

# Photonic Cleaning Technologies presents: Paul Derby Outreach Using Electronically Assisted Astronomy



Solar Eclipse August 2017 taken with an iPhone 7 afocally to the 3.5" Questar duplex eyepiece

Growing up in a small oil company town in Oklahoma I loved to glance up at the night sky and admire the milky way and constellations. It never occurred to me that clear dark skies were rare until I moved to Oklahoma City to go to college. The dark sky memories were imprinted in my young mind and would be with me forever. More to say about that later on in this article.

My high school journalism teacher asked our 10<sup>th</sup> grade class if anyone would be willing to take pictures for the school newspaper and yearbook. She inquired every day the first week of class with no response until Friday, when she made her request and said the school would pay \$2 for each picture used. I stuck my hand up volunteering to be the student school photographer. I'd never taken a picture before, but my dad had a 2 ¼ x 3 ¼ Graflex sheet film camera in a drawer at home that he intended to use someday. Our teacher had several photo assignments ready for scheduling,

so I needed to get ready quickly. We had a small camera store in town, so I took the Graflex to the camera store and asked the owner for help. I needed film, chemicals, and equipment to take and make pictures. He happened to have a few boxes of the right size cut film and gave me a quick lesson on how to develop the negatives and make contact prints. I left with enough stuff to get started.

The first pictures were awful but earned money. I made enough to buy a roll film adapter for the back of the camera which made things much easier. Over the 3 years in high school, I was able to make enough money to set up a much better darkroom, get an enlarger and improve my skills enough to land a summer job working with 14 staff photographers at the Oklahoma Publishing Company. Two of these photographers became my mentors; I learned a lot. The company published a morning and evening newspaper and several magazines. That job turned into full time work for the 5 years I went to college.



The transit of Mercury passing over the sun. Taken with an iPhone Xs afocally connected to the 3.5" Questar duplex eyepiece.



The full moon over the US Capitol taken with a Nikon D3 and 200mm f/2.0 Nikon lens

During high school and college, I avidly read Scientific American and carefully studied every Questar Telescope ad in each month's magazine. After college and grad school I went to work at one of the research and development facilities of a large super computer company, Control Data Corporation. I still read Scientific American and followed the Questar advertisements and after saving up money for over 25 years finally felt comfortable ordering a Questar Duplex without ever actually seeing one. I picked the duplex model so I could use the optical tube as a camera lens and have the option to do astronomy later remembering the skies of my hometown. The Silicon Valley skies where I started working, then the Minneapolis skies, and later on the Washington DC skies were all terribly light polluted; these skies didn't grab my attention so the Questar remained a terrestrial camera lens for a number of Nikon SLR cameras and eventually the DSLR models.

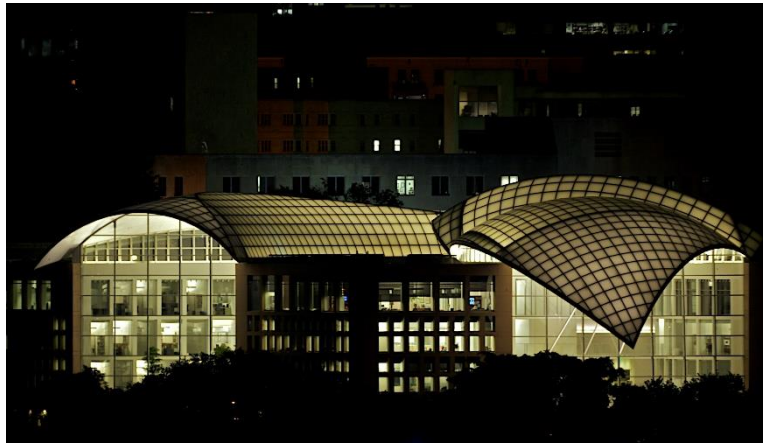
After moving through several employers and eventually doing IT work at The Pentagon, one of my work colleagues liked to talk about photography and I mentioned that I had a Questar. He was also interested in astronomy and invited me to attend a Northern Virginia Astronomy Club observing night at a park about an hour west of town. I joined him and was able to visit with a few amateur astronomers that night and look through their telescopes. That rekindled the childhood memories of the Oklahoma night skies. I joined the club and took my 15-year-old Questar to the next observing session and one of the members was very excited about my telescope and showed me that pointing it up at the sky let you see lots of new things.

