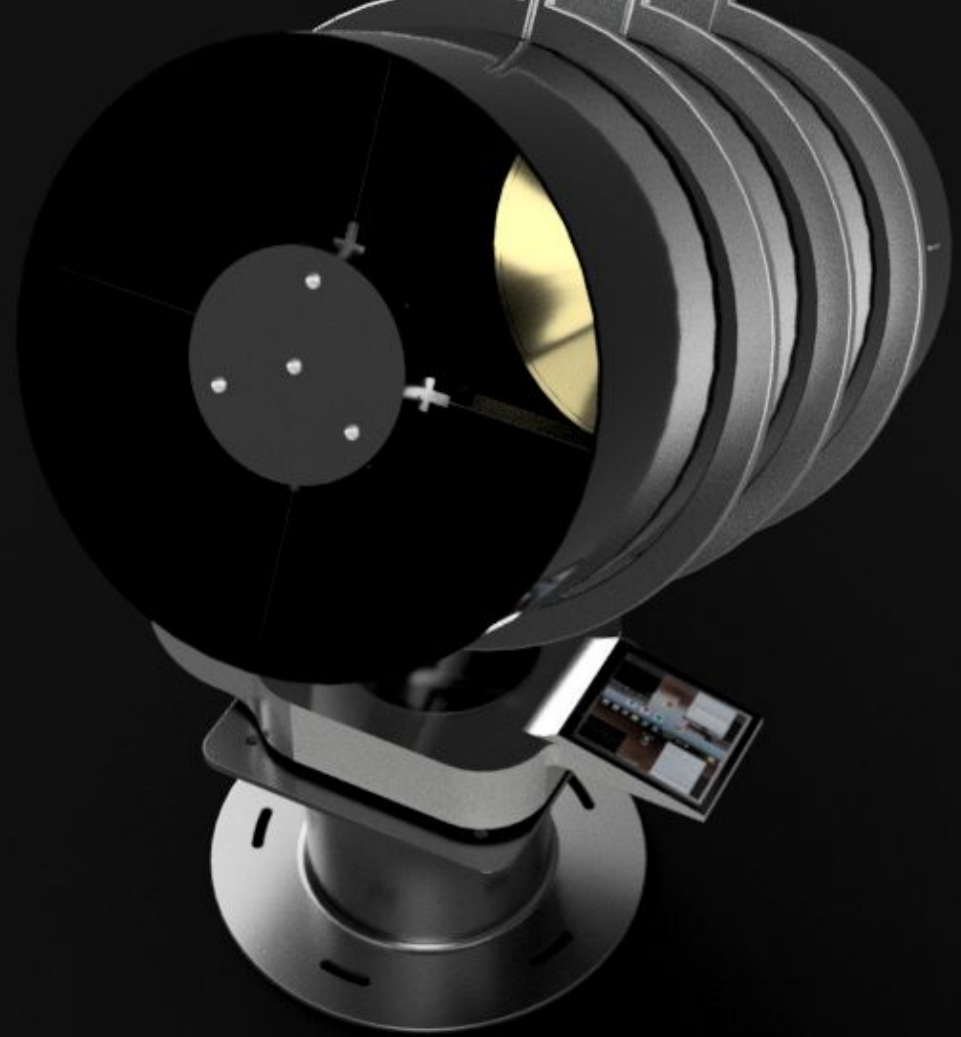


# WIKEE

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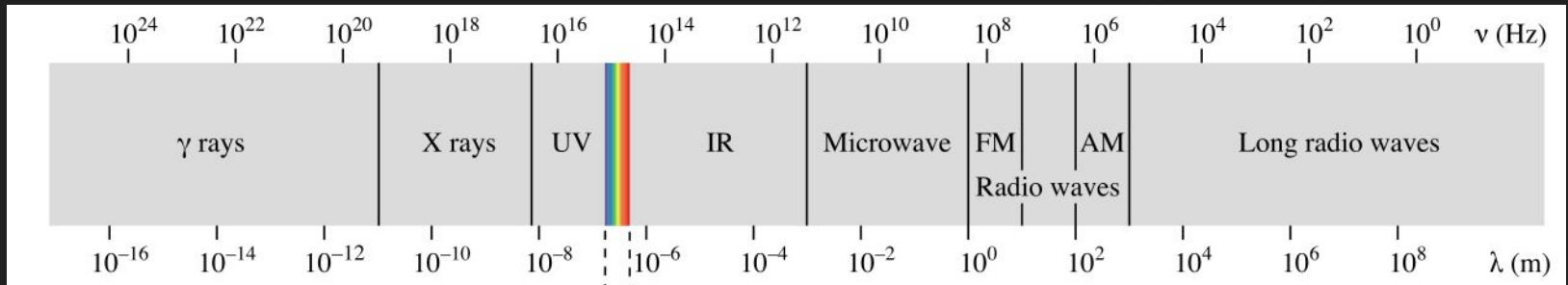
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Wide field  
Infrared  
Kuiper belt and  
Exoplanet  
Explorer  
telescope



# Experiencing the universe around us.

- Our senses are extremely limited and ill equipped to figure out what is happening in the universe.
- The senses of touch, smell, taste, and hearing only let us take in a small part of the universe.



