

Split Star Process with Masked Stretch

Here is a handy way to bring faint detail, near the background, out without greatly increasing the noise or bloating the stars excessively. The workflow uses Images Plus, but parts of it can be accomplished with any layer capable editor using the links at the end of this article.

The idea is to use an iterative process to gradually increase the contrast of a mask that can then be applied to a masked stretch of the original image. Let's start with Scott's great M81, M82 image and apply a normal arcsinh stretch to see the problem.



Figure 1 - Simple Arcsinh Stretch

In order to maintain any detail in the galaxies the Integrated Flux Nebula (IFN) is barely visible and the brighter stars have badly bloated.

To solve this problem we need a mask to limit the stretch to the IFN and galaxies to bring out the faint detail. The first step is to apply the same arcsinh stretch, but really push the stretch at the expense of bloated stars and noise. as shown below.

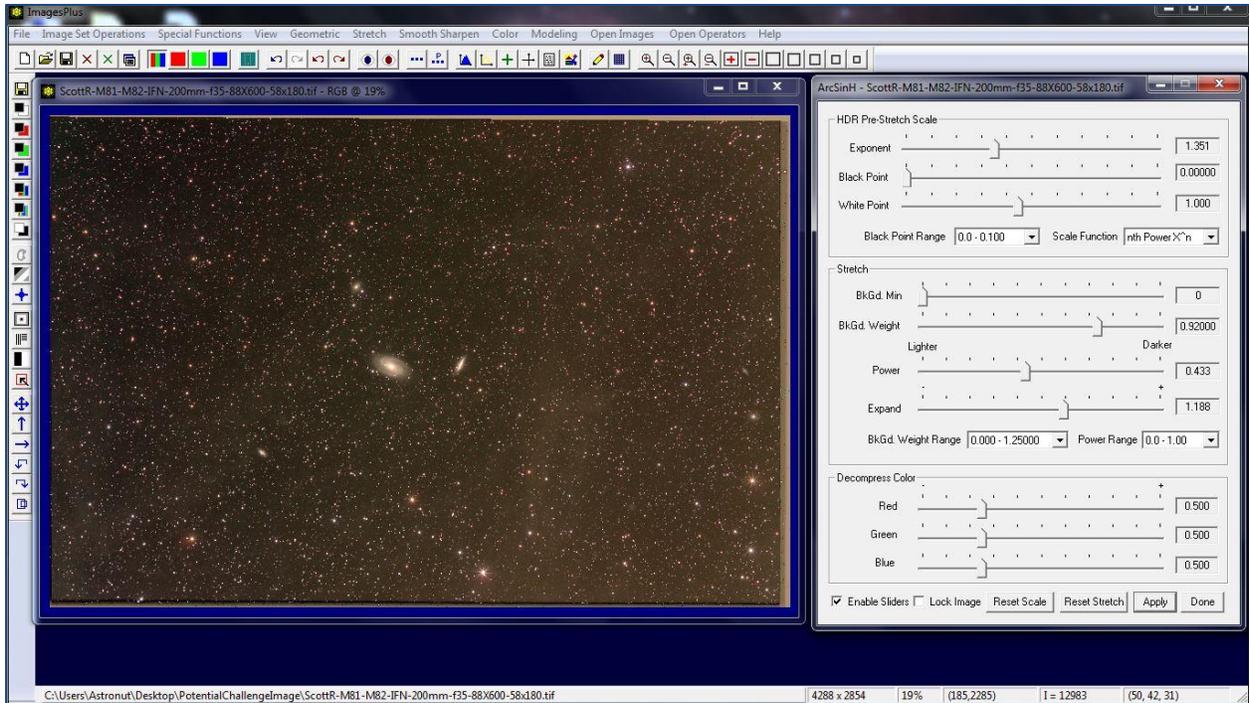


Figure 2 - Initial Stretch

Next use the feature mask tool to remove the stars and then smooth the image to remove much of the noise.

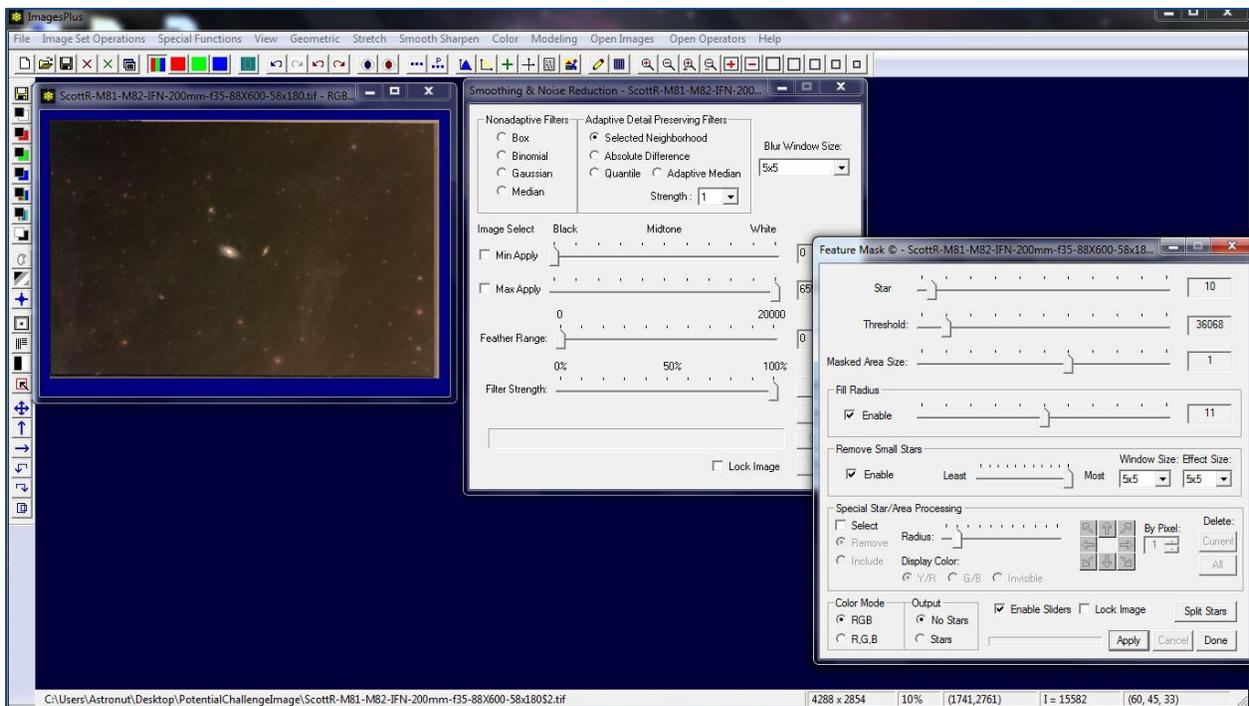


Figure 3 - Feature Mask and Noise Reduction

The stretch leaves some fine line noise in the image and it is important to remove it as any detail in this mask will be imprinted on the final image. Both the line and band suppression tools are used to clean up the image. First the line suppression was applied at 100% opacity and the band suppression was applied at 25%. Next the image is converted to a luminance mask.

