SNR 0509-68.7

1 Summary

- **Common Name:** N 103B
- **Distance:** 50 kpc (distance to LMC, Westerlund(1990))
- **Center of X-ray emission (J2000):** ( 05 08 59.7, -68 43 35.5)
- **X-ray size:** 32" x 30"
- **Description:** ??

1.1 Summary of Chandra Observations

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Obs ID</th>
<th>Instrument</th>
<th>Exposure uf</th>
<th>Exposure f</th>
<th>Date Observed</th>
<th>Aimpoint (J2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500012</td>
<td>125</td>
<td>ACIS-23678</td>
<td>40.3</td>
<td>32.4</td>
<td>1999-12-04</td>
<td>( 05 08 59.0, -68 43 30.0 )</td>
</tr>
</tbody>
</table>

1.2 Chandra Counts and Fluxes

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy Range (keV)</th>
<th>Signal (counts)</th>
<th>Rate (counts s⁻¹)</th>
<th>F_5 (ergs cm⁻² s⁻¹)</th>
<th>F₁ (ergs cm⁻² s⁻¹)</th>
<th>L₅ (ergs s⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>total</td>
<td>0.3 - 10.0</td>
<td>2.26e+05</td>
<td>6.982e+00</td>
<td>2.19e-11</td>
<td>5.94e-11</td>
<td>1.77e+37</td>
</tr>
<tr>
<td></td>
<td>( 125 )</td>
<td>0.3 - 2.1</td>
<td>2.16e+05</td>
<td>6.94e+00</td>
<td>1.88e-11</td>
<td>5.61e-11</td>
</tr>
<tr>
<td></td>
<td>2.1 - 10.0</td>
<td>9.437e+08</td>
<td>2.914e+01</td>
<td>3.16e-12</td>
<td>3.37e-12</td>
<td>1.00e+36</td>
</tr>
</tbody>
</table>

- **NH = 0.31 (10²³cm⁻²)**
- **Assumed distance:** 50 kpc (distance to LMC, Westerlund(1990))
- **nH was derived with two thermal plasma model**

1.3 Nearby Sources

<table>
<thead>
<tr>
<th>Obs ID</th>
<th>Position (J2000)</th>
<th>Size</th>
<th>Net Count</th>
<th>Count rate</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>( 05 07 36.3, -68 47 52.7 )</td>
<td>&lt; 14.1&quot;</td>
<td>322.0</td>
<td>7.99e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 08 03.1, -68 40 16.5 )</td>
<td>&lt; 7.2&quot;</td>
<td>67.9</td>
<td>1.69e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 08 08.4, -68 40 46.4 )</td>
<td>&lt; 6.1&quot;</td>
<td>135.0</td>
<td>3.35e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 08 12.9, -68 44 35.6 )</td>
<td>&lt; 5.9&quot;</td>
<td>61.3</td>
<td>1.53e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 08 32.7, -68 54 29.1 )</td>
<td>&lt; 17.6&quot;</td>
<td>881.0</td>
<td>2.19e-02</td>
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</tr>
<tr>
<td></td>
<td>( 05 08 48.0, -68 45 53.7 )</td>
<td>&lt; 2.5&quot;</td>
<td>5.0</td>
<td>1.24e-04</td>
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</tr>
<tr>
<td></td>
<td>( 05 09 06.8, -68 39 37.2 )</td>
<td>&lt; 3.6&quot;</td>
<td>49.2</td>
<td>1.22e-03</td>
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<tr>
<td></td>
<td>( 05 09 17.1, -68 40 52.9 )</td>
<td>&lt; 1.8&quot;</td>
<td>34.7</td>
<td>8.61e-04</td>
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</tr>
<tr>
<td></td>
<td>( 05 09 39.8, -68 53 25.4 )</td>
<td>&lt; 15.5&quot;</td>
<td>51.2</td>
<td>1.27e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 09 48.2, -68 39 57.5 )</td>
<td>&lt; 3.1&quot;</td>
<td>19.7</td>
<td>4.89e-04</td>
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</tr>
<tr>
<td></td>
<td>( 05 10 09.3, -68 52 52.0 )</td>
<td>&lt; 16.2&quot;</td>
<td>117.0</td>
<td>2.90e-03</td>
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</tr>
<tr>
<td></td>
<td>( 05 10 22.7, -68 39 12.8 )</td>
<td>&lt; 6.8&quot;</td>
<td>53.4</td>
<td>1.33e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 10 22.8, -68 50 57.9 )</td>
<td>&lt; 16.3&quot;</td>
<td>51.9</td>
<td>1.29e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 10 26.1, -68 52 31.7 )</td>
<td>&lt; 19.2&quot;</td>
<td>51.2</td>
<td>1.27e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 10 36.4, -68 40 29.7 )</td>
<td>&lt; 10.3&quot;</td>
<td>50.9</td>
<td>1.26e-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( 05 10 45.9, -68 56 28.8 )</td>
<td>&lt; 33.6&quot;</td>
<td>675.0</td>
<td>1.68e-02</td>
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</tr>
<tr>
<td></td>
<td>( 05 10 48.3, -68 45 25.7 )</td>
<td>&lt; 12.3&quot;</td>
<td>1080.0</td>
<td>2.68e-02</td>
<td></td>
</tr>
</tbody>
</table>

