

Research Committee report for November 2016

This month has been rich in both observations and theoretical speculations.

**Solar system Observations:** Clif Ashcraft took a HDR waxing crescent moon and later a mosaic of the waning gibbous moon, both with exquisite detail.

**Star Observations:** Clif added his speckle interferometry observations (red line and dot) of the close double star STT 410AB to a plot of older observations (green and blue dots). These make up a provisional orbit with a period of 1400 years, inclined somewhat to our line of sight. He would like to re-measure this star with his new drift calibration technique since his position angle is clearly a little off. On the orbit plot for STF 2454AB his data were consistent with the older observations.

**Deep Sky Observations:** Helder Jacinto imaged the open cluster NGC 7142 and the reflection nebula NGC 7329 in Cepheus from light-polluted Union in a crazy-long exposure (16 hours). The nebula is 3000 light years from us, and the star cluster is in the background at a distance of 6000 light years. He also spent five hours on open cluster NGC 752 in Andromeda and revealed a nice range of star colors, after discarding subframes with airplanes running through them.

Tolga Gumusayak imaged M76, the Little Dumbbell planetary nebula in Perseus. This is one of the faintest Messier objects and he took 26 hours in LRGB and narrowbands from Jenny Jump to show its outer details. He also imaged the ghost of Cassiopeia, and wrote a blog about the Andromeda galaxy (<http://www.tolgaastro.com/ap-blog/how-large-is-andromeda-galaxy>).

Tony Sharfman was busy this fall taking many images, including planetary nebulae M57 (Ring in Lyra), M 27 (Dumbbell in Vulpecula), and M 76 (Little Dumbbell with clear inner structure). He also imaged emission nebulae Pacman (NGC 281 in Cassiopeia), the Heart Nebula (IC 1805 in Cas), the Soul Nebula (IC 1848 in Cas), the Bubble Nebula (NGC 7635 also in Cas), ced214 in Cepheus, Sadr region (IC 1318 in Cygnus), and the Cocoon Nebula (IC 5146 in Cygnus). Tony also imaged the globular cluster M71 in Sagitta about 12000 light years away, and the nearer double cluster in Perseus.

**Presentations:** On November 9 Clif talked to the NJAG club (Montclair State University) about his work on speckle interferometry of double stars.

**Other activities:** Aaron Zuckerman reopened a discussion on the necessity of dark matter in galaxies and galaxy clusters. See Stacey McGaugh (The Radial Acceleration Relation in Rotationally Supported Galaxies, <https://arxiv.org/pdf/1609.05917.pdf>) and Erik Verlinde (Emergent Gravity and the Dark Universe, <https://arxiv.org/pdf/1611.02269v2.pdf>). They explain away dark matter by modifying Einstein's gravity as an emergent phenomenon. "In the same way that temperature arises from the movement of microscopic particles, gravity emerges from the changes of fundamental bits of information, stored in the very structure of spacetime." We shall see. Margot Brouwer (First test of Verlinde's theory of Emergent Gravity using Weak Gravitational Lensing measurements, <https://arxiv.org/pdf/1612.03034.pdf>) finds that Emergent Gravity passes the first test involving 33000 galaxies.

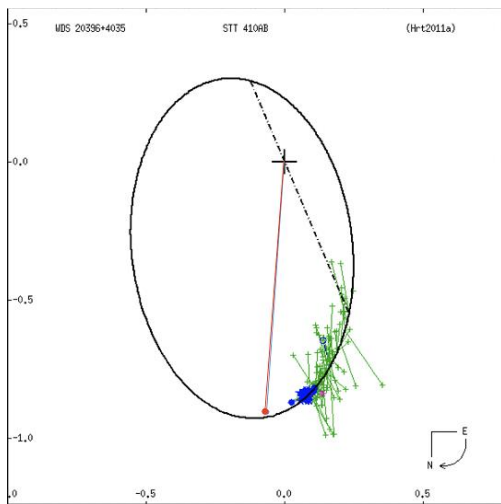
Clif pointed out the new online spectroscopy database of the British Astronomical Association (<https://britastro.org/specdb/>), a valuable resource.

Our exoplanet FUN group (Follow Up Network) had a target of opportunity one night to observe the sudden final dimming of a microlensing event. This is when a star passes half-way between us and another star, exactly lined up. Unfortunately we missed this because we were clouded out, but Dennis Conti got some data. It is exciting that our group is able to participate in further experiments.

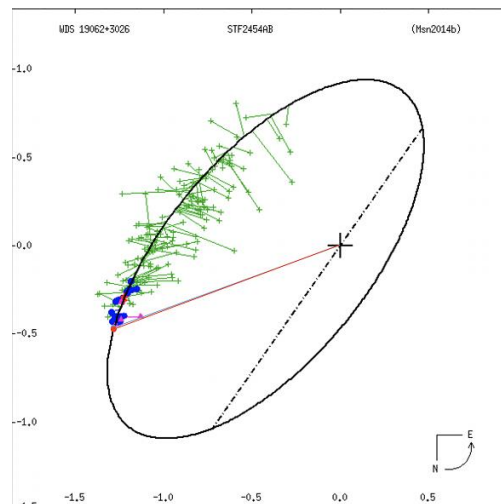
We are also looking into projects involving the brightness of outflows from protostars, the spectra of eclipsing binaries, and stars which might become supernovae.

In the spring of 2017 we plan to give a members' workshop on intermediate astrophotography/simple image processing (Jason Kendall and Tolga Gumusayak), and also a workshop on intermediate spectroscopy/analysis (Steve Lowe and me).

Respectfully submitted, Mary Lou West, Research Committee Chair



STT 410AB Orbit by Clif Ashcraft



STF 2454AB Orbit by Clif Ashcraft



Inner structure of M76 by Tony Sharfman



Outer structure of M76 by Tolga Gumusayak