# Feeding Your Sense of Exploration

The background of the slide is a deep space scene. It features a central galaxy with a bright, glowing blue core and a surrounding ring of reddish-orange and yellowish light. The galaxy is set against a dark, starry background with numerous small, distant stars of various colors (blue, green, yellow, white) scattered across the field of view.

Galactic structure.

Comets and TNO'S.

Exoplanets.

Survey telescopes.



# Visible Light

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- The night sky we see.
- Stars, bright nebula, galaxies, and planets shine brightest in this window.

# Infrared Light

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- Cooler stars shine brightly in the infrared.
  - ~58% of all stars are nearly invisible.
- Kuiper belt objects such as comets are more easily found in the infrared.
- Infrared light passes through gas clouds with ease!

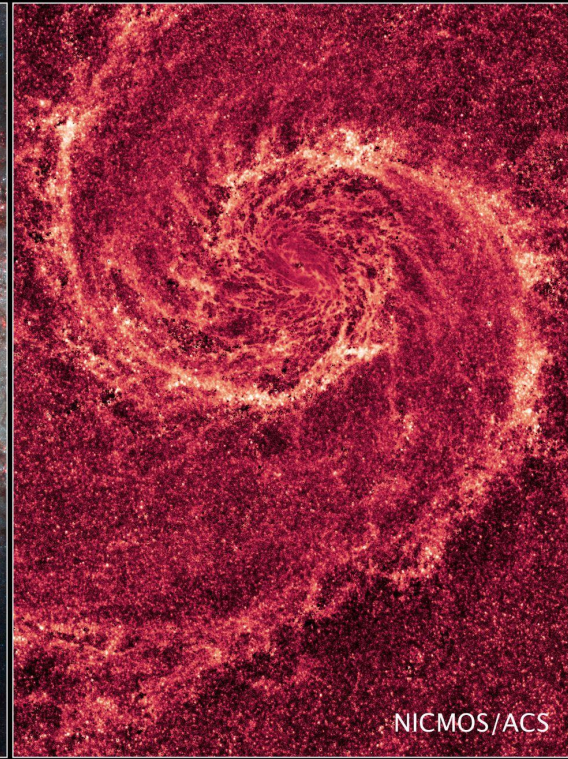




# What the Infrared says about Galaxies.

- Near infrared is dominant
- Gas clouds are transparent
  - We see the structure

*By peering through the gas we see that large gas clouds harbor huge amounts of stars*



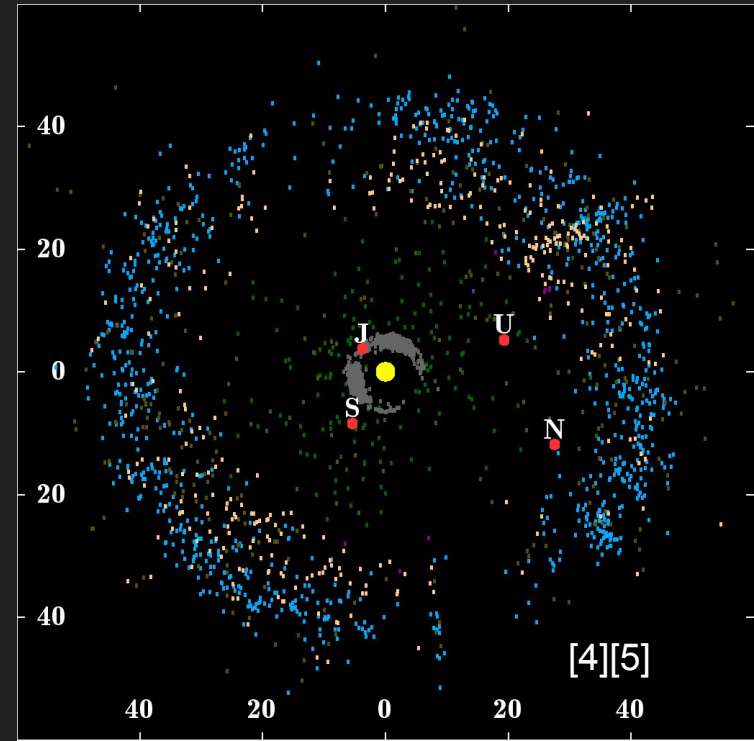
Spiral Galaxy M51  
Hubble Space Telescope ■ ACS ■ NICMOS



# Comets And the Kuiper belt.

- The Kuiper belt is a region that lies outside of neptune's orbit.
- Most short period comets come from here.
- Small gravitational interactions can send comets to the inner solar system.