(note) 1. This nearby source list is incomplete.
2. The size given above is the size of the region used in detecting that source.
3. For each source, background was subtracted from annular region around the source.

1.4 References

- Dickel and Milne, 1995 AJ, 109, 200 : ATCA
- Westerlund, 1990 A&ARv, 2, 29 : Distance to LMC
2 Fit Detail

- See spectrum page for used regions.

Two component were assumed.

2.1 Component 1:

- represented by region far east
  
  source=(xswabs * xsvapec)  
  reduced $\chi^2 = 1.3488$  
  $n_h = 0.2826 \times 10^{22} / cm^2$

2.2 Component 2:

- represented by region small clump around center
  
  source=(xswabs * (xsapec + xsapec))  
  reduced $\chi^2 = 1.89472$  
  $n_h = 0.3378 \times 10^{22} / cm^2$

2.3 Total:

- Above two component were added together.
  
  fit was done with all the parameter(except nH and normalization factor) fixed at values from above fit.
  
  source=(xswabs * ((xsapec + xsapec) + xsvapec))  
  reduced $\chi^2 = 20.8426$  
  $n_h = 0.3071 \times 10^{22} / cm^2$

3 Chandra Images : Band Images

- Left : raw image, binned by 1x1 pixel
- Right : gaussian smoothed version of above ($\sigma = 2$ pixel)

3.1 Wide Band Images

Total : 300-10000 eV

3.2 Soft Band : 300-2100 eV
3.2 Band images used in true color image.

Red : 300-600 eV

Green : 600-900 eV

Blue : 900-10000 eV
3.3 Misc.

- 1650-2150 eV

- 4200-10000 eV

4 Chandra Images: True Color

- Individual images are adaptively smoothed.
- Warning: the adaptive smoothing process sometimes produces artifacts.
- Convolution method: fft
- Kernel type: gauss
- Significance (min, max): (3, 5)

RED: 300-600 eV
GREEN: 600-900 eV
BLUE: 900-10000 eV
5 Chandra Images: Equivalent Width Map

5.1 Equivalent Width Images

- Individual images (line and two continua) are binned by given pixel size and then adaptively smoothed.
- Same scale map (from the least count images) was used for all three images.
- Continuum at given line position was estimated by linear interpolation of two continuum images in pixel-by-pixel base.

<table>
<thead>
<tr>
<th>Continuum</th>
<th>Line</th>
<th>Continuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>300-500 eV</td>
<td>500-700 eV</td>
<td>700-1100 eV</td>
</tr>
</tbody>
</table>

6 Chandra Spectrum

- Images show regions used to extract spectra
- Regions with red strikes are excluded

6.1 ObsID 125

- Background was subtracted from the region around the SNR.
small clump around center
7 Radio Image

- left: radio image
- right: chandra x-ray image with radio contour lines

3.5-cm

- 3.5-cm flux density: 0.15 Jy
- Image from Dickel and Milne (1995)

6-cm

- 6-cm flux density: 0.26 Jy
- Image from Dickel and Milne (1995)
8 Images from Survey Missions

- Left: Chandra Image (0.3-10 keV)
- Center: Images from SkyView with the same scale
- Right: Images from SkyView with a reduced scale

ROSAT PSPC (1.0 deg): X-ray (0.1-2.4 keV)

IRAS 12 micron: Infrared (12 micron)

IRAS 25 micron: Infrared (25 micron)

IRAS 60 micron: Infrared (60 micron)

IRAS 100 micron: Infrared (100 micron)

4850 MHz: Radio (4850 MHz continuum)

Digitized Sky Survey: Optical (J or E band images with a few exceptions)
The Two Micron All Sky Survey (J-band): IR (1.25 microns)

The Two Micron All Sky Survey (H-band): IR (1.65 microns)

The Two Micron All Sky Survey (K-band): IR (2.17 microns)