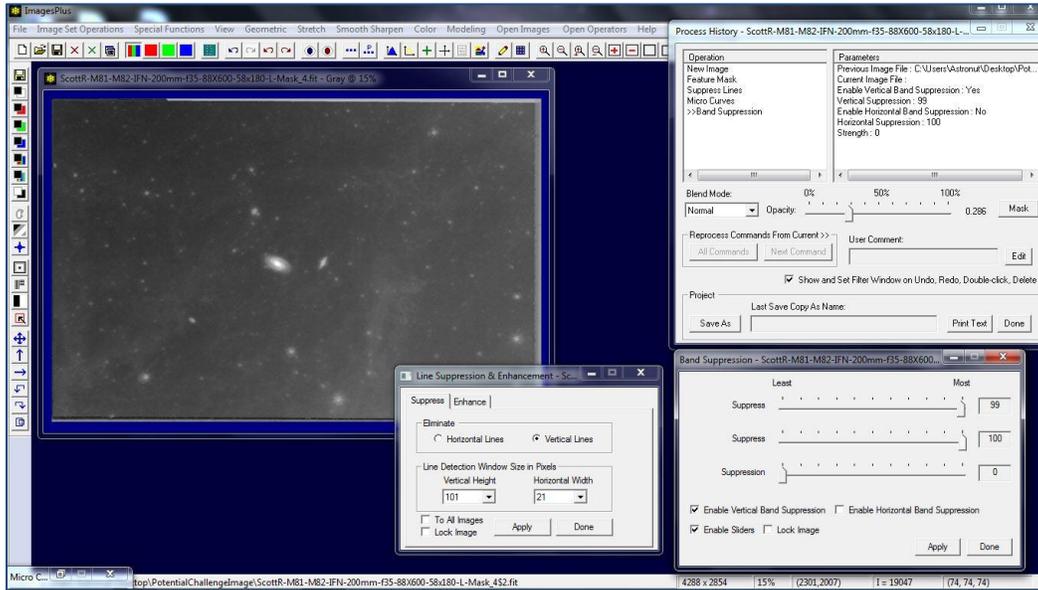


Figure 4 - Line and Band Suppression

The mask is then applied to an arcsinh stretch of the original image to imprint the faint IFN detail on the image and the feature mask tool is again used to remove the stars and make a new version of the mask with a little more contrast on the IFN.

