Chapter 3

Chromospherically active

Variable Stars

......The discovery of the RS CVn binaries was intimately related to the discovery of star spots, an interesting episode of astronomical history.

... Douglas Hall
In this chapter four chromospherically active variable star; Sigma Gemini, VY Aries, IM Peg and DX Leo are discussed.

3.1 Sigma Gemini (HD 62044)

The Sigma Gemini (HD 62044; HR 2973; HIP 37629) is chromospherically active bright binary variable star belonging to RS CVn type variable from Gemini Constellation. The maximum and minimum V magnitudes of Sigma Gemini are 4.13 and 4.29 respectively. The photometric period of Sigma Gemini is 19.423 days. The Johnson B-V color index of Sigma Gemini is 1.116. The RA and DEC of Sigma Gemini are 07h 43m 53.83s and +28° 51’ 40.1” respectively. The spectroscopic observations of this star show strong Ca II H & K emission (Strassmeier et al. 1993) as well as variable Hα emission (Eker 1986). The Spectral type of Sigma Gemini is K1 III SB. The sky map view of Sigma Gemini (HD 62044) with comparison star (HD 60318) using SkyMap Pro 7 is as shown in fig. 3.1.

Fig. 3.1: Sigma Gemini (HD 62044) with comparison star (HD 60318) in Sky map
3.2 VY Aries (HD 17433)

The VY Aries (HD 17433; HIP 13118) is a chromospherically active variable star belonging to the RS CVn type variable. The maximum and minimum V magnitudes of VY Aries are 6.83 and 7.01 respectively. The RA and DEC of VY Aries are 02h 49m 18.14s and +31° 9' 19.5'' respectively. Using sixteen years of photometry data accumulated during 1974-1991, Strassmeier & Bopp (1992) determined a very accurate photometric period of 16.42 days for this star. The Johnson B-V color index of VY Aries is 0.956. The Spectral type of VY Aries is K0. The sky map view of VY Aries (HD 17433) with comparison star (HD 17572) using SkyMap Pro 7 is as shown in fig. 3.2.

![Sky map of VY Aries (HD 17433) with comparison star (HD 17572)](image)

**Fig. 3.2:** VY Aries (HD 17433) with comparison star (HD 17572) in Sky map
3.3 IM Pegasi (HD 216489)

The IM Peg (HD 21489; HIP 112997; HR 8703) is chromospherically active bright binary variable star belonging to RS CVn type variable (Hall 1976). The RA and DEC of IM Peg are 22h 53m 29.38s and +16° 53’ 31.1” respectively. The maximum and minimum V magnitudes of IM Peg are 5.60 and 5.85 respectively. The photometric period of IM Peg is 24.6 days. The Johnson B-V color index of IM Peg is 1.132. The spectroscopic observations of this star show strong Ca II H & K emission. The Spectral type of IM Peg is K1 III SB. The sky map view of IM Peg with comparison star (HD 216635) using SkyMap Pro 7 is as shown in fig. 3.3.

![Sky Map of IM Peg](image)

**Fig. 3.3:** IM Peg (HD 216489) with comparison star (HD 216635) in Sky map
3.4 DX Leo (HD 82443)

The DX Leo (HD 82443; HIP 46843) is chromospherically active variable star belonging to RS CVn type variable. DX Leo ($V = +7.01$, $B - V = +0.76$, Prot ' 5.377d) is a single K0V star with constant radial velocity $V_r = +8:2$ kms$^{-1}$ (Gaidos et al. 2000). The RA and DEC of DX Leo are $09h 33m 15.78s$ and $+26^0 56' 48.5''$ respectively. The sky map view of DX Leo with comparison star (HD 82191) using SkyMap Pro 7 is as shown in fig. 3.4.

![Fig. 3.4: DX Leo (HD 82443) with comparison star (HD 82191) in Sky map](image)
**Table 3.1**: Log of our photometric observations

<table>
<thead>
<tr>
<th>Variable Star</th>
<th>Comparison Star</th>
<th>Nights</th>
</tr>
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<tbody>
<tr>
<td>Sigma Gemini&lt;sup&gt;1&lt;/sup&gt; HD 62044</td>
<td>HD 60318</td>
<td>32</td>
</tr>
<tr>
<td>VY Ari&lt;sup&gt;2&lt;/sup&gt; HD 17433</td>
<td>HD 17572</td>
<td>27</td>
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<tr>
<td>IM Peg&lt;sup&gt;3&lt;/sup&gt; HD 216489</td>
<td>HD 216635</td>
<td>25</td>
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<tr>
<td>DXLeo&lt;sup&gt;4&lt;/sup&gt; HD 82443</td>
<td>HD 82191</td>
<td>18</td>
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</tbody>
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