1.0 Imaging of Galaxy IC1296 August, 2013

In the course of making a routine image of M57, I noted the serendipity of a faint galaxy nearby and a suitable guiding star. I have undertaken imaging of IC1296 with an eye to determining the limits of the 14-inch telescope in BB2. The galaxy is located at RA18^{h} 53^{m} 49^{s} and DEC 33^{o} $05^{'}$ $28^{"}$. The test would show the limits of magnitude and resolution of the mount, optics and the Adaptive Optics guiding system.

Accordingly, the SBIG ST-8 camera linked to the computer by USB was set to make 1000 second exposures at f:11, the native magnification of the Celestron C14. The configuration set M57 at the lower left corner of the image and put the target galaxy near the north-south center and about 1/3 the distance from the eastern edge of the image about 500 pixels away (perhaps 250 seconds). The 1000 second images were backgrounded, flat fielded and stacked for effect. The composite image was analyzed by SKYX as 0.45 arcseconds per pixel. Alignment was found to be xxx.x degrees re north.

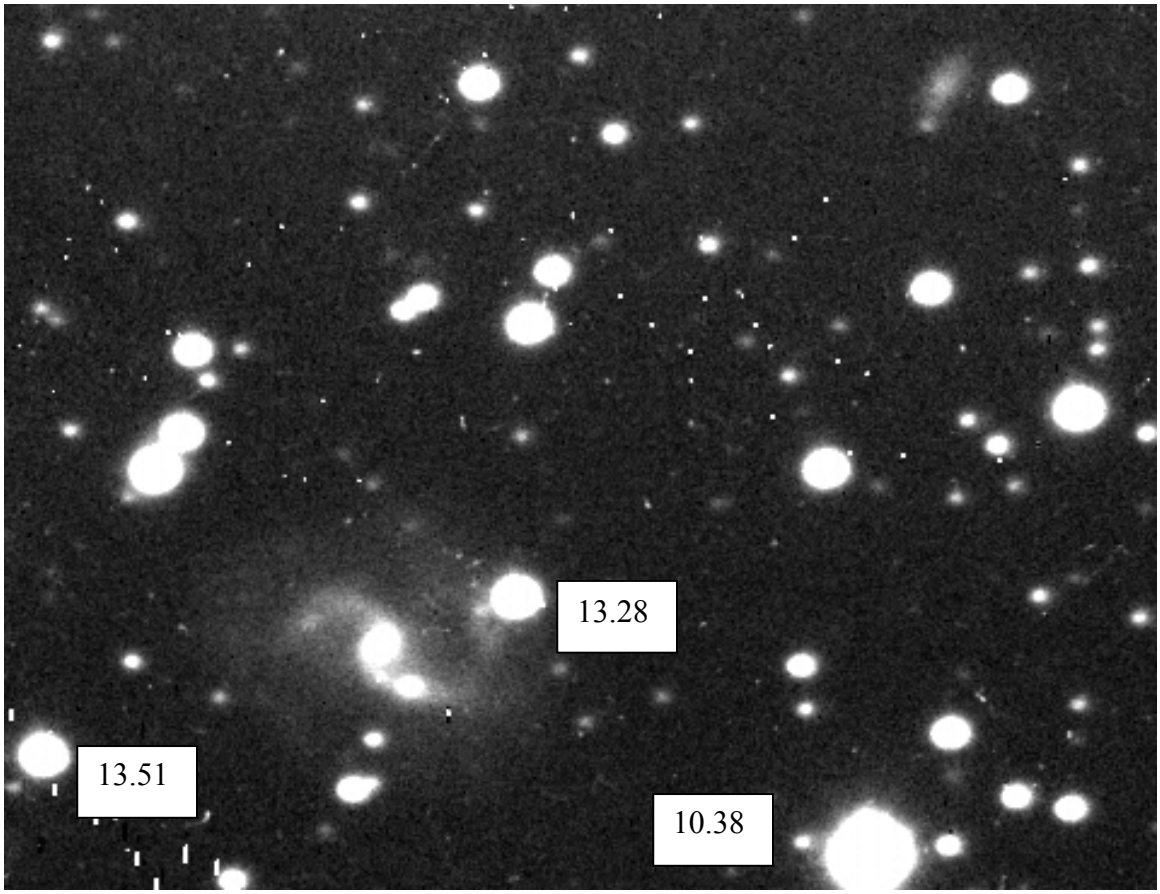


Figure 1. See IC1296 at lower left and, as identified by SKYX, PGC 2813669 at the upper right. The former is measured at the central mass at M15.7 and the latter at

M17.25 at its central mass. Three reference stars are labelled for reference. The image is 206 arcseconds wide.

The image of IC1296 shown in Figure 1 brings many questions to mind. Firstly, is the central mass a nucleus of the galaxy? Then, is the smaller "star" a few arcseconds to the southwest really a part of the galaxy or is it an incidental star? In fact this question exists for all the stars contiguous to the spiral. Are they all involved? Are they any involved? Is the fuzzy part of the image surrounding the spiral a part of the "glow" of the galaxy? I proceed to analyze the image in several ways to draw out definitive answers to these questions.

