


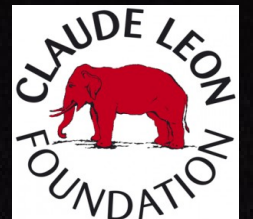
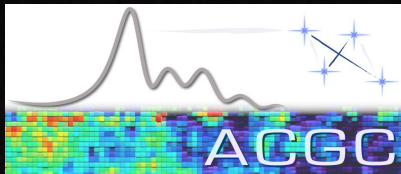


Circinus X-1 and SXP1062



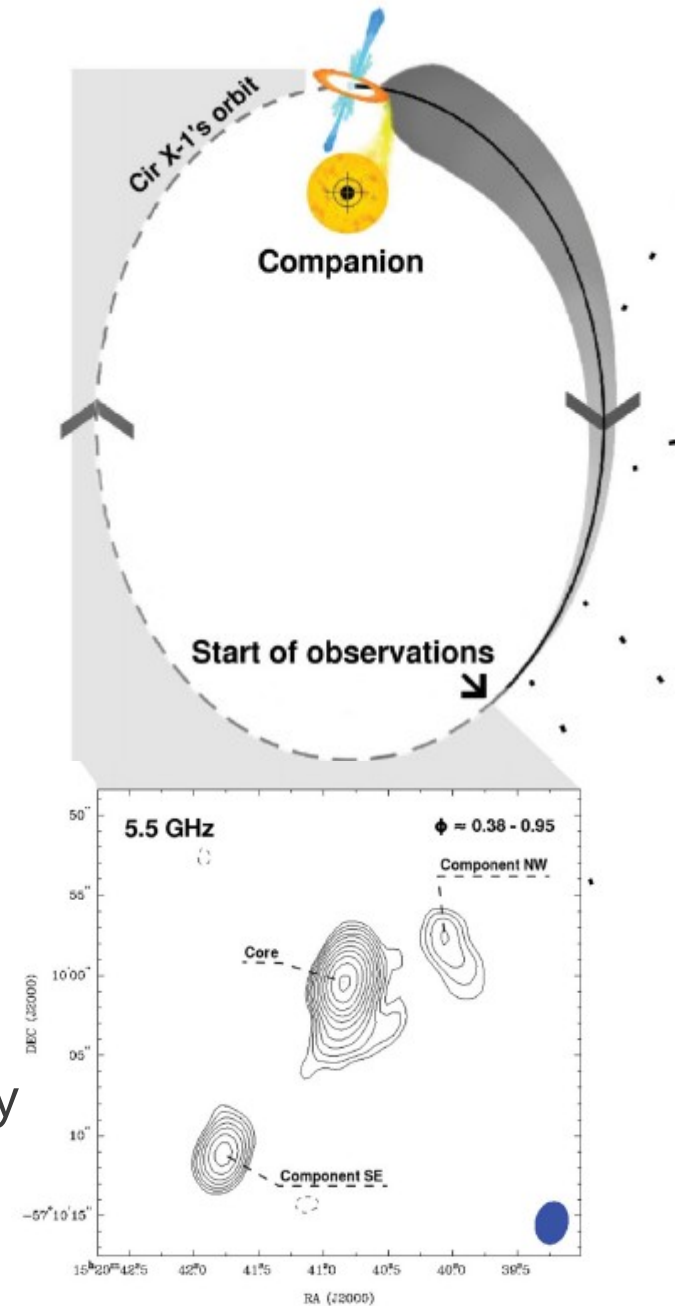
Matthew Schurch
ThunderKAT Multi-wavelength team
University of Cape Town

