

## Imaging a tidal dwarf galaxy before discovery

Darrell Crofford , Chris De Pauw and Hugo Van den Broeck

During the winter season 2013-2014 we used a ASA 10" F/3.8 astrograph telescope remotely, to do wide-field imaging from San Pedro Valley Observatory in Benson Arizona. Darrell, the owner of the scope, and a group of Belgian amateurs, connected with Ghent University, use the scope on a regular basis. That's how Darrell Crofford (San Pedro Observatory), Chris De Pauw, Hugo Van den Broeck and colleagues (UGent group) decided in March 2014 to collaborate on a project.

Many amateur astronomers know the three beautiful galaxies to be found in the constellation of Leo, NGC3628, M65 and M66, also known as the Leo Triplet. They are about 35 million light years away. They seem to have a strong gravitational influence on each other. For instance, M66 and NGC3628 seem to have had a near-collision. M66 exhibits asymmetry in its spiral arms, while NGC3628 does not look like a normal edge-on galaxy, due to its wide divergence of its ends. Apart from these frequently described disturbances, however, there is even more peculiar evidence. On some shots of NGC3628, a curious long tail can be noticed, as a result of strong disturbances in its gravitational field. This tail is like a highway consisting of stars and dust leaving the galaxy and extending 300.000 light years far in intergalactic space. Recording this phenomenon needs a very long exposure time. In March 2014 we decided on doing this difficult task together: capturing the tidal tail of Leo's triplet.

We took exposures of Leo Triplet during four nights: 24, 25, 27 and 28 March 2014. We used a SBIG STL 11000 camera and took long exposure frames through 4 Astrodon filters: LRGB 250:120:110:90 min. The total exposure time was 9h30 min. The result was a complete success: the tidal tail was clearly visible. We were proud of this accomplishment. But the real surprise came 2 weeks later!

On April 8, researchers from Germany and Poland published a draft paper: "*Discovery of a tidal dwarf galaxy in the Leo Triplet*". Tidal dwarf galaxies (TDGs) are actively star forming systems which appear to be forming from debris in the tidal arms of interacting spirals. Using radio observations with the Very Large Array (VLA) in New Mexico, these researchers found a new gravitationally independent dwarf galaxy in the Leo Triplet, which we imaged only a few weeks earlier. For the optical component of this study, they used Sloan Digital Sky Survey (SDSS) images. When we compared our image of Leo Triplet to these images, we located the new discovered TDG (object in white circle) in our image, which had an even higher resolution than the SDSS images!

After we had detected this TDG on our image, we contacted Dominik Bomans of Ruhr-University Bochum Germany, one of the authors of the study. Enthusiastic by our image, the researchers from Bochum will now analyze our images for further examination. The color structure in our data could contain information on the distribution of stellar populations and star formation regions in the TDG. As amateurs we engage in astrophotography for fun and making beautiful, interesting pictures, but sometimes something unexpected like this pops up.

-Draftpaper B. Nikiel-Wroczyński, M. Soida, D.J. Bomans, M. Urbanik : <http://arxiv.org/abs/1404.1744>

-San Pedro Valley Observatory <https://arizona-observatory.com/>