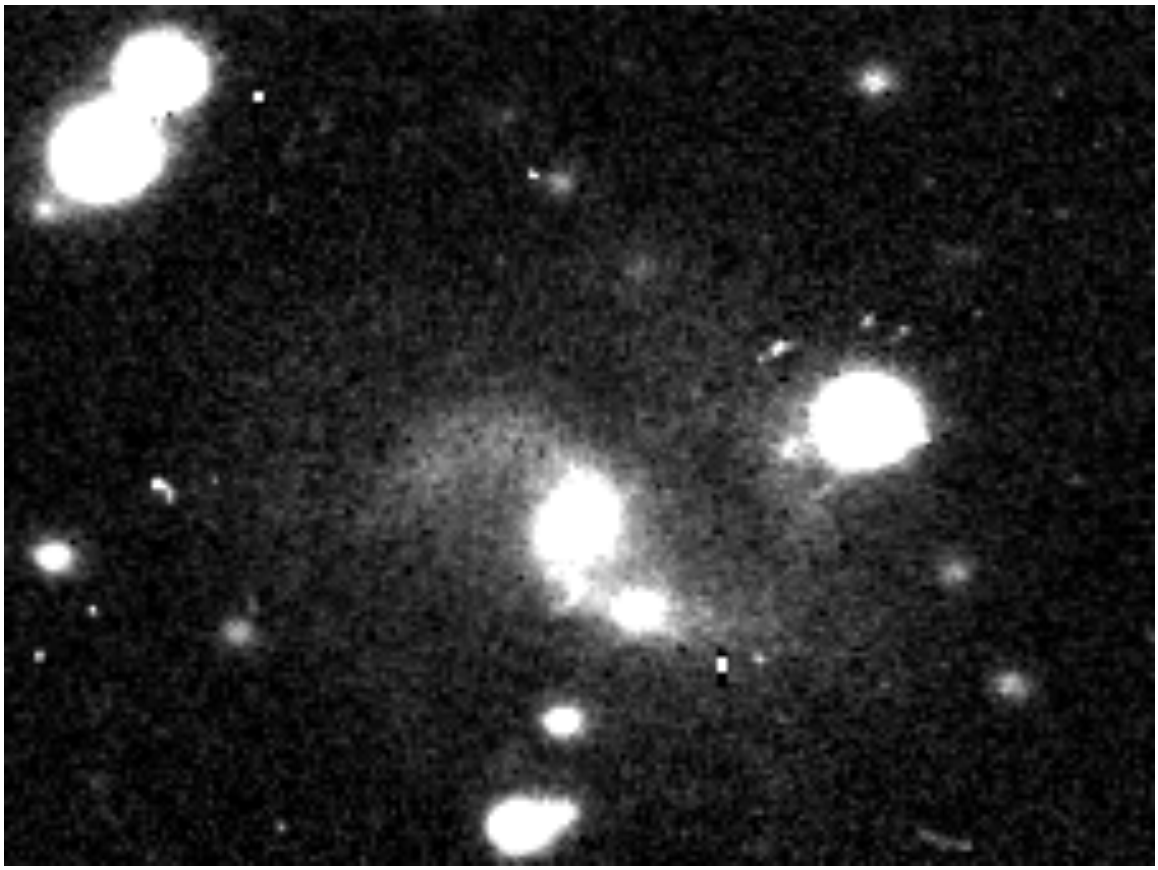


Figure 2. An enlarged image of IC1296 representing 10, 1000 second, red filtered images averaged together. The magnitude of the bright star to the right is 13.28. The

magnitude of the core of the galaxy is 15.9. Note that the faint image extends outward to a faint, wide ellipse. The image is 90 arcseconds wide.

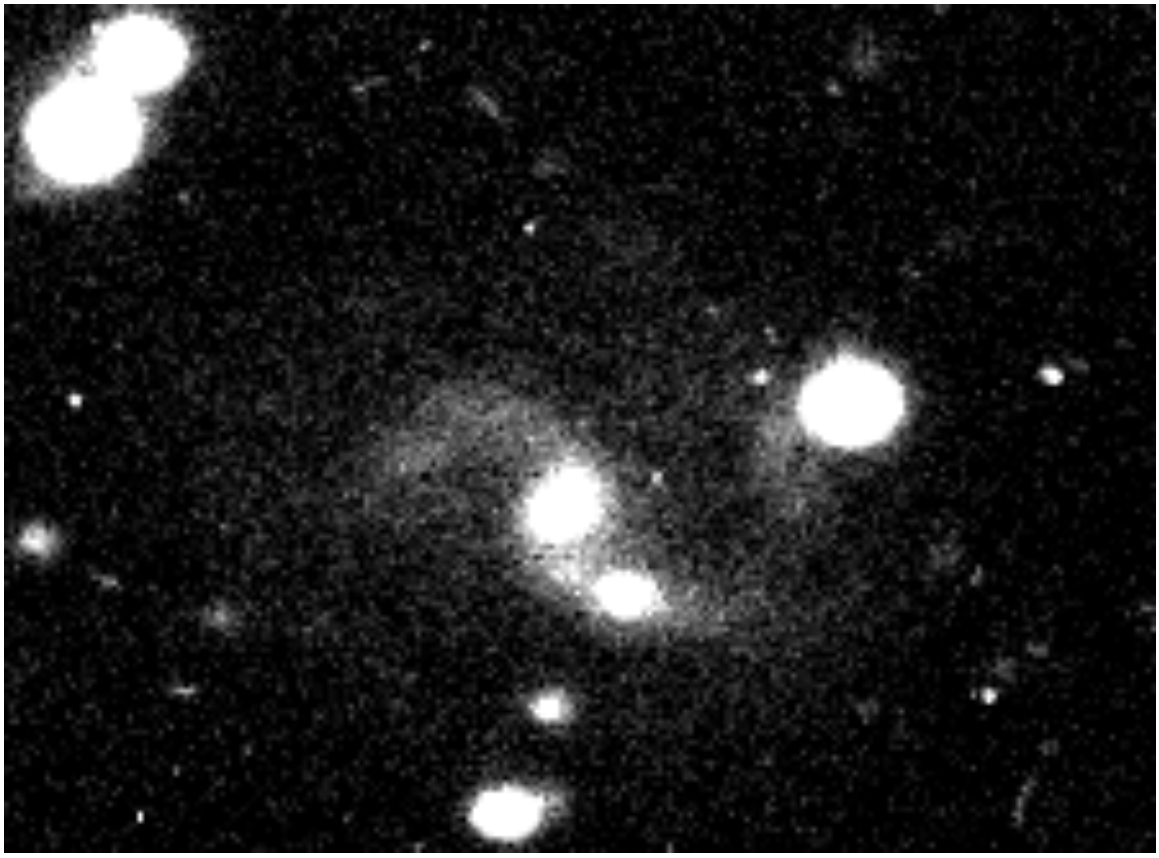


Figure 3. An enlarged image of IC1296 representing 10, 1000 second, green filtered images averaged together.