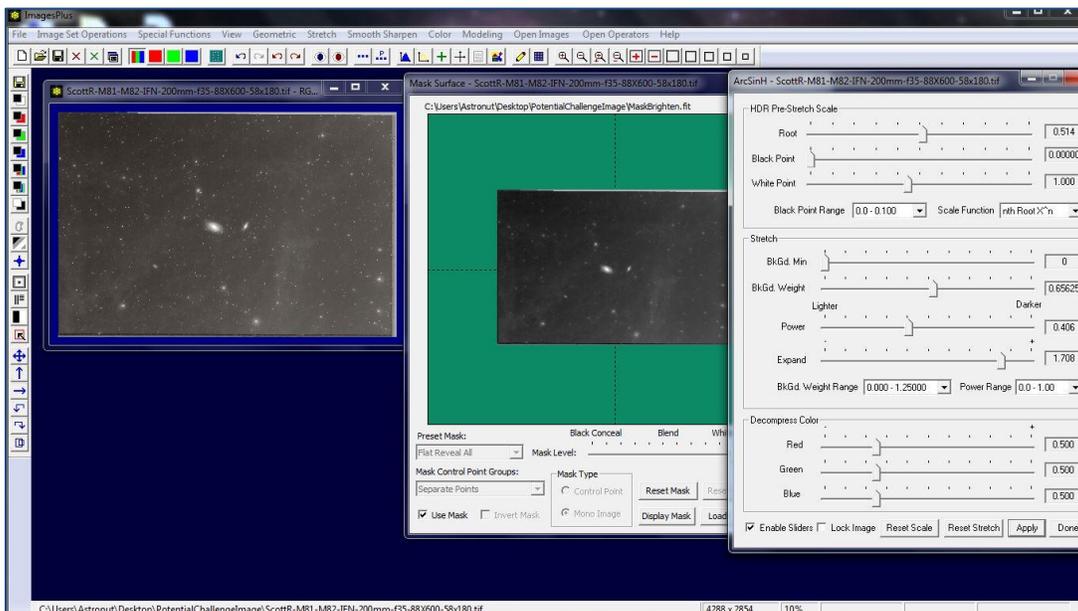


Figure 5 - Masked Arcsinh Stretch

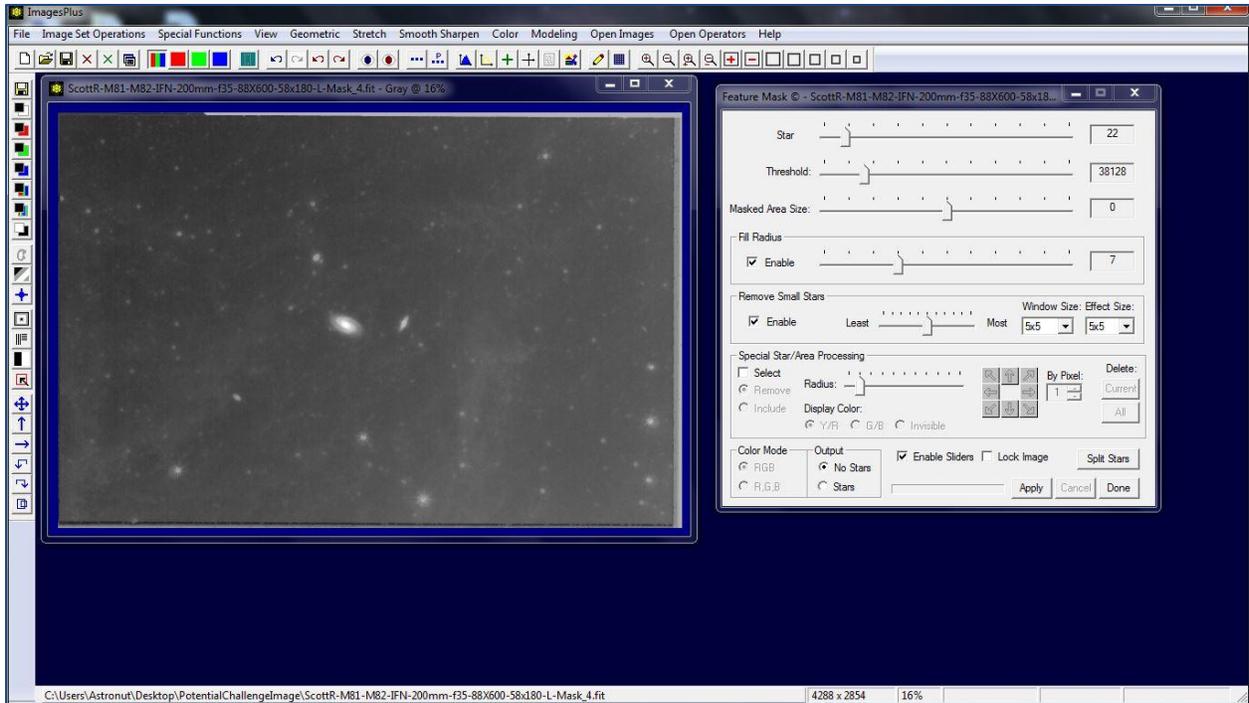


Figure 6 - Feature Mask to Remove Stars Again

The next step is to improve the contrast of the mask a bit. Use micro curves to lower the level of the dark areas slightly. Remember that the key to this whole technique is to take baby steps and not do too much in any one step or the noise will increase and make the background lumpy.

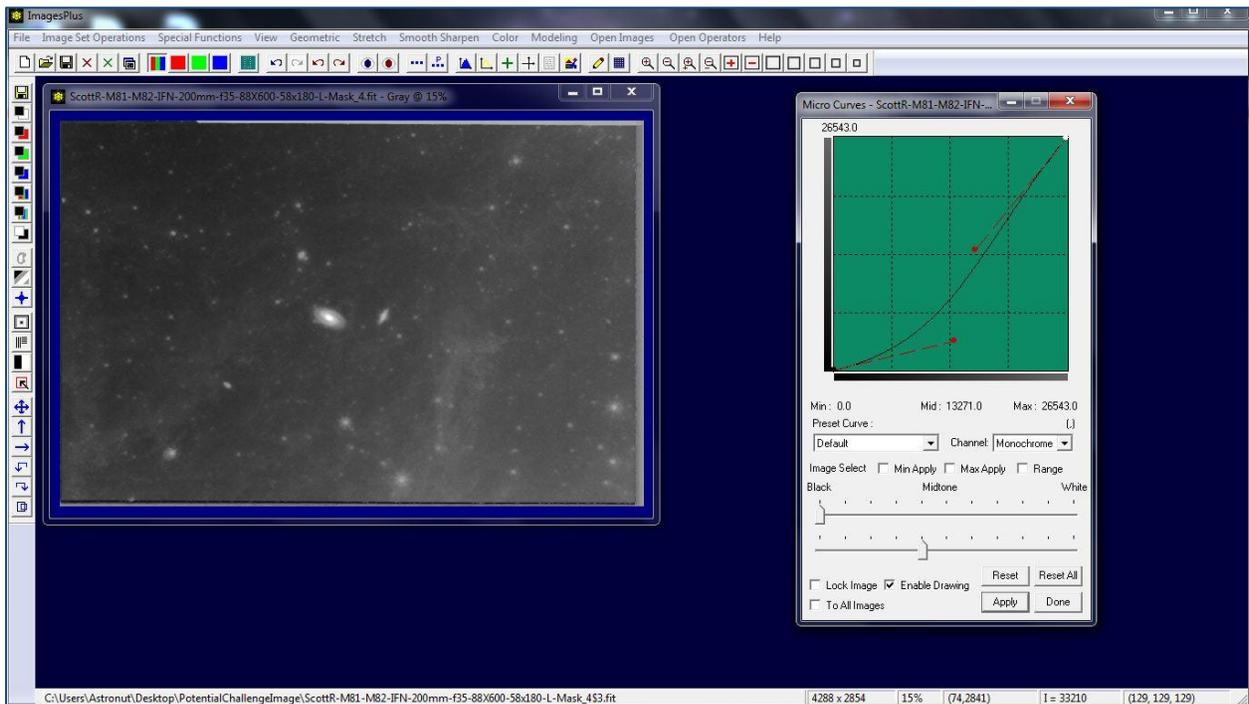


Figure 7 - Contrast Boost using Micro Curves

Next step is to remove the left over halos with cloning and then smooth the background using your favorite noise reduction technique. Here I used the frequency filter to smooth the background without destroying the IFN detail.

