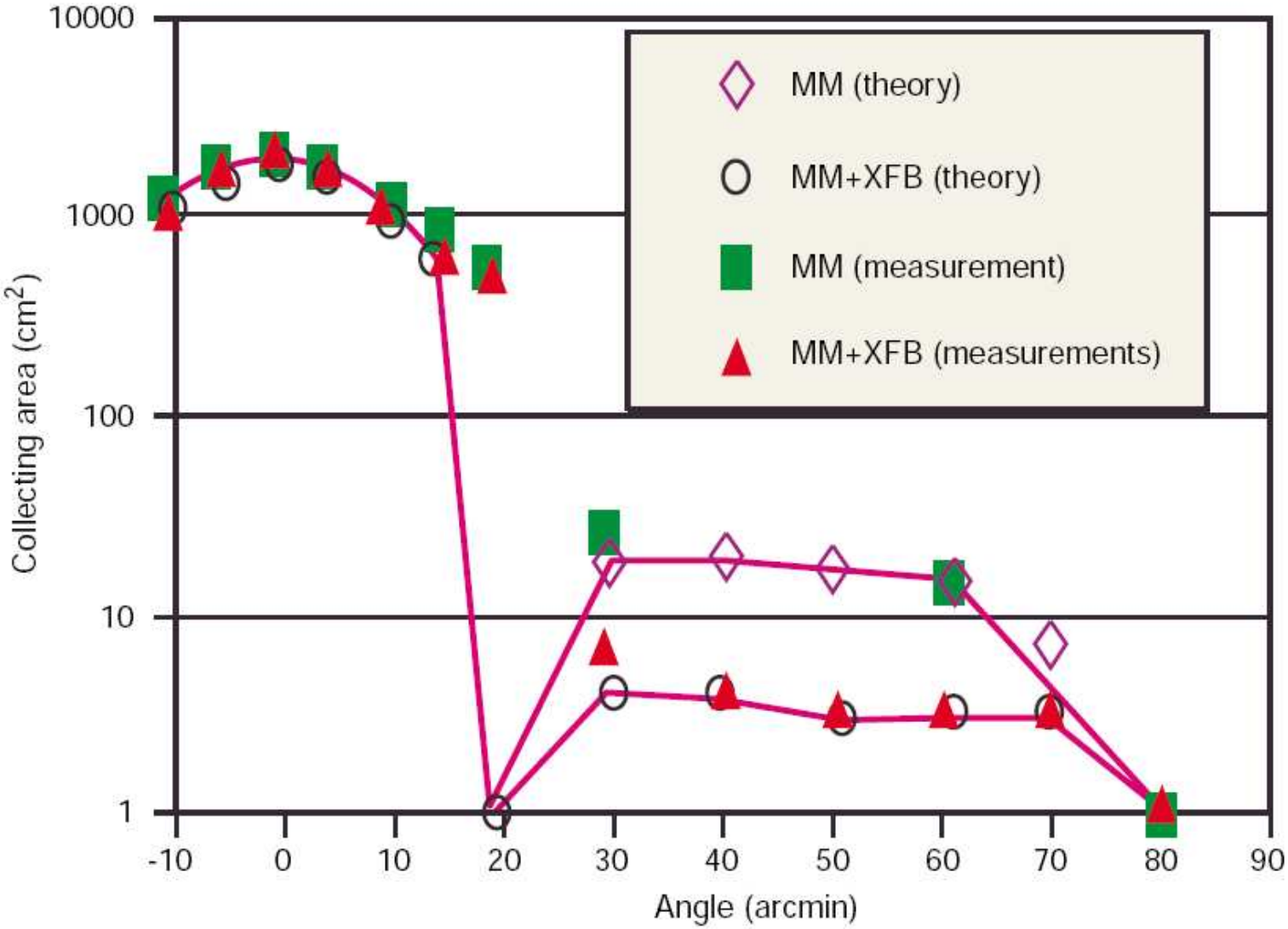
XRT: X-ray baffle: reduction (CSL)