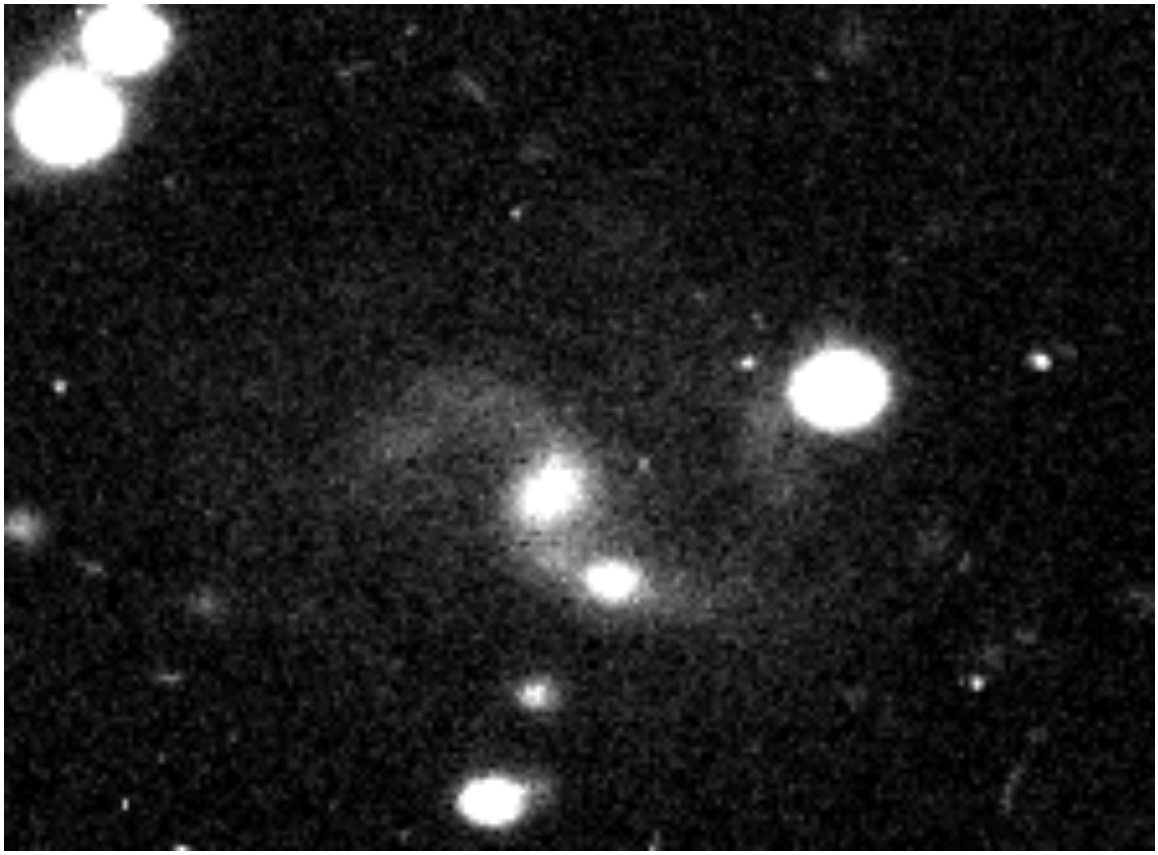


Figure 4. An enlarged image of IC1296 representing 10 blue filtered images averaged together.

While these images characterize the object galaxy well, some additional characterization was performed through plotting isolux lines to identify the interaction between the several starlike images.