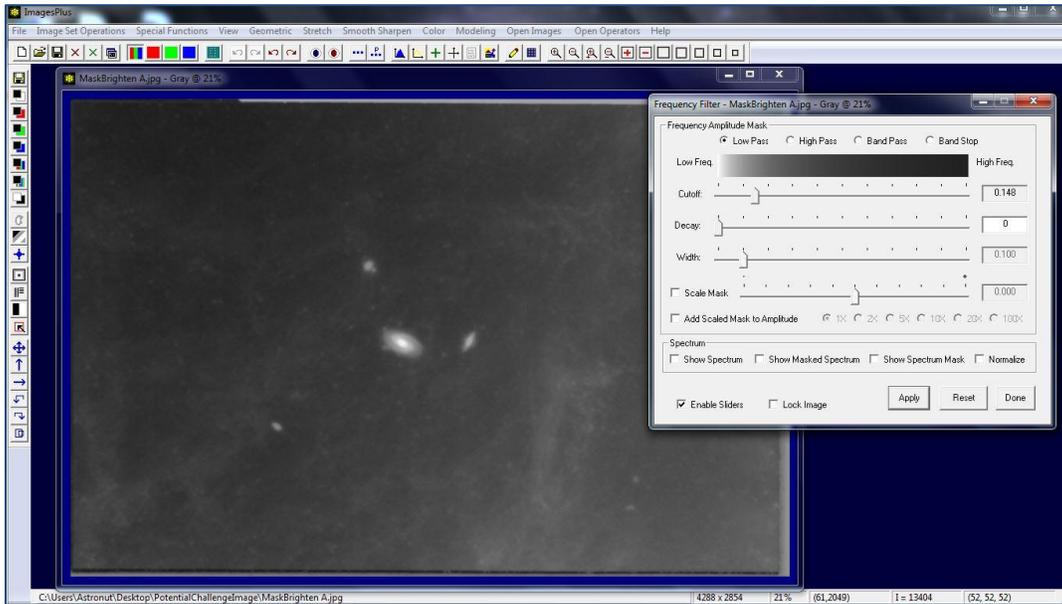


Figure 8 Noise Reduction

Save this mask and use it for the next iteration of arcsinh stretching of the original image to impart more IFN contrast.

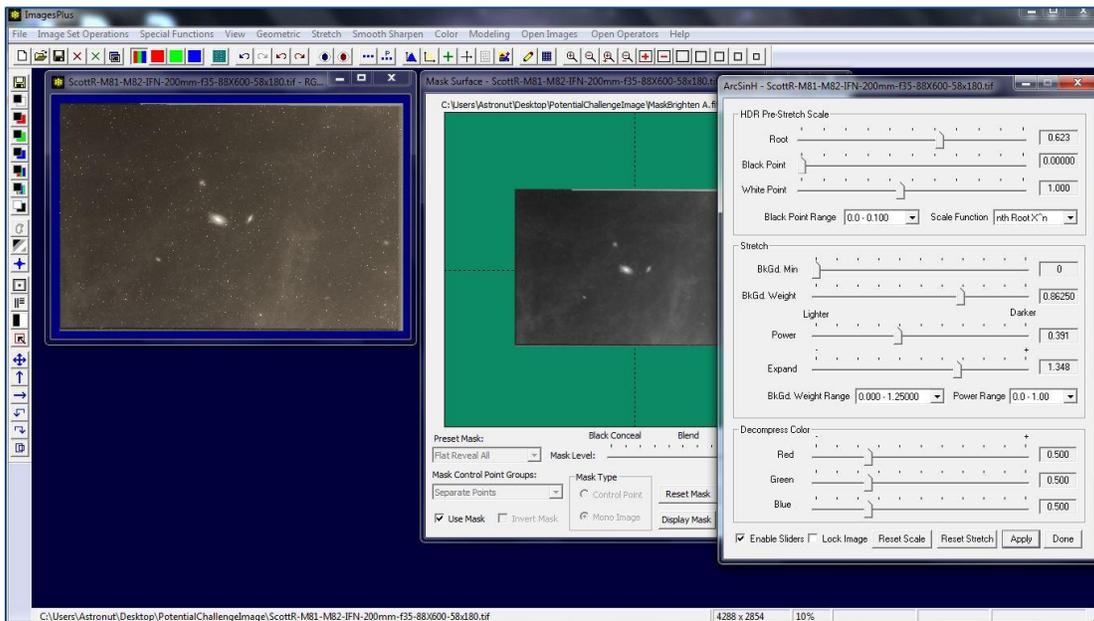


Figure 9 - Masked Arcsinh Stretch

As with the previous iteration use the feature mask and micro curves to finish off the mask.

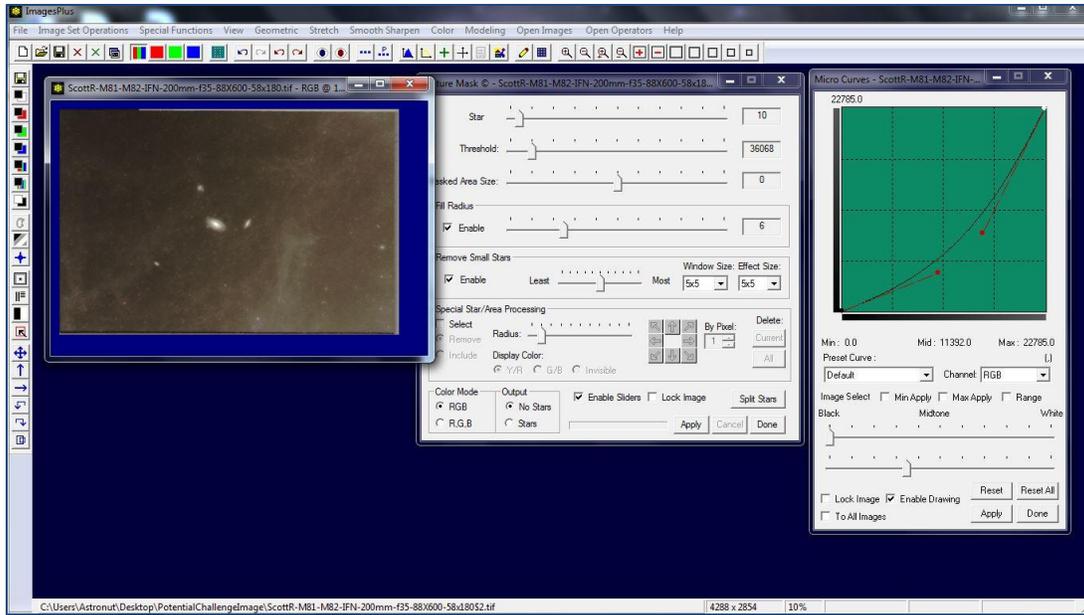


Figure 10 - Second Iteration Processing

Convert the image to a luminance mask and remove the diagonal gradient using the background compensation or the multi-point flatten tool.