Claude Leon Foundation, NRF Research Grant



Brief History of Cir X-1

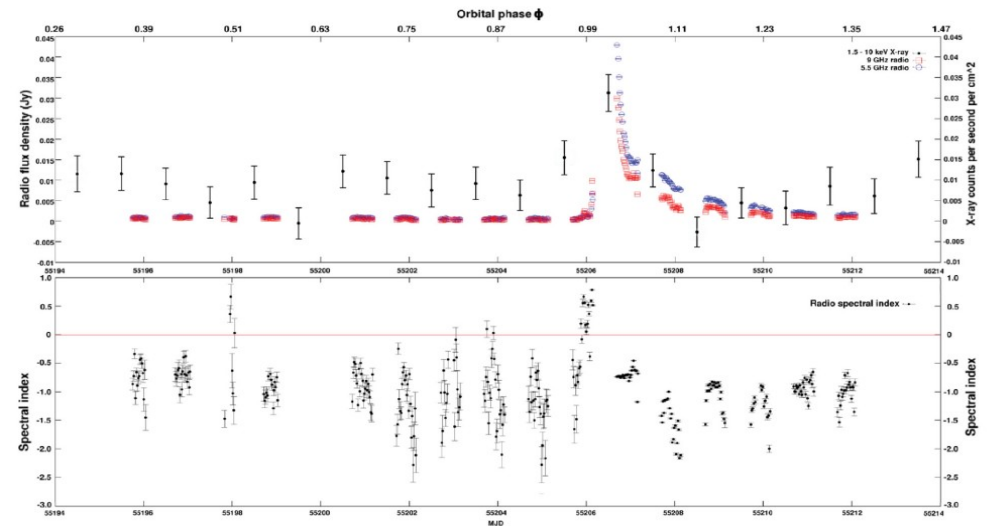
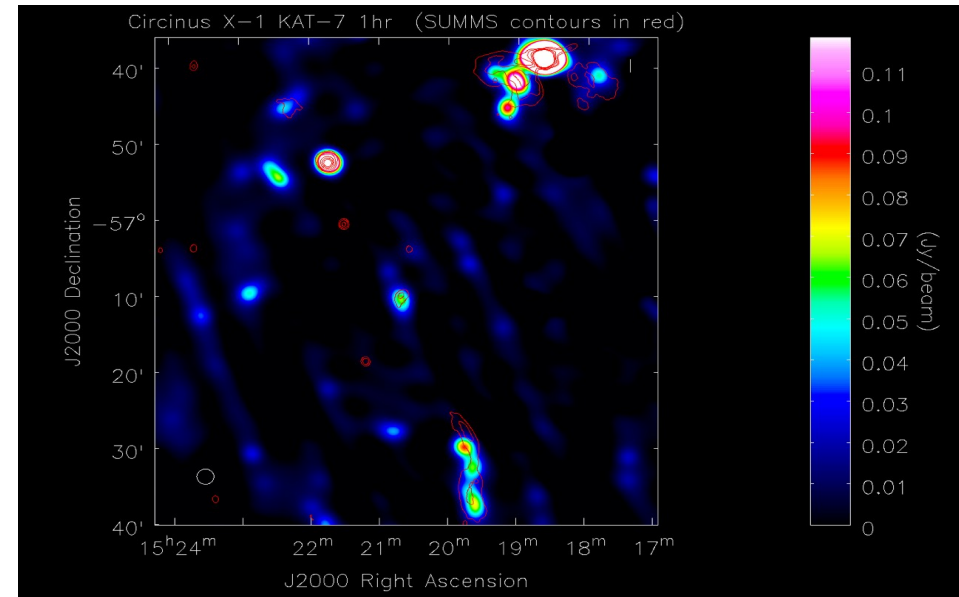
- An extremely peculiar X-ray binary.
- Rediscovery of bursting X-ray behaviour in May 2010 (Papitto et al. 2010) confirms Neutron star class binary.
- $P_{\text{orb}} = \text{MJD}43083.12+16.56$ (HartRAO, George Nicolson). $e=0.45$ (Jonker et al. 2007).
- Highly reddened optical counterpart with magnitudes $V=21.4$ to $K=11.0$.
- Optical counterpart still unclassified possibly $3-5M_{\odot}$ subgiant or $10M_{\odot}$ supergiant (Jonker et al. 2007).
- Radio jet, inclination angle $\sim 5^{\circ}$ (Fender and Hendry 2000)
- System is similar to BeXRBs, but with a lower B-field due to non detections of pulsations.