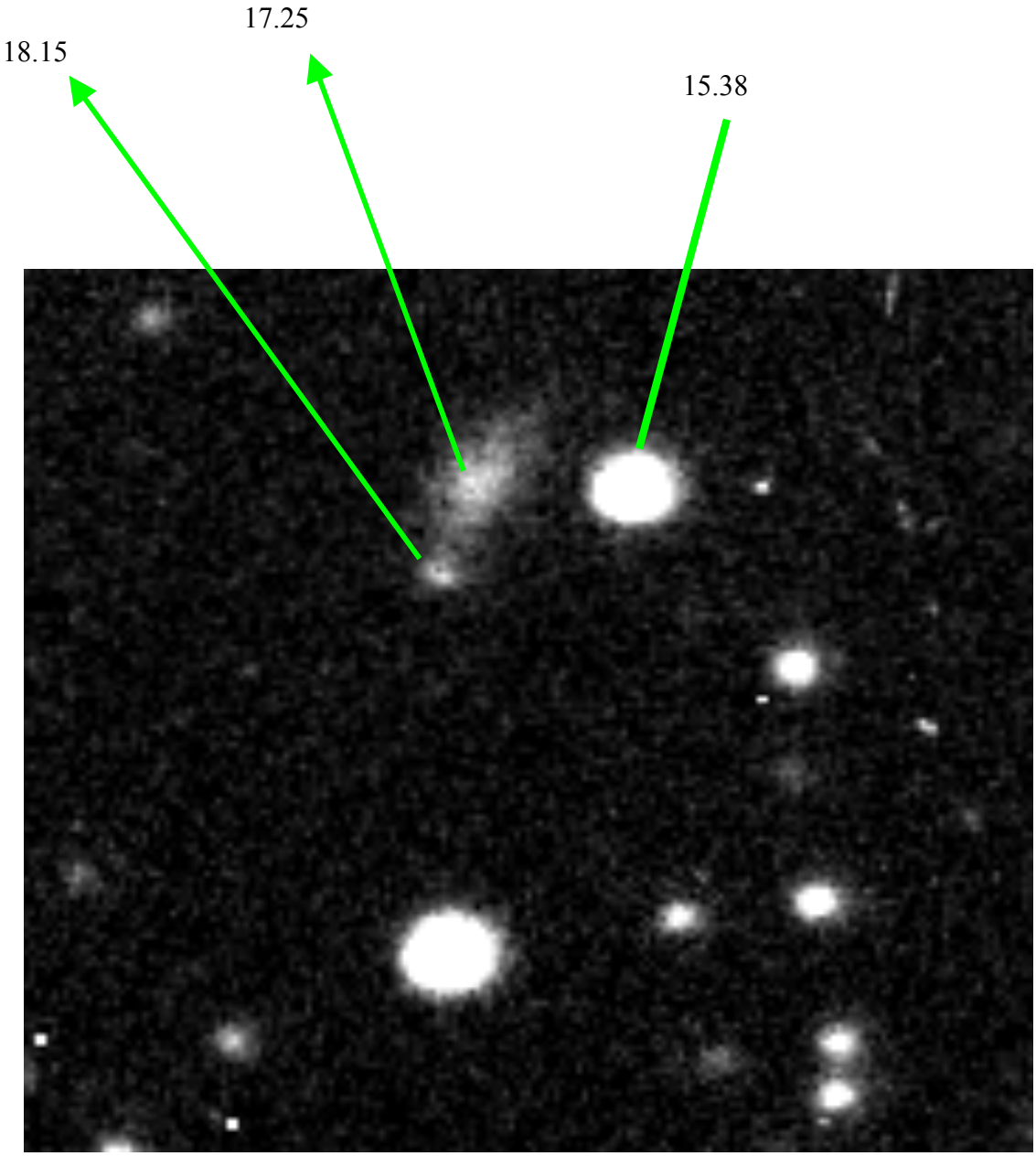


Figure 5. Average of 10, 1000 second, red filtered images of PGC 2813669 shown in black and white. The image is 65 arcseconds wide.

The faint image of Figure 5 has been identified as PGC 2813669. In these images it is only a few percent above sky glow and defining it is challenging. Again one must ask if the southerly "star" is a star that happened to be in the way or is it a real part of a

faraway galaxy viewed from the side. The bright star to the west appears to be detached but it deserves to be tested insofar as it it possible. Further, in this view we see a near doublet in the southwest corner. There appears to be a haze of nebulosity between and about them.

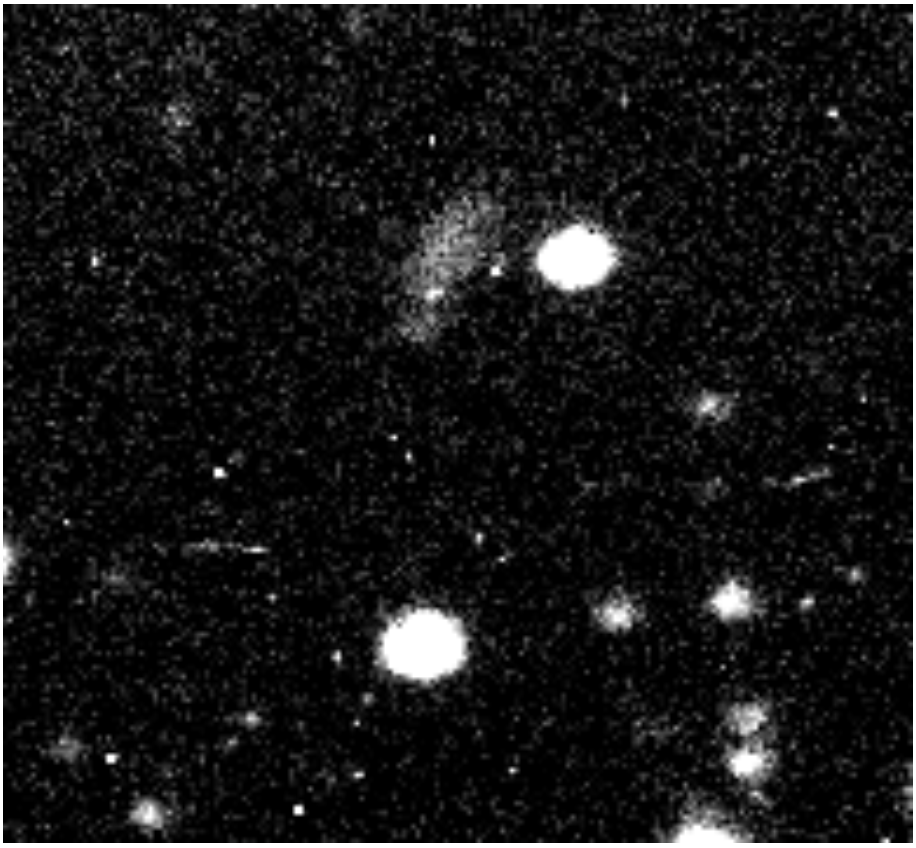


Figure 6. Average of 10, 1000 second, green filtered images of PGC2813669 shown in black and white. The image is 65 arcseconds wide.