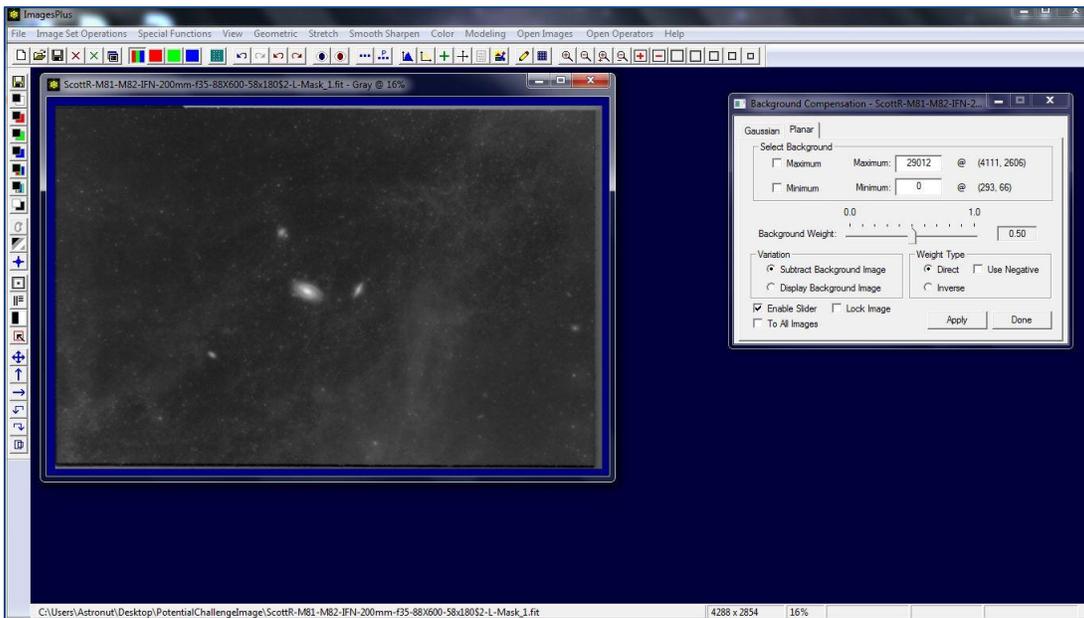


Figure 11 - Gradient Removal

Now we have a mask that has a fair amount of IFN contrast and very low noise. Now I'll stop here as I like a smooth, slightly lower contrast look to my images, but if you want the IFN to overwhelm everything else in the image use another couple of iterations to really make it pop.

Using this mask I use another arcsinh stretch to produce part of the final image as shown below.

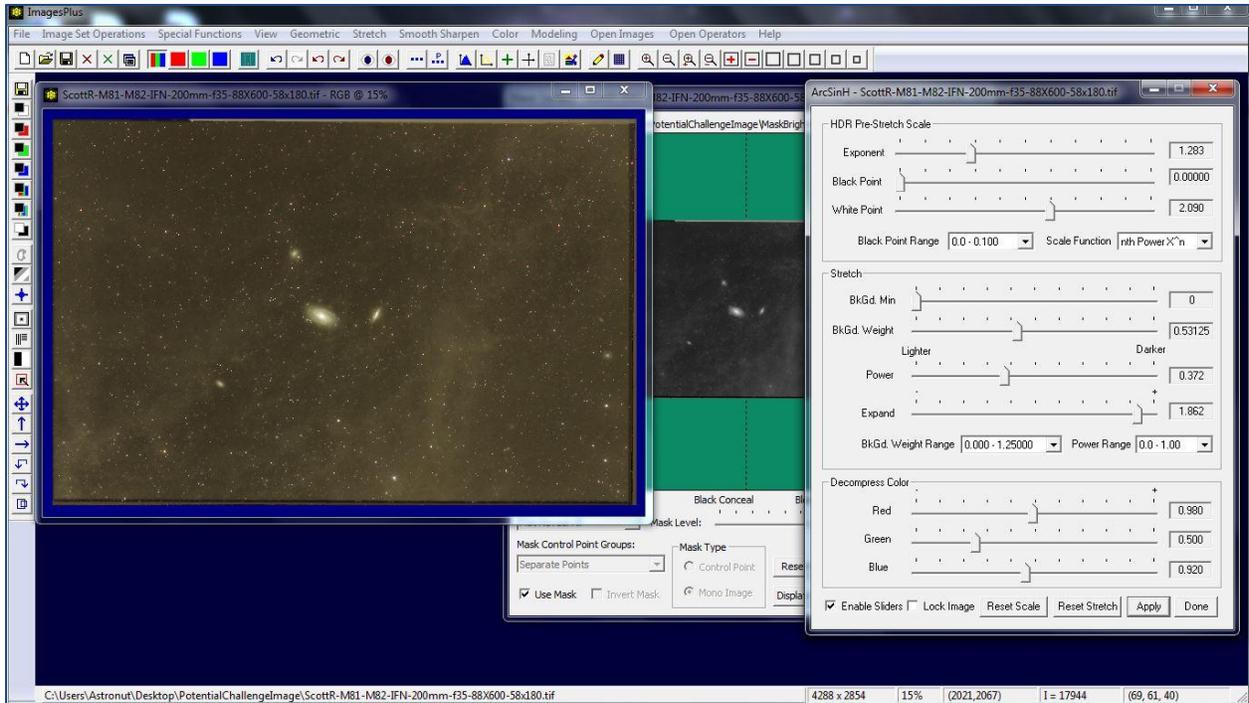


Figure 12 - Final Iteration Stretch

The multi-point flatten tool is used to correct the background colour to a neutral gray. Several points are selected with the tool, all in darker areas to normalize the background as shown below.