The Questar now served as a telephoto lens and as an astronomical observing device. Here are some night pictures that I took with the Questar, iPhone, or Nikon D series DSLR cameras.

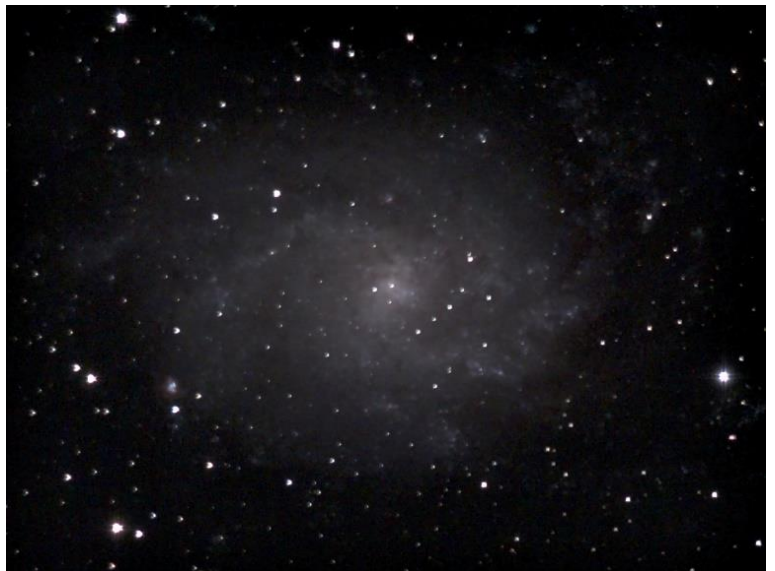
*Right: United States Institute of Peace taken with a Questar 3.5 duplex with a Nikon D3 axially connected. 1,300mm FL. The camera was set up at the US Air Force Memorial. The building is across the Potomac River about 2 miles away.*

About 6 years ago some bright scientists in France conceived of an integrated “smart telescope” combining a Newtonian telescope with imaging capture software embedded in an internal raspberry Pi. This scope connected to a smart phone running a custom APP that allowed fully automated capture of many space objects. They financed the project through a Kickstarter campaign and started delivery of the telescopes in 2020. I received the Unistellar eVscope in June and have used this telescope to show night sky images of nebula, star clusters and galaxies to thousands of attendees at a regional state park about an hour’s drive west of Washington DC. The Appalachian foothills help to block out some of the DC light pollution. This telescope and tripod fit into a backpack that weighs 20 lbs and can be set up and operational in less than 15 minutes. There are no wires to deal with. The only adjustable control on the telescope is the focus knob. I operate my telescope using the IOS Unistellar APP running on an iPhone in Operator mode. An iPad is set up on a stand and runs in Observer mode for up to 10 people to stand around and watch the telescope capture and transmit images every 4 seconds as the picture keeps improving.

*Center & lower right: some of the images that were shared with text messages to attendees during the live capture of these objects.*



United States Institute of Peace



M33 Triangulum Galaxy with about 40 minutes of photon capture time



Helix nebula



After 3 years of use the mirror in my eQuinox telescope was getting too dirty for my comfort. I was hesitant to wash the mirror in water or rub my finger over the surface and risk dragging a tiny piece of sand over the mirrors surface. I discovered First Contact Polymer and was very happy to clean the mirror with only polymer contact to the surface.

A recent addition to the “smart telescope” family is the ZWO SeeStar S50. This is a 3.5 lb telescope with an embedded camera, computer, light pollution filter, and auto focuser. There are no external controls on the telescope. It connects to an APP via WiFi. My first light with this telescope was the October full moon a few hours after sun rise. This image is of the full moon in daylight. (*top left*)



I've been serving as the Northern Virginia Astronomy club volunteer coordinator for the Sky Meadows State Park's, Astronomy for Everyone, monthly events the past 3 years. Over this time, I've been able to introduce sky objects to thousands of attendees, letting them watch a smart telescope find an object using plate solving, center the object with successive approximation movements, and taking 4 second exposures that are transmitted to an iPad in real time. This gets a huge WOW factor from the audience and is a great entry into astronomy and image capture. The combination of photography and astronomy, and systems integration, are my passion that I love sharing at outreach opportunities.



*Are you a First Contact Polymer user and Astro Imager? Contact us at [sales@photonicleaning.com](mailto:sales@photonicleaning.com) for the chance to be selected as a featured guest courtesy of Photonic Cleaning Technologies!*