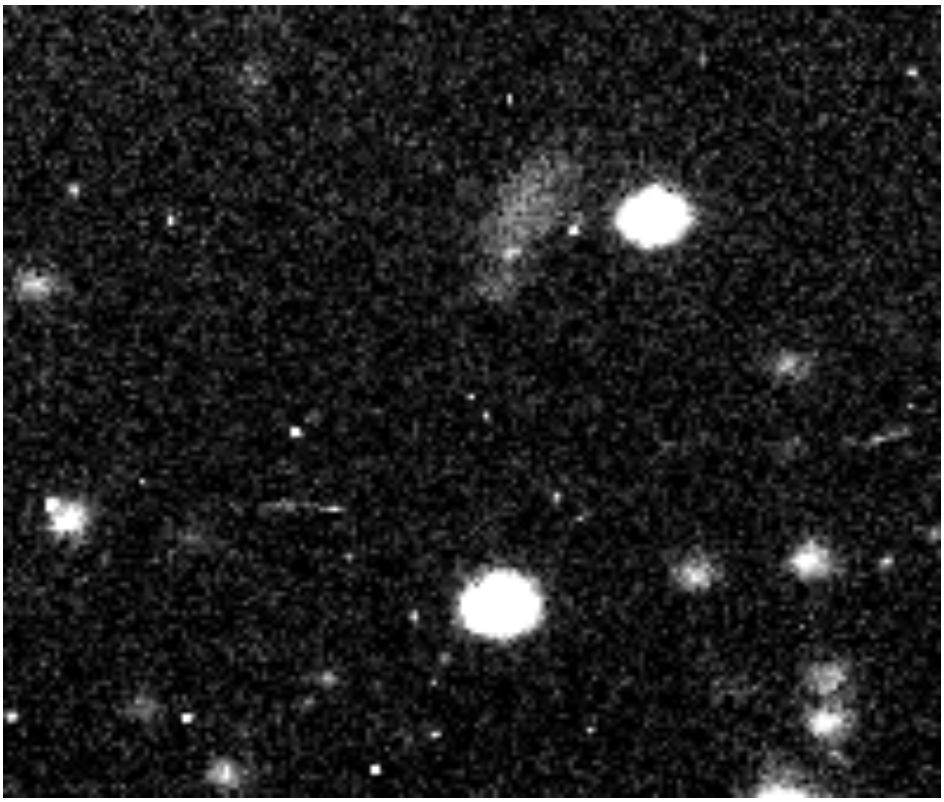


Figure 7. Average of 10, 1000 second, blue filtered images of PGC2813669 shown in black and white. The image is 65 arcseconds wide.

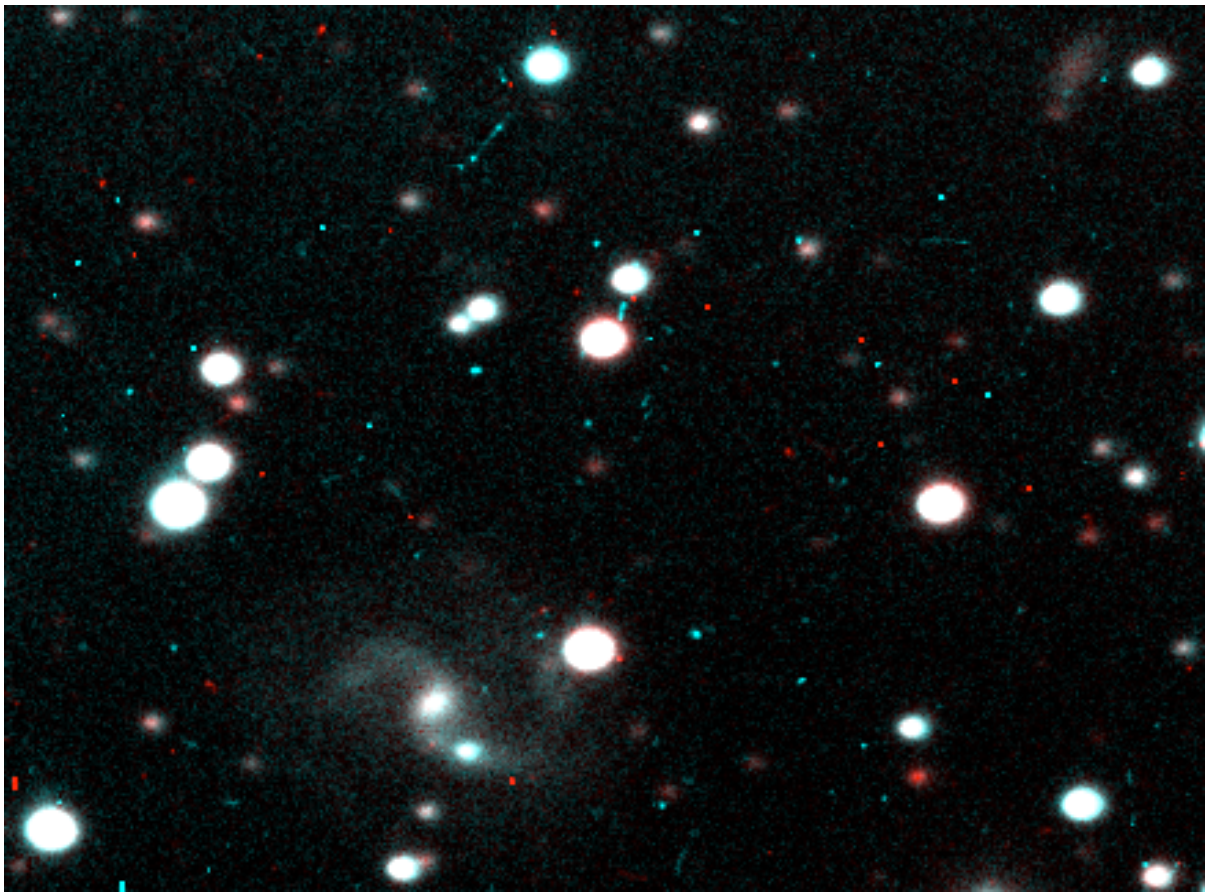


Figure 8. Composite RGB image representing 10 each red, green, and blue filtered images for a total of 30 images. Each image was dark subtracted and flat fielded. A few artifacts which do not disappear in dark subtraction and flat fielding appear as full colors. Those artifacts are assumed to be attributable to either local radioactivity or cosmic ray events.

