Multi-wavelength Study of Gamma-ray Binary: LS I+61° 303

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Be/X-ray Binary: LSI+61 303

V=10.7 mag  d ~ 2 kpc (Hutchings & Crampton 1981)
## Orbit solution for LSI+61 303

In units of the semi-major axis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_{\text{orb}}$</td>
<td>26.496 days</td>
</tr>
<tr>
<td>$e$</td>
<td>0.72</td>
</tr>
<tr>
<td>$\omega$</td>
<td>21 deg</td>
</tr>
<tr>
<td>$\phi_{\text{peri}}$</td>
<td>0.23</td>
</tr>
<tr>
<td>$a \sin(i) (R_{\text{sun}})$</td>
<td>8.2 +/- 2.9</td>
</tr>
<tr>
<td>$T_0^*$</td>
<td>2443366.775</td>
</tr>
</tbody>
</table>

(Casares et al. 2005)

*The radio ephemeris of Gregory (2002)*
LSI$+61^\circ303$: a microquasar?

$\nu \geq 0.4c$

Massi et al. (2001)

Cometary Shape: A Be-pulsar binary?

Dhawan, Vivek; Rupen, M. 2006
First high-energy (> 100 MeV) COS-B gamma-ray source: \text{CG/2CG 135+01 = LS I +61 303} (Gegory & Taylor 1978)
Periodic gamma-ray emission $> 400$ GeV was observed by MAGIC?

Peaked at around the apastron point.

Albert et al. (2006)
FERMI LAT OBSERVATIONS OF LS I +61°303: FIRST DETECTION OF AN ORBITAL MODULATION IN GeV GAMMA RAYS

A. A. ABDI, M. ACKERMANN, M. AJELLO, W. B. ATWOOD, M. AXELSSON, L. BALDINI, J. BALLET, G. BARBIELLINI

100MeV-20GeV 1-day binned light curve between 2008 Aug. 24 and 2009 March 24
Light Curves of LSI+61 303 in different energy bands.
Gamma-ray emission models

Mirabel 2006
2.16m Telescope at Xinglong Station, National Astronomical Observatories
Long-term variability of the Hα line

1424 days ~ 4 year

Liu & Yan (2005)
Additional component observed in the Halpha line in 2001

The EW of the new component is between -1.06 and -2.51 Å, which is comparable to the Halpha emission of the accretion disk around a neutron star.

(Liu & Yan 2005)
Short-term variability of the Hα line

[Graphs and data points]

$P_{\text{orb}}$ !
Multi-wavelength variability of the Be/X-ray binary LSI+61 303
~MJD 54900

(Hadasch et al. 2012)
Thanks!