Introduction

Given that the measurements for our first report were the results of a single image, we felt that it would be more appropriate and would also provide better results if new measurements were obtained based on several new photographs. Having created these more accurate results, the hope is to publish this new data in the hope that it would become the most current data for BU 109. Given that BU 109 is currently (August 2015) very high in the Australian sky and, with his familiarity with the remote iTelescope facilities at Siding Spring, Wilfried Knapp used 2 telescopes, the iT17 (431mm) and the iT27 (700mm) to acquire the new imagery and then process the data to extract the new positional and magnitude data. A summary of WDS 2014.96 data is shown in Table 1. A summary of current WDS data at the end of August 2015 is shown in Table 2.
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Further Research

As our first report was based on measurements with only one single image, we decided to do a follow up with results based on more images to have a better foundation for our results. As BU109 is currently rather high in the Australian sky and iTelescope has with Siding Spring a location here, we took this opportunity to take images in several sessions with two different telescopes.

To aim for utmost Vmag precision we took with telescope iT17 images with V- and B-filter. As this telescope offers B-V transformation coefficients. The transformed results we got are given in Table 3.

For utmost precise measurement of Sep and RA we took several images with telescope iT27 with a resolution of 0.53 arcseconds per pixel. As countercheck we measured also Vmag with this images (no B-V transformation coefficients available for iT27). The results are given in Table 4. The B-V color index of ~0.7 for both B and C components indicate a rather yellowish hue rather neutral for visual observation and imaging.

In Table 5 we list the average RA/Dec coordinates and measurement errors for the BU109 components based on Astrometrica plate solving results using the UCAC4 catalog using the same iT27 images listed in Table 4.

Using the formula provided by R. Buchheim (2008) new separation and position angles were calculated (shown in Table 6) based on the RA/Dec coordinates listed in Table 5.

Table 3. Vmag, Bmag, and B-V results based on images for BU 109 B and C processed with AAVSO VPhot.

<table>
<thead>
<tr>
<th>Component</th>
<th>Vmag</th>
<th>Bmag</th>
<th>B-V</th>
<th>Err</th>
<th>Std</th>
<th>SNR</th>
<th>Date</th>
<th>N</th>
</tr>
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<tbody>
<tr>
<td>BU109B</td>
<td></td>
<td></td>
<td></td>
<td>11.123</td>
<td>0.007</td>
<td>0.003</td>
<td>252 2015.627</td>
<td>5</td>
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<tr>
<td>BU109 iT17 V-V report 1</td>
<td></td>
<td></td>
<td></td>
<td>11.090</td>
<td>0.007</td>
<td>0.001</td>
<td>250 2015.632</td>
<td>5</td>
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<tr>
<td>Mean / RMS</td>
<td>11.107</td>
<td>0.007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2015.630</td>
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<td></td>
<td>11.210</td>
<td>0.008</td>
<td>0.003</td>
<td>239 2015.627</td>
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<td>220 2015.632</td>
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<tr>
<td>Mean / RMS</td>
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<td></td>
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<td>11.821</td>
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<td></td>
<td>11.814</td>
<td>0.037</td>
<td>0.037</td>
<td>157 2015.632</td>
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<td>Mean / RMS</td>
<td>11.818</td>
<td>0.032</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2015.630</td>
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<tr>
<td>BU109C</td>
<td></td>
<td></td>
<td></td>
<td>11.966</td>
<td>0.027</td>
<td>0.026</td>
<td>143 2015.627</td>
<td>5</td>
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<td>BU109 iT17 V-V report 2</td>
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<td></td>
<td></td>
<td>11.962</td>
<td>0.037</td>
<td>0.037</td>
<td>138 2015.632</td>
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<tr>
<td>Mean / RMS</td>
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<td>0.032</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2015.630</td>
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</table>

Table 5. Average RA/Dec coordinates and measurement errors for BU109 components.

<table>
<thead>
<tr>
<th>Component</th>
<th>RA</th>
<th>Dec</th>
<th>Err</th>
<th>Standard deviation</th>
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<tbody>
<tr>
<td>BU109B</td>
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<td></td>
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<td>0.013</td>
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<tr>
<td>BU109C</td>
<td></td>
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<td></td>
<td>0.036</td>
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Table 6. New separation and position angles for BU109 components.

<table>
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<tr>
<th>Component</th>
<th>Separation</th>
<th>Position Angle</th>
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<td>BU109B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BU109C</td>
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<td></td>
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Specifications of the Used Telescopes


Conclusions

Since we have two tables with slightly differing Vmags for the B and C components of BU 109, the question arises as to which of the two should be relied on with regard to recommending changes to the visual magnitudes of the B and C components of BU 109. The field of view with the iT17 telescope (Table 3) was limited to 15 arcminutes, whereas the iT27 telescope (Table 4) offered us the advantage of a much larger 27 arcminute field of view. The larger field of view provided more references stars with which to check our photometry results, and consequently generated more consistent results. That consistency also makes us confident with regard to the declination and RA coordinates in Table 5, which were used to generate the revised separation and position angles shown in Table 6. For that reason, we place greater confidence in the photometry results in Table 4.

Acknowledgements

The following tools and resources have been used for this research:
- Washington Double Star Catalog
- iTelescope
- AAVSO Vphot
- AAVSO APASS
- UCAC4 catalog via the University of Heidelberg website
- Aladin Sky Atlas CDS, SIMBAD, VizieR
- 2MASS All Sky Catalog
- AstroPlanner
- Astrometrica

Table 4. Vmag results based on iT27 images for BU109 B processed with AAVSO Vphot

<table>
<thead>
<tr>
<th>Name</th>
<th>Vmag</th>
<th>Err</th>
<th>Std</th>
<th>Err (SNR)</th>
<th>SNR</th>
<th>Date</th>
<th>N</th>
</tr>
</thead>
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<tr>
<td>BU109B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>BU109 iT27 1x2s</td>
<td>11.152</td>
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<td>0.015</td>
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<td>BU109 iT27 stack 3x4s</td>
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<td>0.014</td>
<td>0.005</td>
<td>217</td>
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<td>BU109 iT27 stack 5x2s</td>
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<td>0.016</td>
<td>0.014</td>
<td>0.007</td>
<td>161</td>
<td>2015.635</td>
<td>5</td>
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<tr>
<td>BU109 iT27 stack 5x3s</td>
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<td>0.016</td>
<td>0.015</td>
<td>0.006</td>
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<td>2015.635</td>
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<tr>
<td>Mean / RMS</td>
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<td>0.037</td>
<td></td>
<td></td>
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<td>2015.635</td>
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Table 5. RA/Dec positions based on Astrometrica plate solving using the UCAC4 catalog

<table>
<thead>
<tr>
<th>Name</th>
<th>Mean RA</th>
<th>dRA</th>
<th>Mean Dec</th>
<th>dDec</th>
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<td>-16:31:00.427</td>
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<tr>
<td>BU109 B</td>
<td>00:40:27.755</td>
<td>0.173</td>
<td>-16:29:14.550</td>
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<tr>
<td>BU109 C</td>
<td>00:40:28.031</td>
<td>0.173</td>
<td>-16:29:25.238</td>
<td>0.143</td>
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Table 6. Separation and position angle based on RA/Dec coordinates given in Table 5.

<table>
<thead>
<tr>
<th>Name</th>
<th>Sep</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU109 AB</td>
<td>106.634</td>
<td>353.172</td>
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<td>BU109 AC</td>
<td>95.587</td>
<td>354.778</td>
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<tr>
<td>BU109 BC</td>
<td>11.403</td>
<td>159.589</td>
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References