from: de Chambure et al., ESA bulletin 100 (Dec.1999), Fig.12

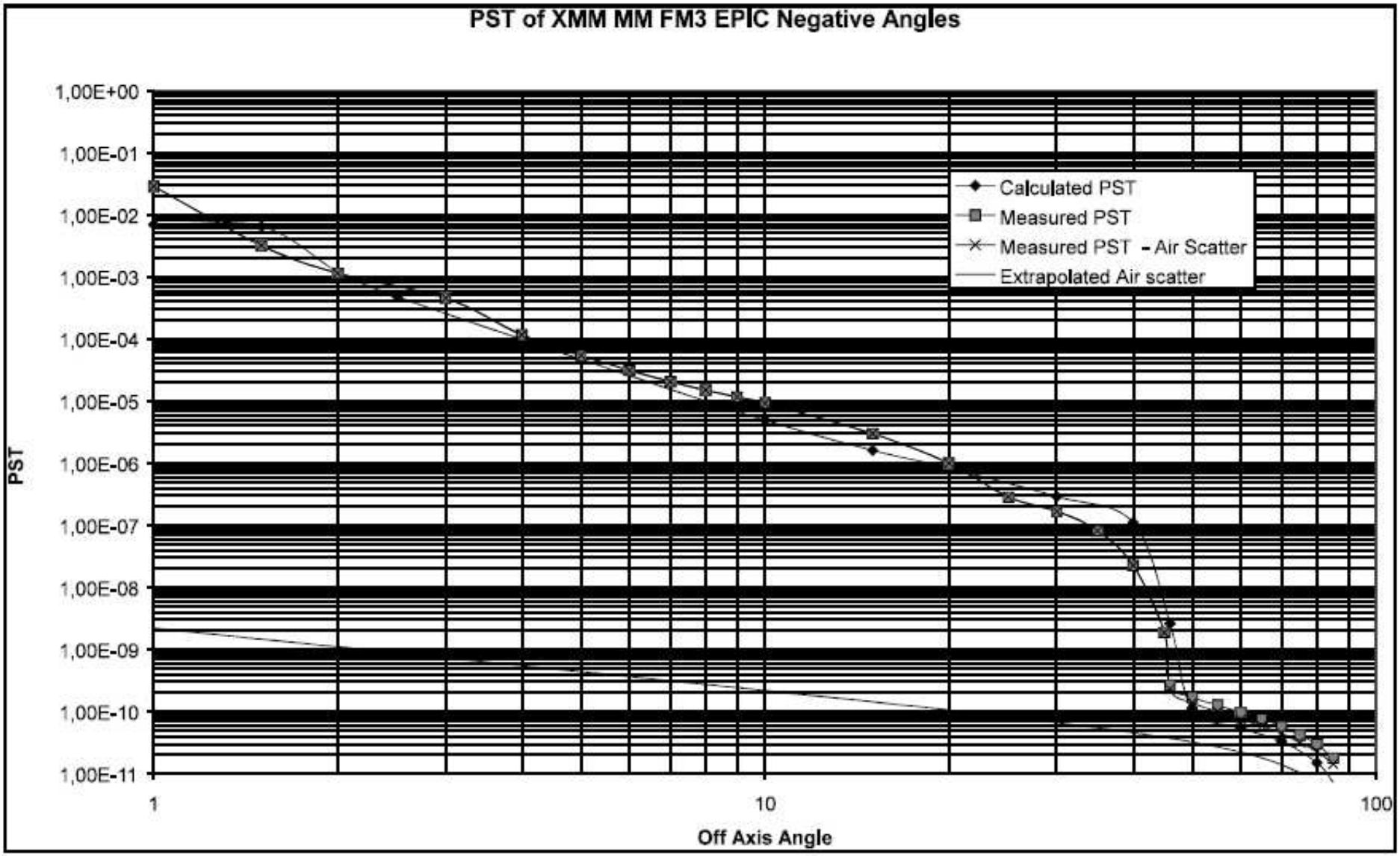
XRT: X-ray baffle: reduction (FM3)



from: de Chambure et al., ESA bulletin 100 (Dec.1999), Fig.13

3 cm^2 between 20' and 80', UHB Sect. 3.2.4, no CCF ?

XRT: very-far-field (FM3)



from: XMM-SOC-CAL-RP-0002 (Dornier XM-TR-DOR-0178)