Calvelo et al. 2012

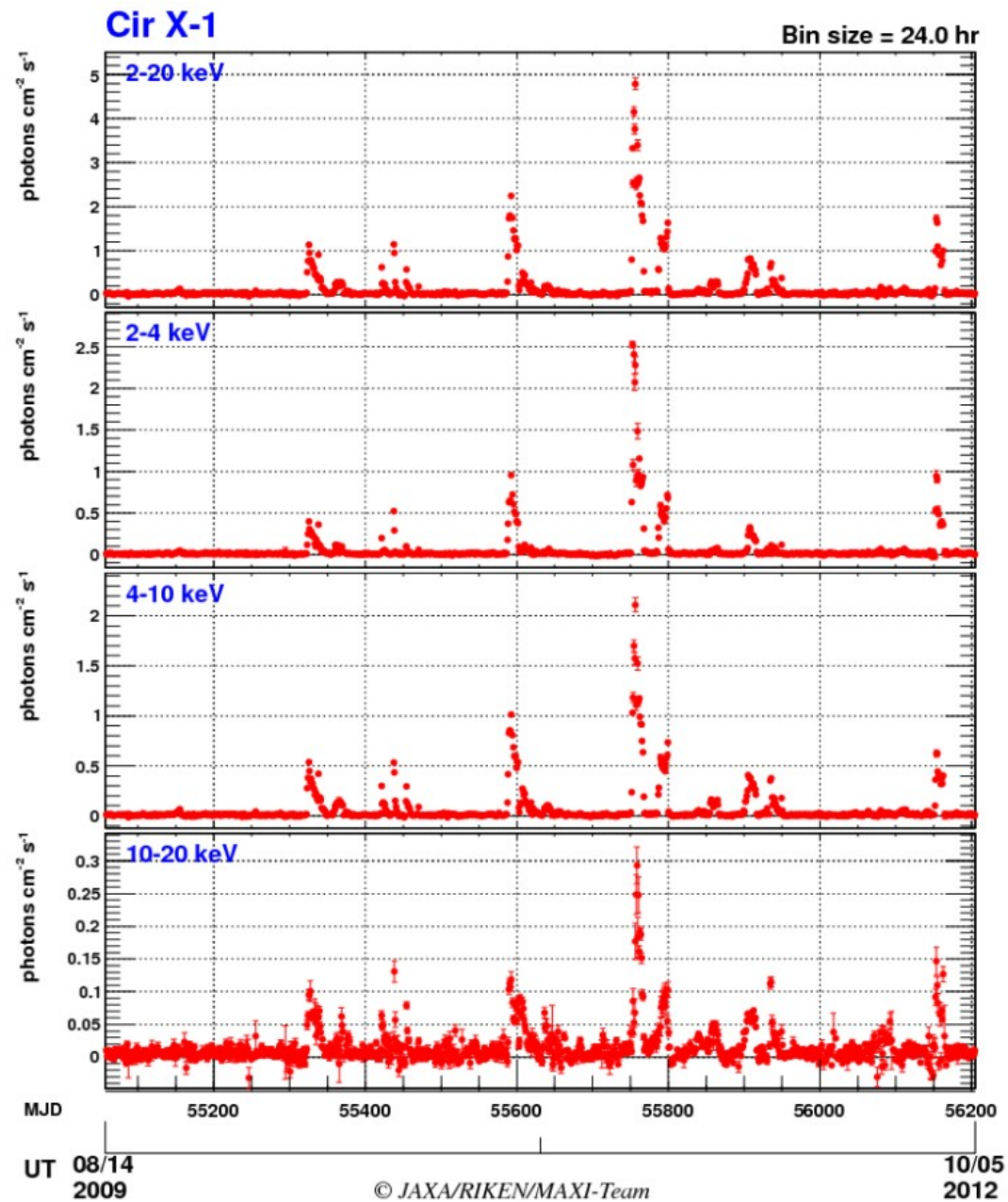
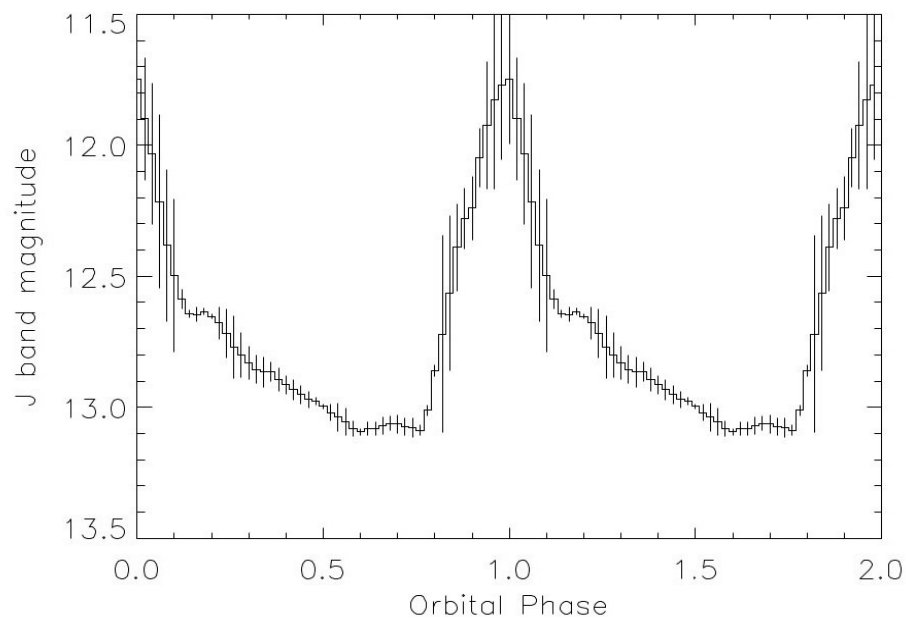
KAT-7 Monitoring