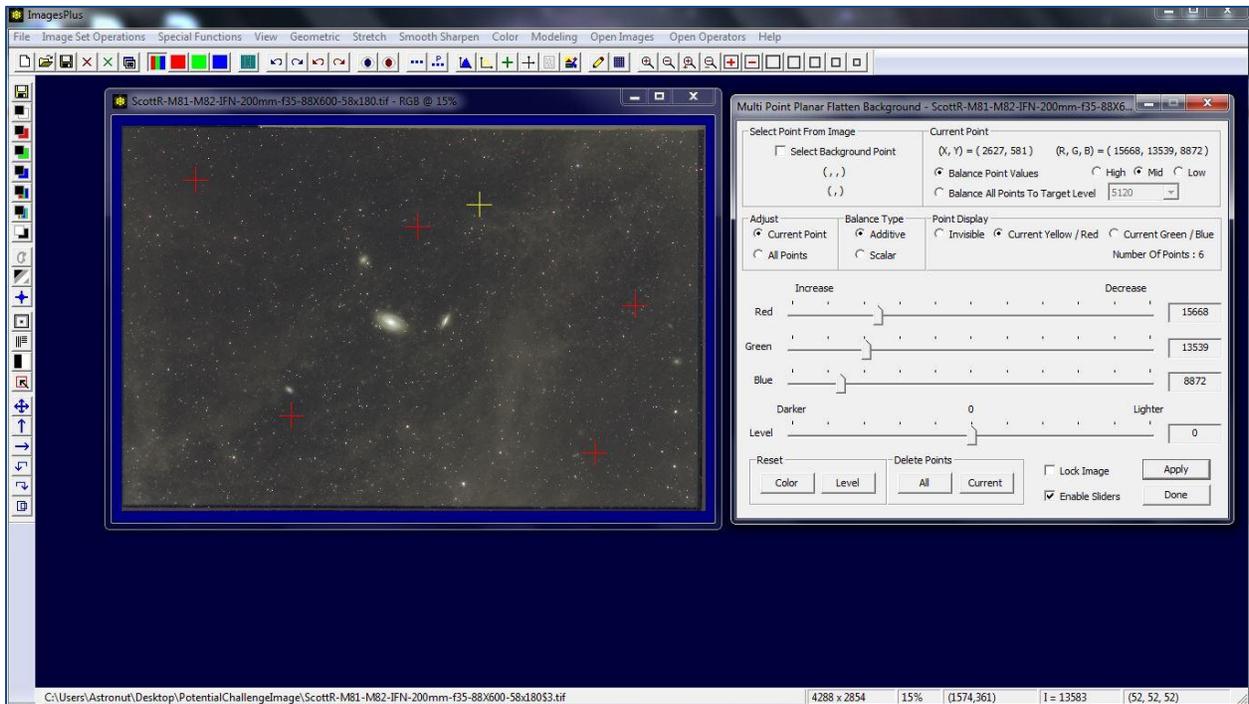


Figure 13 - Background flatten

Now we get to see the real power of the feature mask tool. All the stretching of the data has washed out the colour of the stars and bleached the colour out of the main galaxies in the image. You could carefully clone out the galaxies in the mask to avoid the problem, but there is a simpler approach. First use the feature mask to remove the stars from the above image and call this image A.

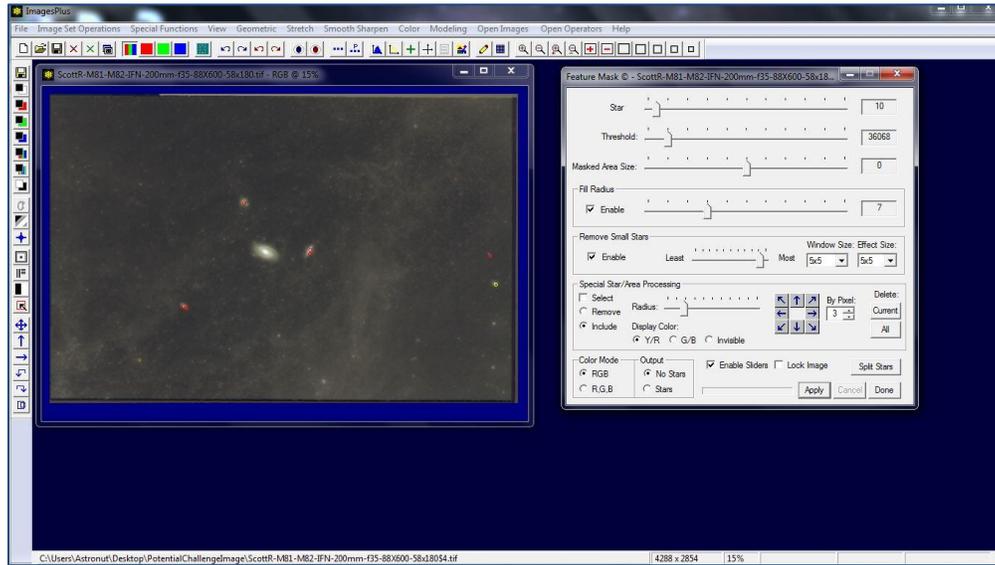


Figure 14 - Making Image A

Next carefully apply an arcsinh stretch, without any mask, concentrating on maintaining as much colour as possible and avoiding star bloat. This means that you must limit the total stretch and none of the IFN will be visible as shown below.

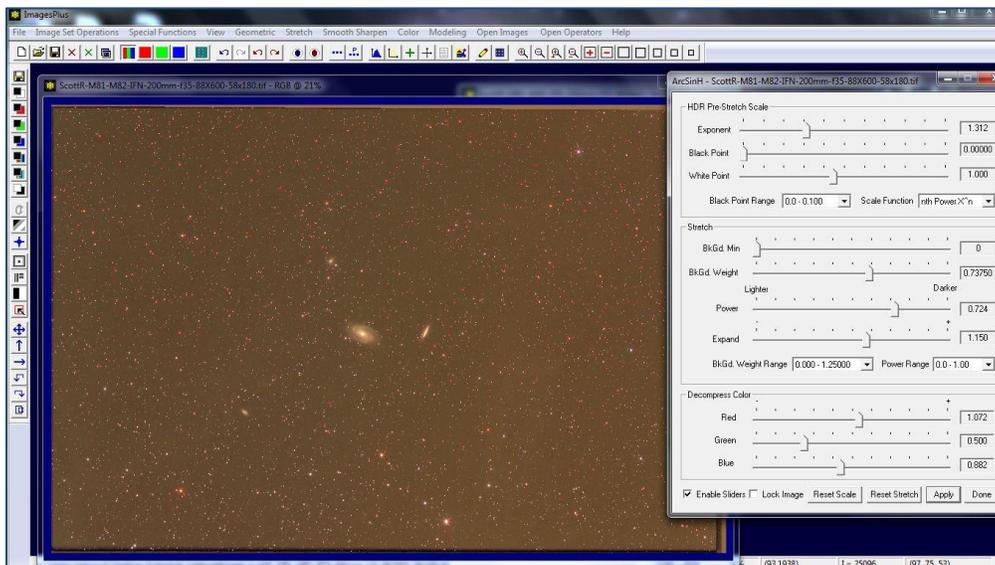


Figure 15 - Unmasked Stretch

Correct the background colour as shown below.