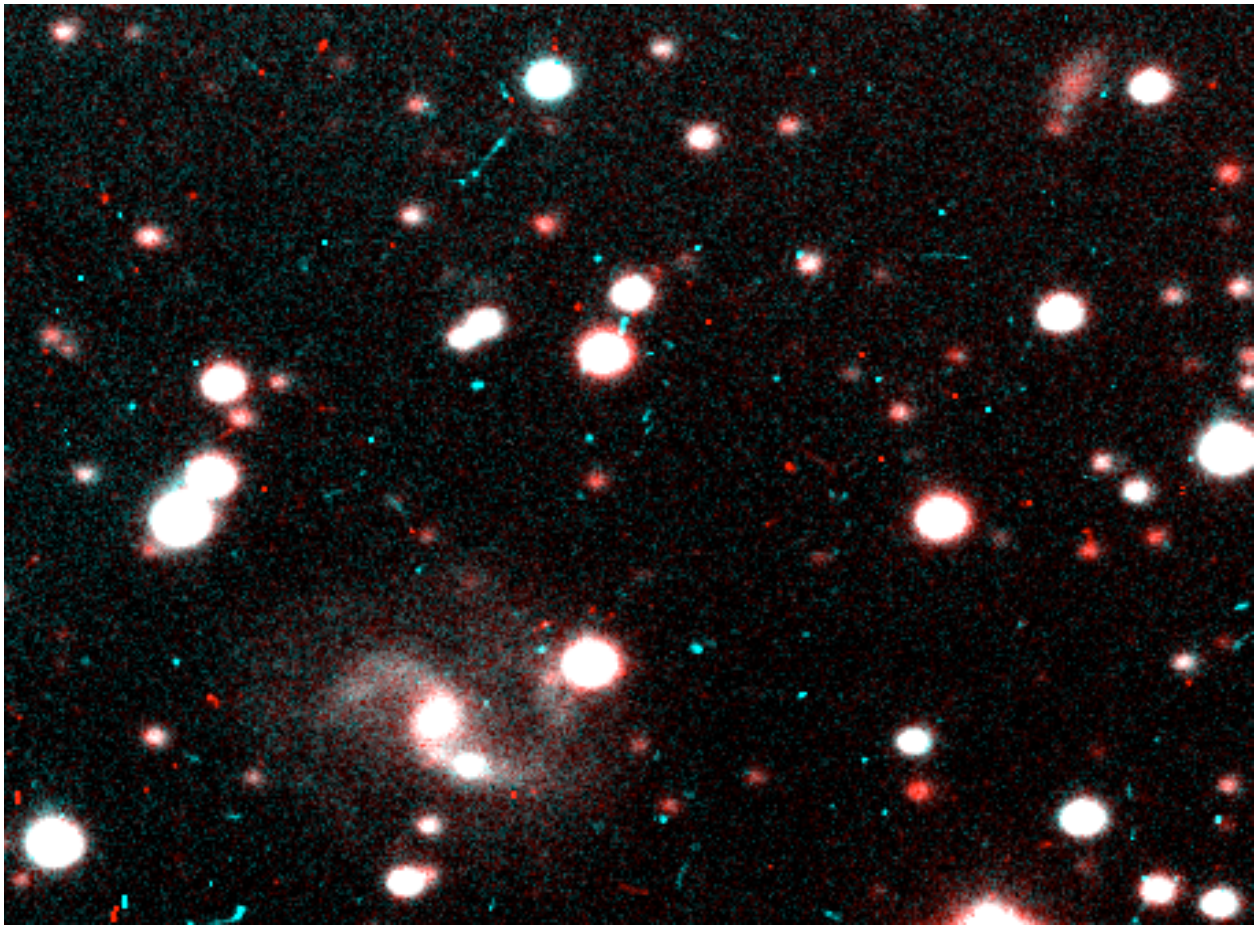


Figure 9. The same image as shown in Figure 8 with the exception that the image brightness was increased while keeping the color balance unchanged.