- Cir X-1 has formed a major part of the KAT-7 commissioning.
- Chosen due to regular radio and X-ray outbursts.
- Total of ~90 observations.
- Outburst characteristics
 - fast rise slow decay.
 - Spectral evolution consistent with internal shocks and jet flows.



Multi-wavelength Data

- MAXI – since 08/2009
- IRSF (JHKs)– 04/2011

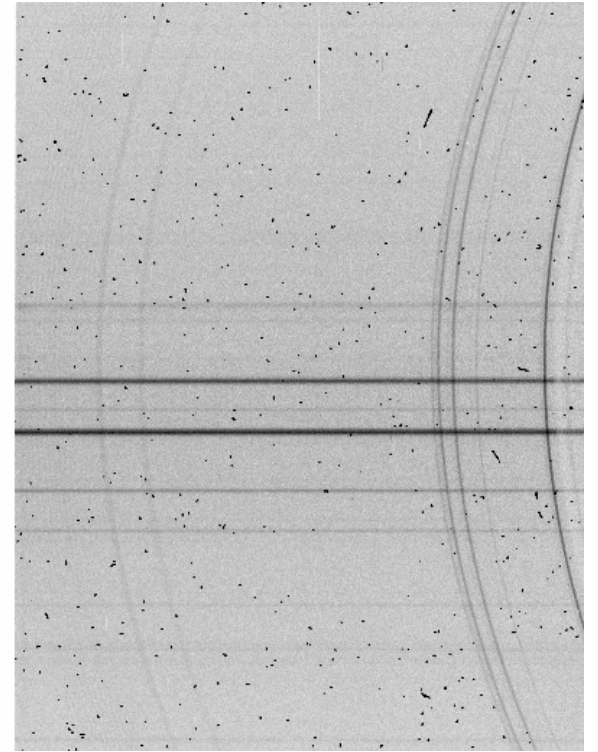
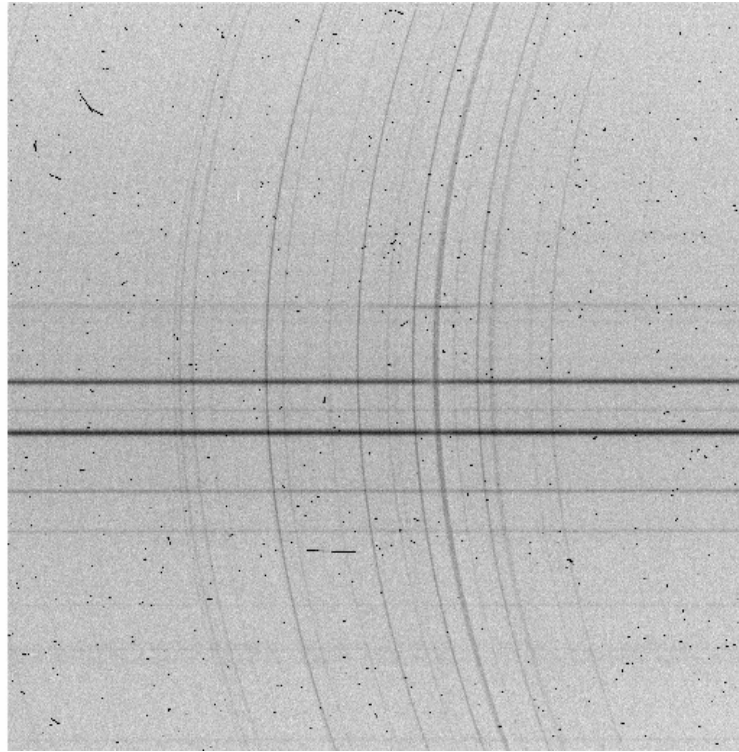
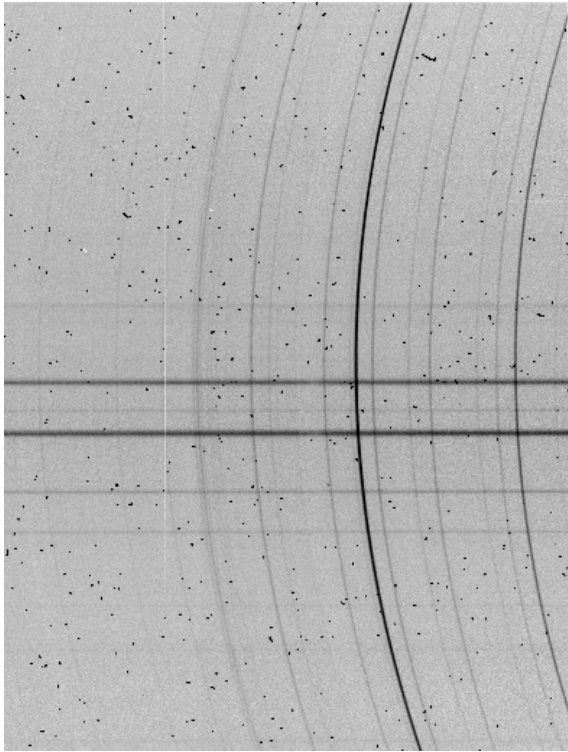


