

# Photonic Cleaning Technologies presents David Burrell - From This Pale Blue Dot



C/2022 E3 (ZTF)

The vastness of space has always captivated me. Any discipline that deals with extremely large or small numbers beyond our everyday human experience is breathtaking. Geology is a prime example. The crystalline rocks of the inner Grand Canyon Gorge are 1.8 billion years old, equivalent to approximately 25 million human generations. To put it in perspective, do you know the names of your ancestors from five generations ago? It's mind-blowing to think about.

Astronomy has fascinated me for the same reasons since I was young. The distances to planets, stars, globular clusters, nebulas, and galaxies are awe-inspiring. It's amazing to point out the Andromeda Galaxy to someone and explain that the light we see began its journey 2.3 million years ago, long before our species existed (presumably). Even when I look at live

images downloaded during an observation session, I'm still astounded by the vast distances and the fact that we're seeing events from hundreds, thousands, and even millions of years ago. Images from the Hubble and James Webb Space Telescope are uncovering secrets from billions of light years in the past.

A few years ago, after retiring, I finally started pursuing my dream of astrophotography, something I had wanted to do for decades. Although I had owned various telescopes over the years, I had never been able to make the jump into astrophotography due to its high cost and my constant traveling while in the military. However, with technology advancements, the cost has come down significantly, enabling enthusiasts like me to pursue this wonderful hobby.



California Nebula (NGC 1499)



Horsehead (Barnard 33) & Flame Nebula (NGC 2024)



Andromeda Galaxy (M31)

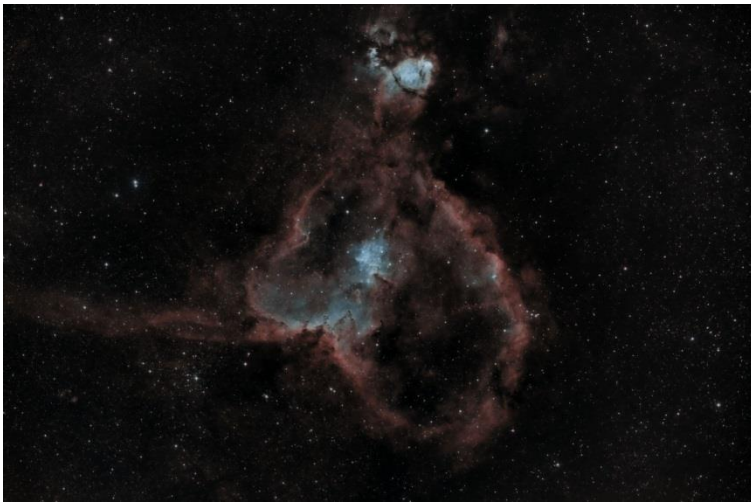
When starting any new hobby, it's beneficial to have someone to help or mentor you through the initial steps. Fortunately, I was able to find such a mentor from the very beginning. Peter Meyers, a Senior Technical Consultant with Woodland Hills Camera and Telescope, was the first person I spoke with when researching what equipment I should purchase for my budget level. He worked for OPT Corp at the time and was the most knowledgeable person I have encountered with respect to his technical expertise. Much of the equipment I now have was based on his expert recommendations. Without his help, this hobby might have initially been much more frustrating.

The workhorse of any astrophotography setup is the mount. I have an Astro-Physics Mach2 German Equatorial Mount, which is controlled through the Astro-Physics Command Center (APCC) software and control box. After setup, the only requirement is polar alignment due to the absolute encoders, which eliminates the need for one- or two-star triangulation. The telescope is a Takahashi 180ED, a very fast scope at f/2.8. The main camera I use is a One-Shot Color camera (QHY 367C). The telescope and camera combination allows for a relatively large field of view of approximately 4 by 3 degrees, which enables me to capture full images of large targets like the California Nebula (NGC 1499), North American Nebula (NGC 2000), and others highlighted in this article. I tend not to capture images less than 30" with this setup, which excludes most galaxies, planetary bodies, and planetary nebulae.

For image capture, I use the SkyX (Software Bisque) planetarium and imaging software. For guiding, I utilize PHD2 through a separate guiding camera. Because of some rather unique characteristics of the Astro-Physics mount that minimize drift on the target, guiding is not as critical. Therefore, the guiding is more passive through a feature within PHD2. Preprocessing images (stacking, aligning, normalizing, etc.) is done through Astro-Pixel Processor (APP).



Pale Blue Dot (Earth)



Heart Nebula (IC 1805)



Image Train

Most of the post-processing is through PixInsight. PixInsight is very intuitive, and there are multitudes of how-to videos online for all ability levels.