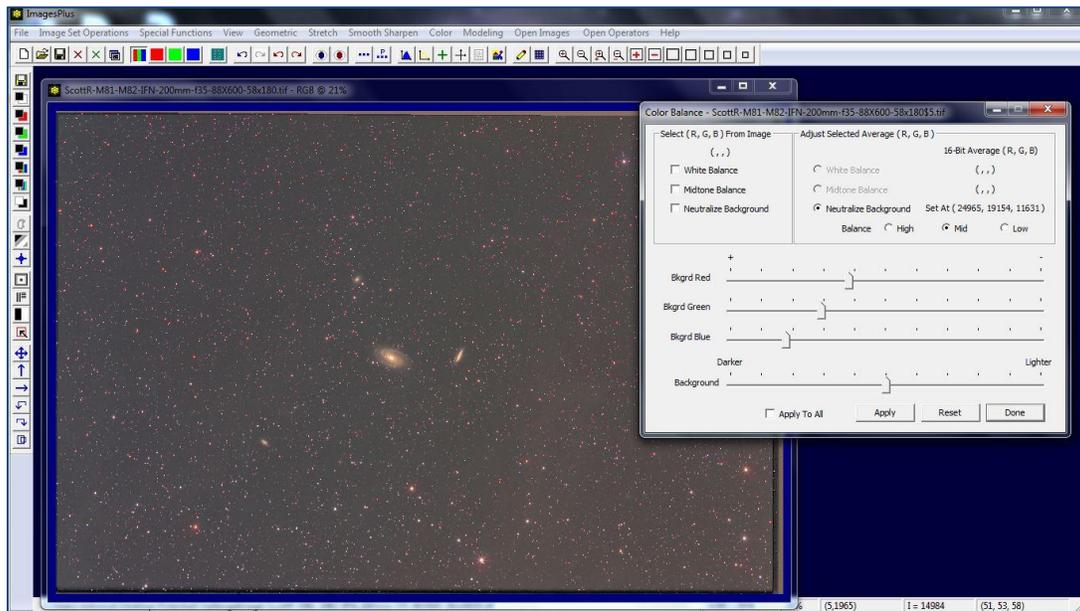


Figure 16 - Background Correction

Use the feature mask to split this image into two, one containing the stars and another containing everything else. Use your favorite technique to boost the star colour, I simply made a star mask and used it on a saturation boost. Save this image as *stars*. Now go to work on the galaxy, sharpen it, increase its saturation and don't worry about what it does to the rest of the image. Concentrate on making the main galaxies look the way you want. When you are happy with this save it as image B.

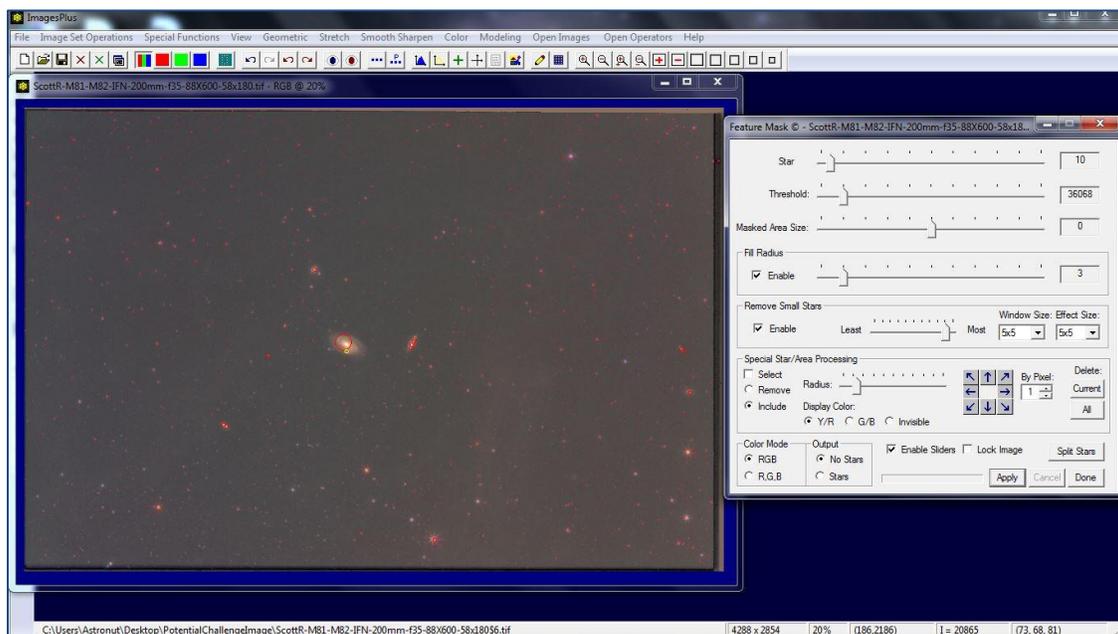


Figure 17 - Building Image B

Finally make a mask covering the two main galaxies and blur it using a large radius Gaussian of about 90 or so and use it in a stack with the combine images using blend mode, opacity and masks tool as shown below.