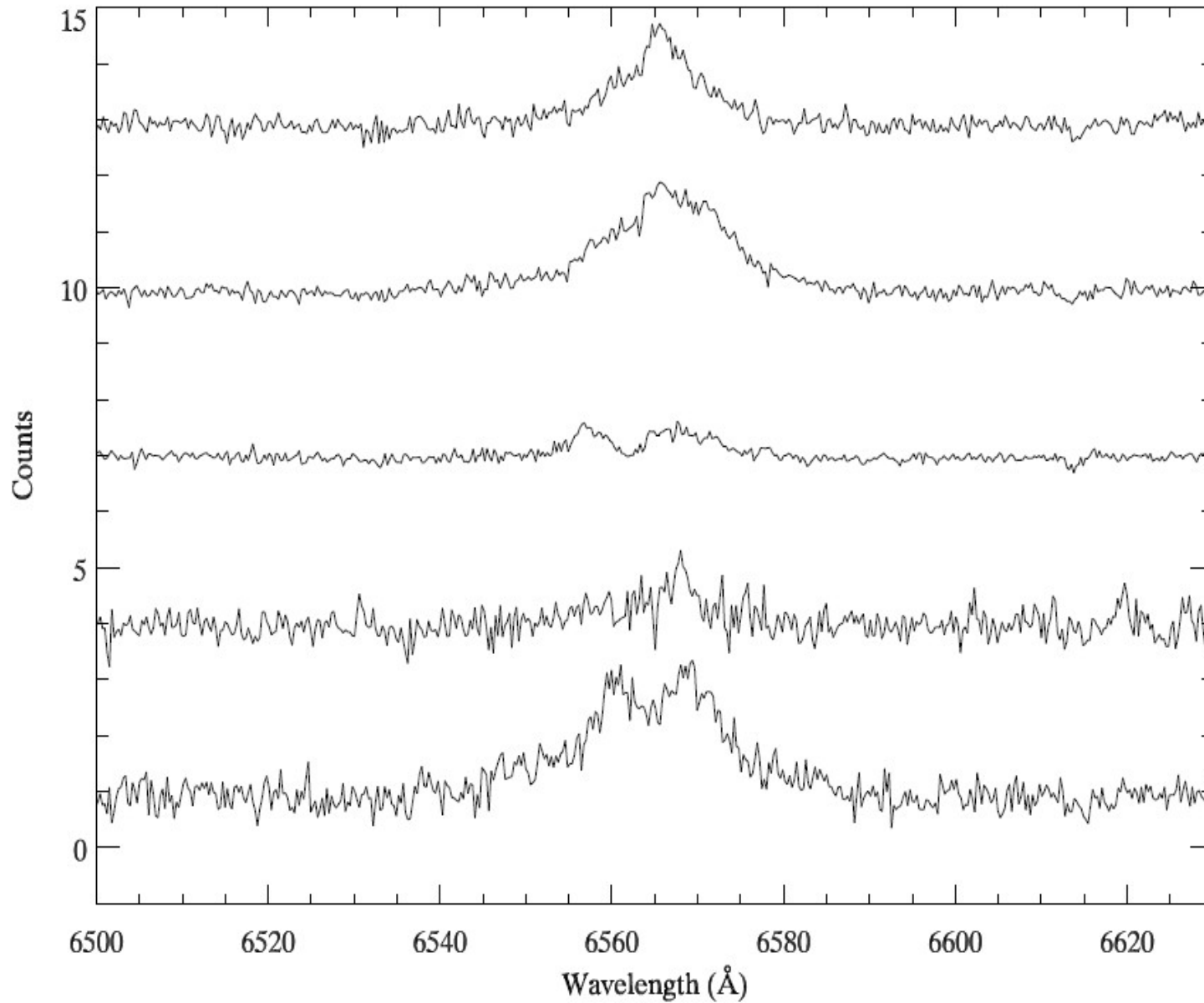
SALT Observations



- ToO time assigned to program 2011-3-RSA-UKSA-001 was used to observe Cir X-1.
 - High resolution red spectroscopy of X-ray binaries throughout outbursts, PG2300, $R \sim 11,000$.
- 2012-1-RSA_UKSC-003
 - PG2300, PG1800 with a resolution of around $R \sim 4500$
- Timed to coincide with periastron passage (16.6d orbital period) but with no moon due to optical faintness.
- 8 orbital phases requested.