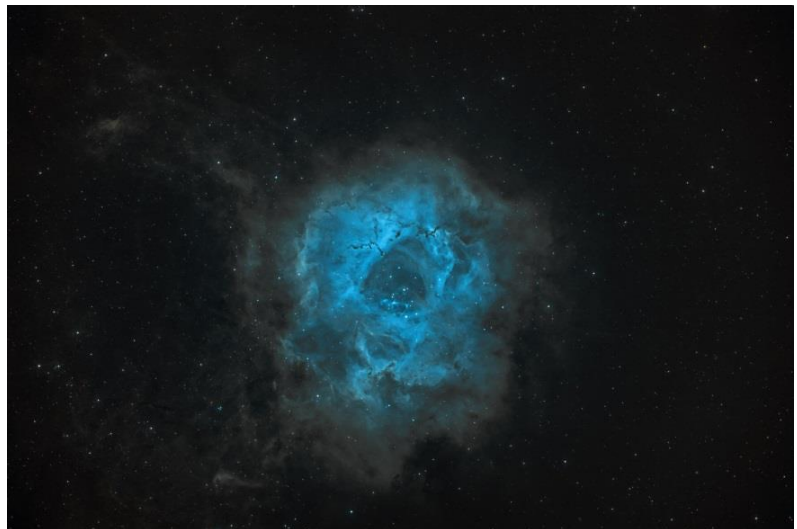
Since November 2021, my wife and I have been full-time RVers. This makes the hobby a challenge sometimes, as one might expect. We were at an RV park near San Antonio, TX in July 2022 when the park automatic sprinklers came on during an image session. I happened to be next to my imaging rig when this occurred. Immediately, I placed the cap over the telescope. Unfortunately, it was too late, as some water droplets made it onto the primary mirror. My laptop ended up soaked and unusable for imaging. How was I going to remove the water spots on the mirror? A day or two later, I remembered watching a video on The Astro Imaging Channel (TAIC) on YouTube addressing this very issue. I rewatched the video "Safely Clean Precision Telescope Optics and Imaging Systems" by David Giesen. I decided to purchase and use the First Contact Polymer offered through Photonic Cleaning Technologies. It is an amazing product. The polymer solution is sprayed on and peeled off when dry, removing all the water spots (water spots require a pretreatment spray), dust, fingerprints, and other impurities. You can find my before-and-after picture of the primary mirror on their testimonial page. I used it for all my optics, including the telescope corrector lens, filters, and camera lens covering. I would highly recommend this product to anyone who wants to clean their optics and regain the light-capturing characteristics of their primary mirror and other optics.

Before concluding, I would like to express my opinion on what I consider to be the most profound image ever captured. The "Pale Blue Dot" is a photograph of Earth taken in 1990 by the Voyager 1 spacecraft from 6 billion kilometers. The "Pale Blue Dot" image is not necessarily considered a "sexy" image in the traditional sense of the word, as it does not depict something visually captivating or stunning.

However, its profound message and the perspective it provides on our place in the universe makes it an image of great significance and impact. Astronomer Carl Sagan requested this image after advocating for it for years. In his book "Pale Blue Dot: A Vision of the Human Future in Space," Sagan reflects on the image's significance and the message it conveys about our place in the universe. The image shows Earth (approximately one pixel in size) as a small and fragile blue dot in the vastness of space, inspiring a sense of unity and shared responsibility for the planet. Sagan's message is a powerful reminder of the importance of preserving and protecting our planet for future generations and the need for global cooperation to address the challenges facing humanity. When we consider the vastness of the universe and our small place in it, the conflicts we face on Earth become ultimately insignificant. As Sagan said, "The Earth is a very small stage in a vast cosmic arena." When we view the world from this perspective, we must recognize the beauty and fragility of our planet and strive to work together to solve the issues that affect us all. Our time on this "pale blue dot" is fleeting, and it is up to us to make the most of it by realizing our shared humanity and focusing on cooperation rather than conflict.

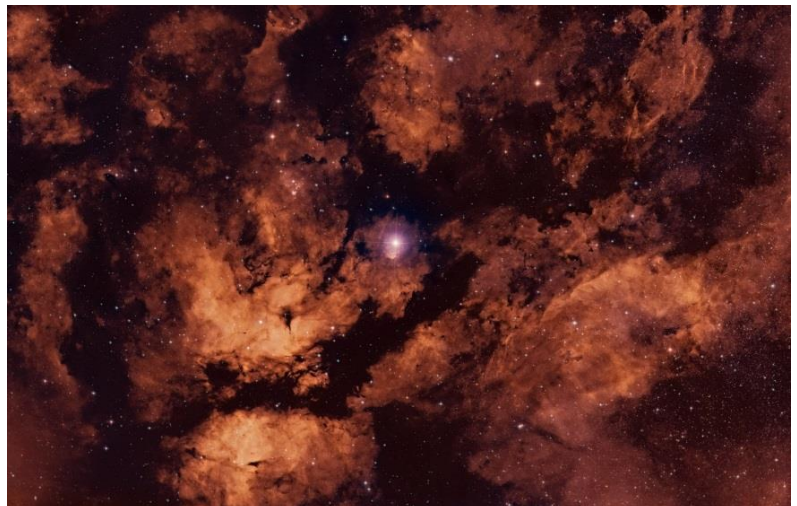


North American (NGC 7000) & Pelican Nebula (IC 5070)



Rosette Nebula (NGC 2237)

Are you a First Contact Polymer user and Astro Imager? Contact us at [sales@photoniccleaning.com](mailto:sales@photoniccleaning.com) for the chance to be selected as a featured guest in an upcoming issue of Amateur Astrophotography Magazine courtesy of Photonic Cleaning Technologies! Not familiar with our products? See our ad on the next page or visit us at <http://www.photoniccleaning.com>



Gamma Cygni Nebula (IC 1318)