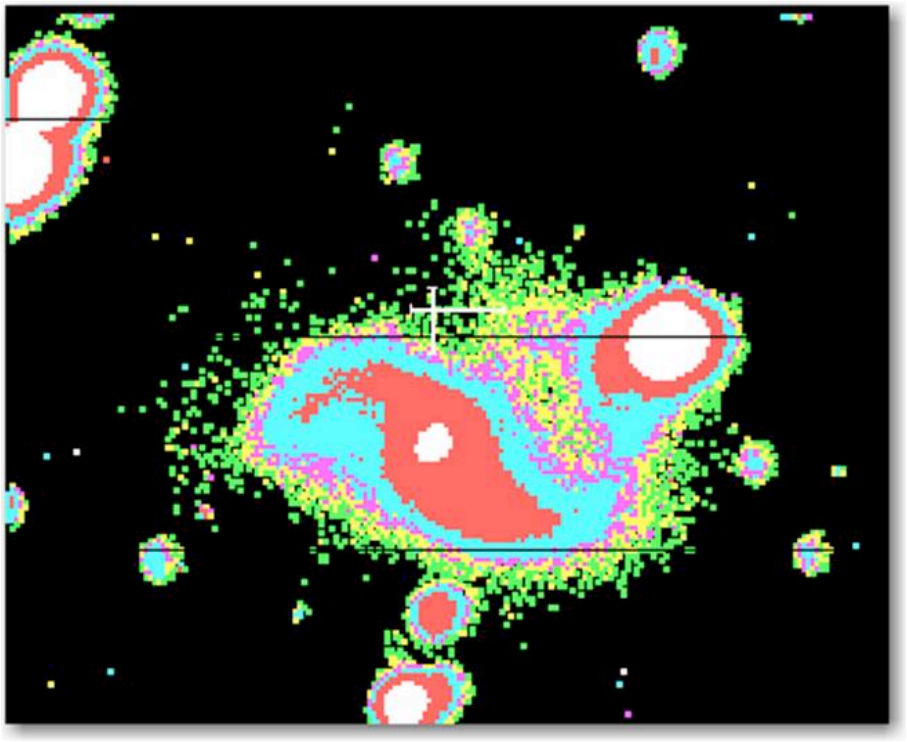


Figure 10

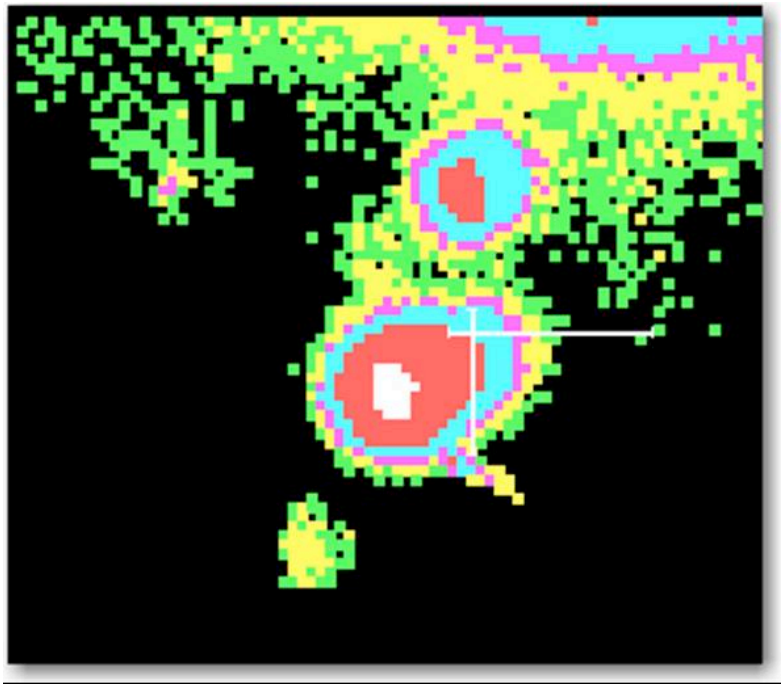


Figure 11 Region below the main object

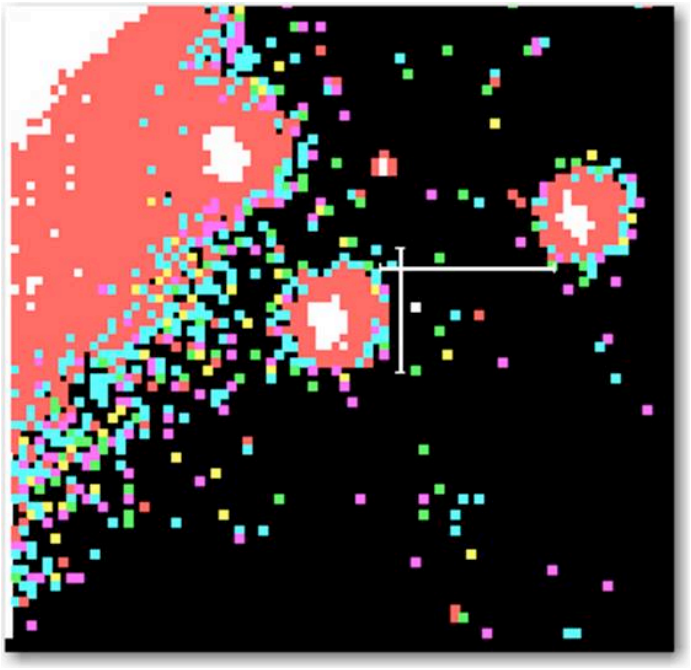


Figure 12. Region to the right of the main object.

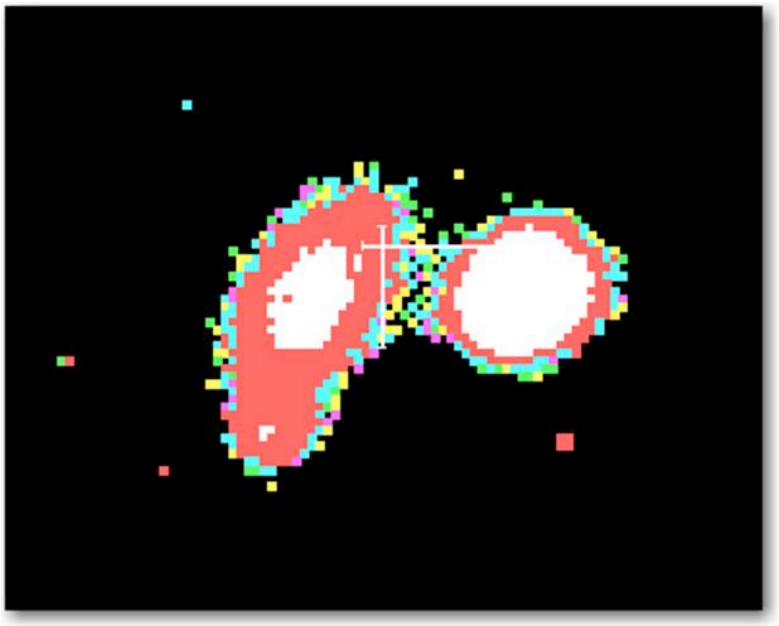


Figure 13. Nonstellar object at upper right.