- The result:
 - 6 epochs of observations but in three groups.

Raw Data





Highly variable
H α emission
associated with
varying accretion
disc / outflow

Complex
behaviour but
related to the
accretion flare /
jet launch

SXP1062

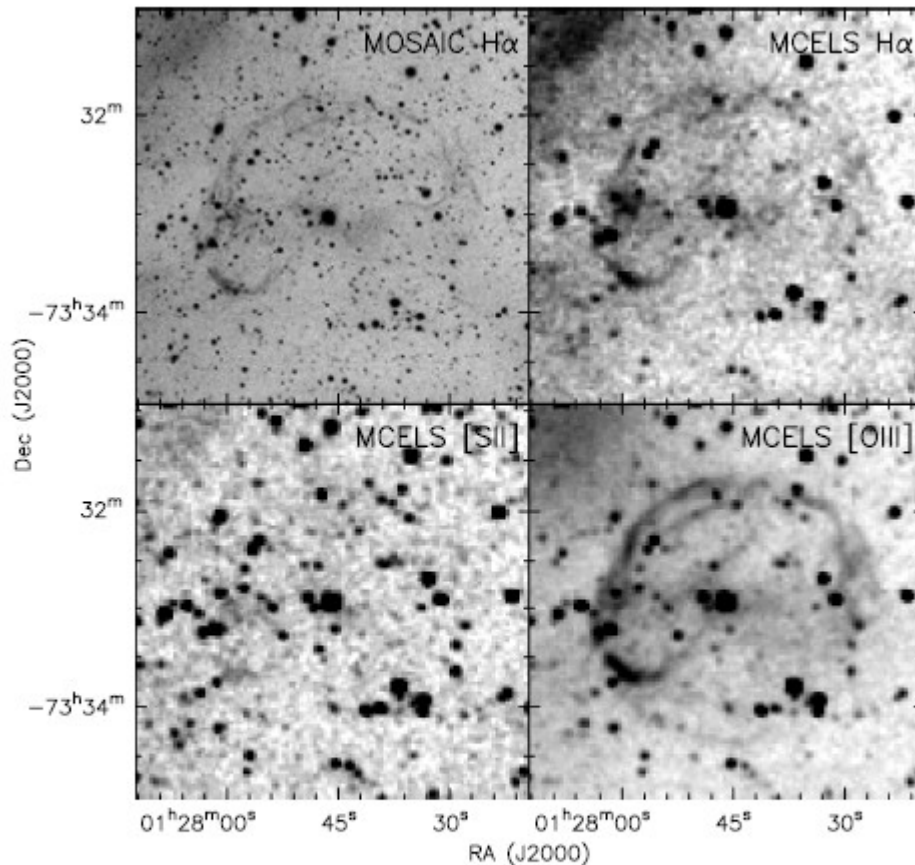


Figure 5. MOSAIC $H\alpha$ image and MCELS $H\alpha$, [S II] and [O III] images of a region centred on the position of 2dFS 3831 = SXP 1062 and showing the shell nebula detected around the target.