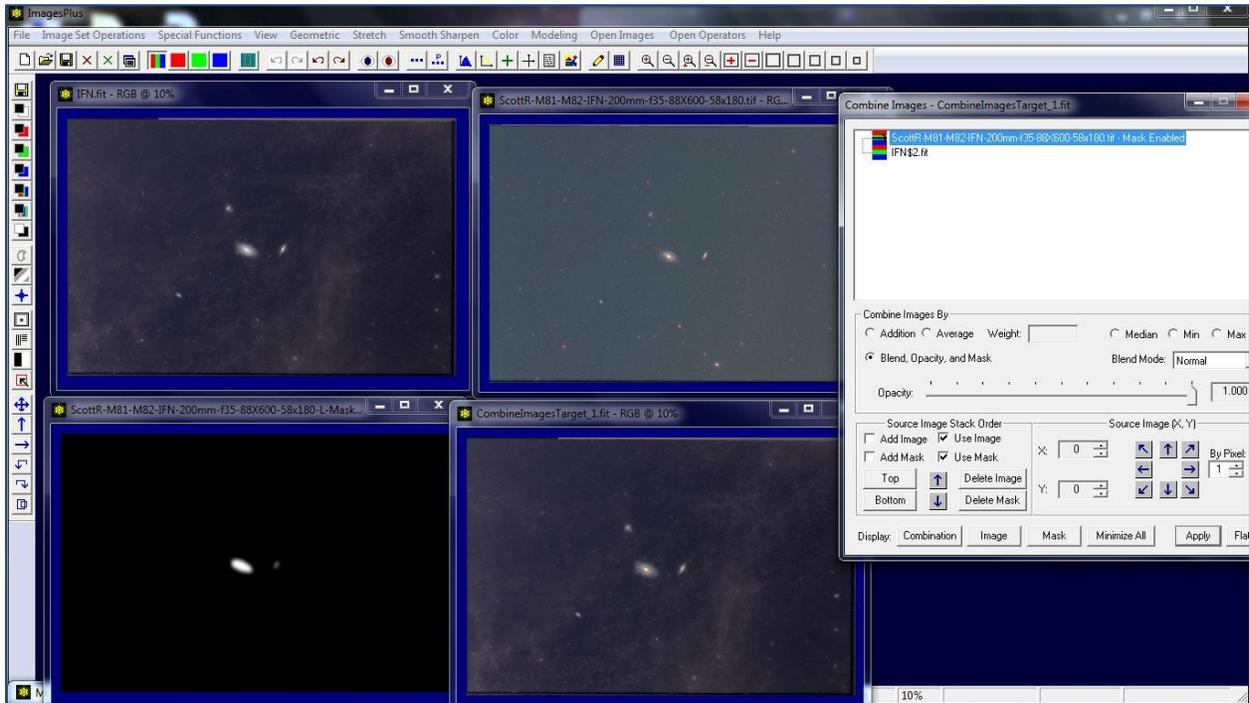


Figure 18 - Making the Final Background Image

Now you have the best of both worlds, an image that has lots of faint IFN and lots of colour and detail in M81 and M82. From here I applied a gentle stretch using microcurves to improve the contrast a bit more. Finally merge this image with the processed star image using the *merge split* blend mode to produce the image below.

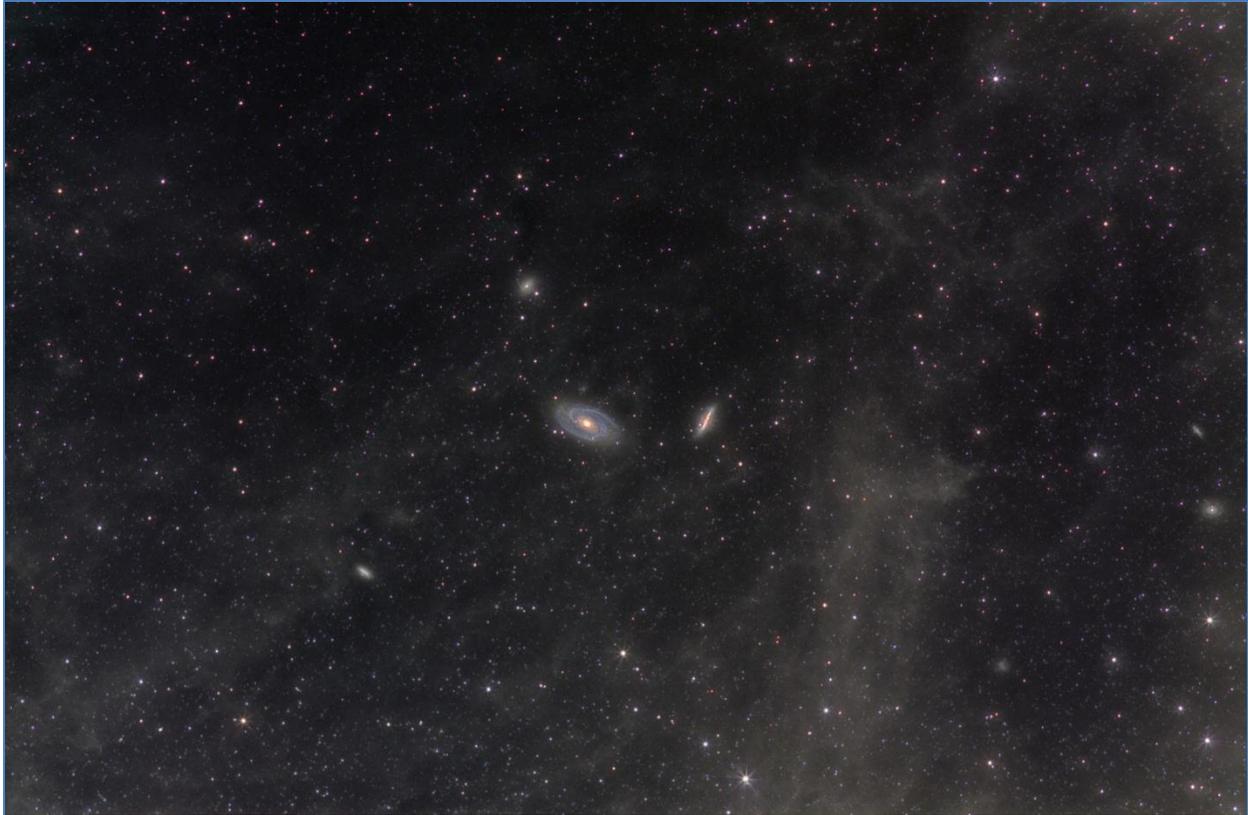


Figure 19 - Final Image

From here you can further enhance the image if you want, I was rather happy with the result so I didn't go any further. One of the nice things about the technique is the quiet background produced. This means that additional stretches are possible without having the image break down and become a mess of noise and you don't have to use so much noise reduction that you get that overly smooth and artificial look.

Have fun with this month's challenge and if you use this technique, experiment with setting for the stretches and noise reduction to make the image your own. Don't worry about the exact tool settings that I used (for the most part they are in the screen captures), for the most part it is the workflow that is important. I left out a screen capture of the final micro curves adjustment before the background and star layer combine as you simply stretch the image to taste. If you want more IFN contrast then add in a few more iterations to the masked stretching. You can also apply a simple "S" curve adjustment to the final image to make things stand out a little more, but be careful not to wash out the subtle star colour.

For those without Images Plus you will have to work a lot harder to use the technique, all is not lost. You can generate starless masks using the technique on my tips page at <http://www3.ns.sympatico.ca/b.macdonald/gallery/StarlessMaskGeneration.htm> and curves can be used in place of the arcsinh stretch; it will take a lot more work though. Generating the split star images is a bit more difficult, but <http://www3.ns.sympatico.ca/b.macdonald/gallery/Stars&DSOs.htm> will give you a place to start.