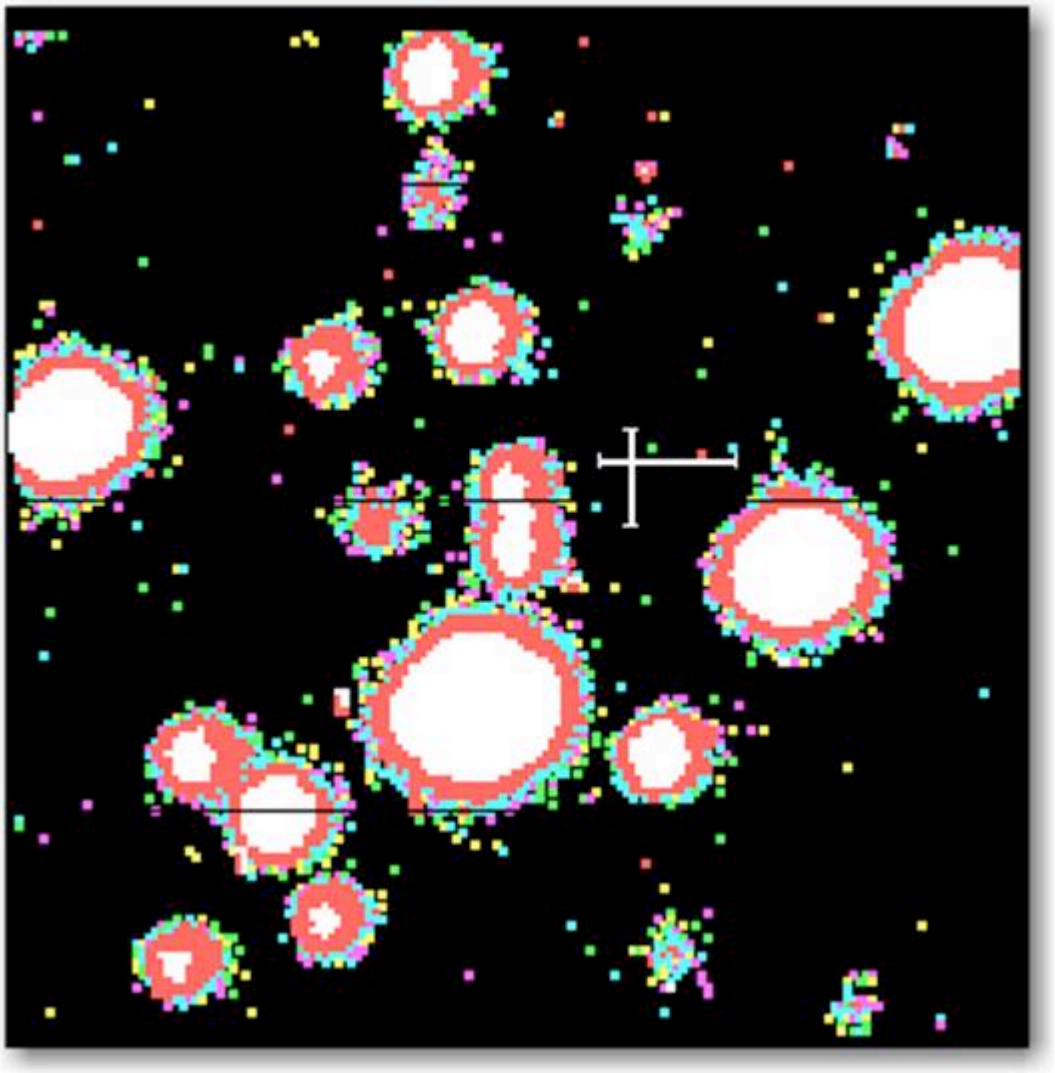
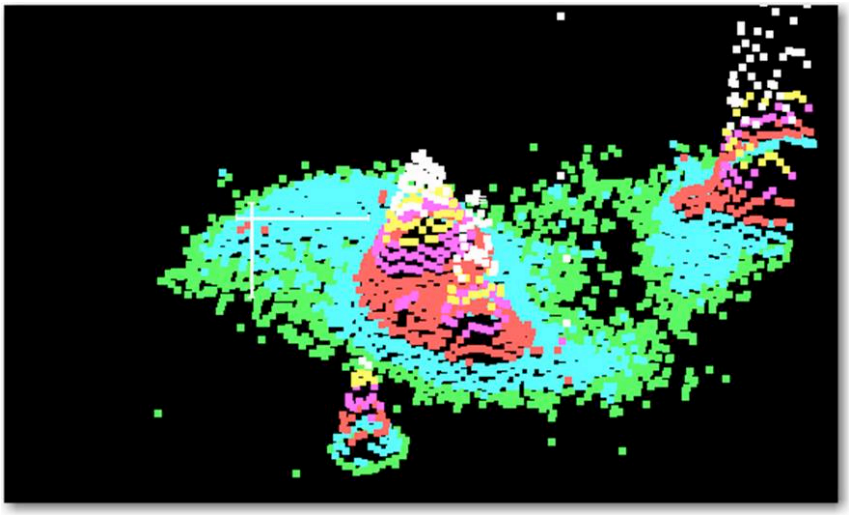


Figure 14. A faint grouping at upper right of the main object showing several nonstellar objects



Pseudo 3D view of the main galaxy.