Chandra detection near
NGC602

2dFS 3831

RA = 01:27:46,

Dec. = -73:32:56

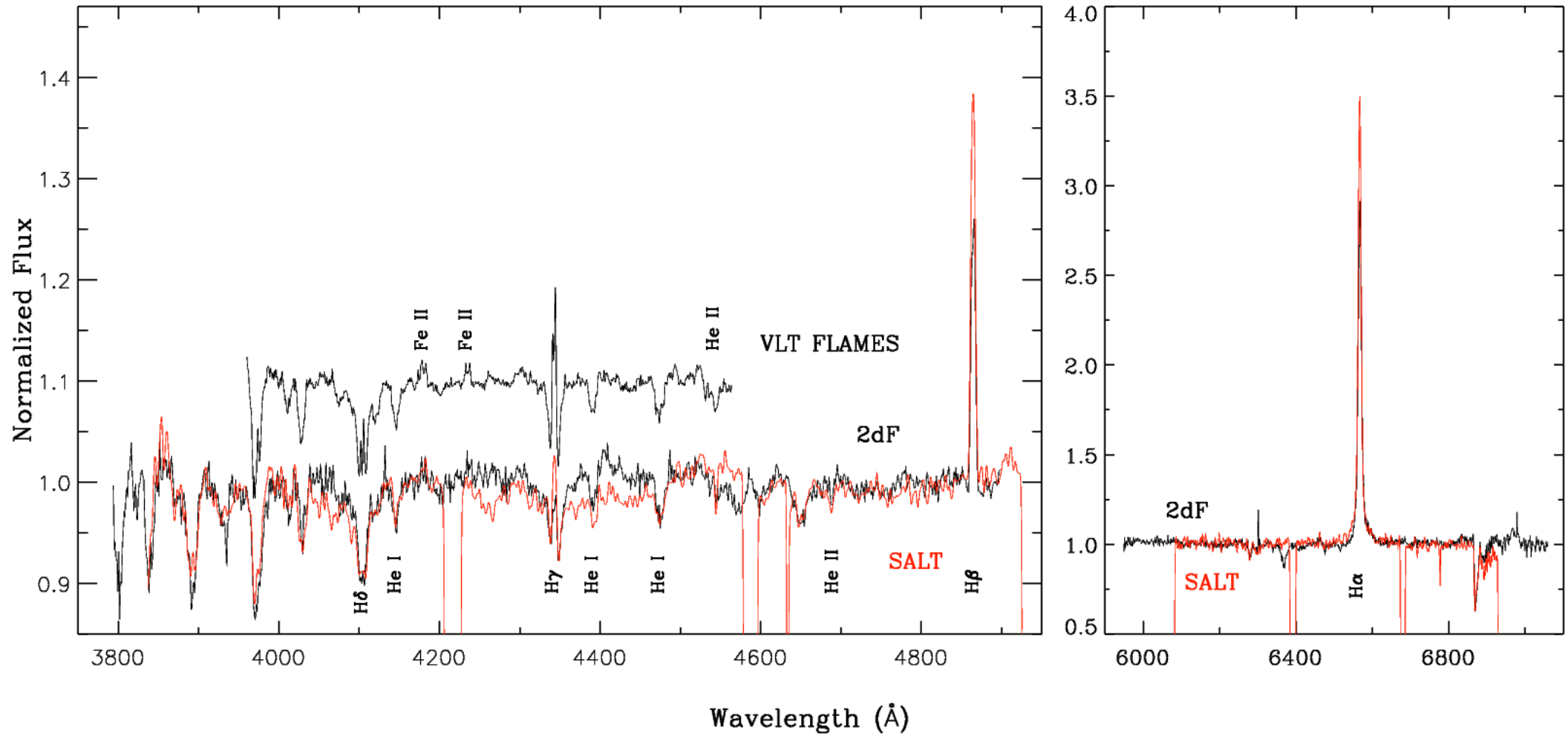
Spin period 1062s

Recently detected by XMM
monitoring.

XMM ToO scheduled for
2012-10-14

-Pulse period slowed to
1070s

SALT - 2012-10-13



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