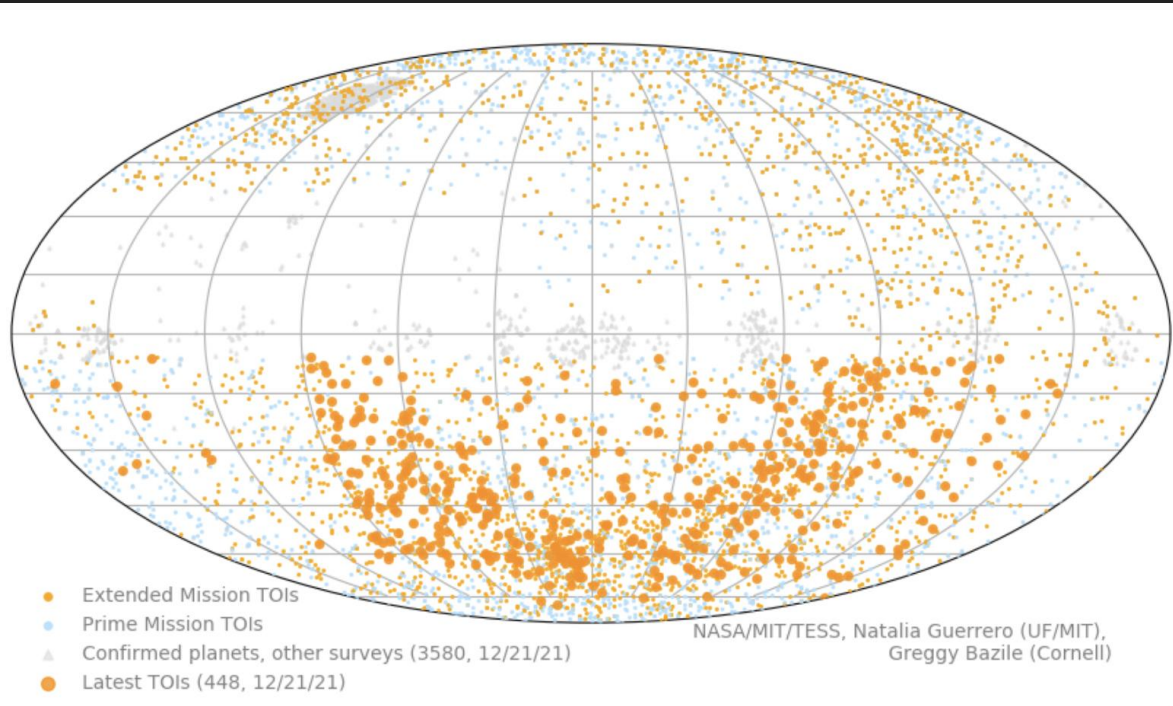
I would like to remind you... Earth is in the inner solar system



# The NEOWISE Mission and the Discovery of Comets.

- In the first 2 years of reactivation the Wide-field Infrared Survey Explorer (WISE) discovered 8 new comets while detecting over a 100
- Also discovered 198 new near earth asteroids within those two years.
- Survey telescopes like these are crucial for advanced warning of potential threats.

# TESS hits 5000 exoplanet candidates.

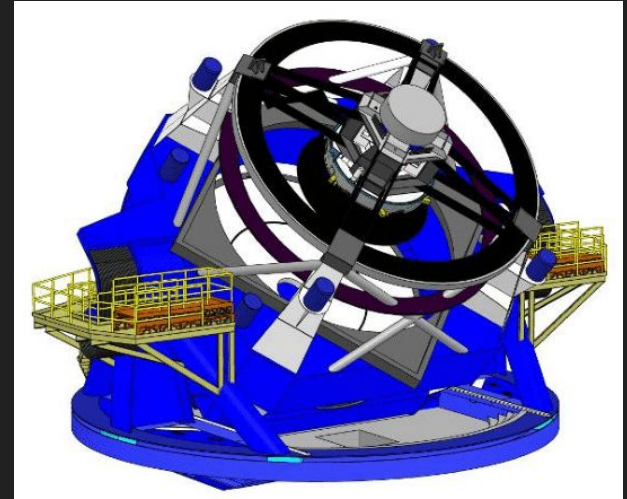


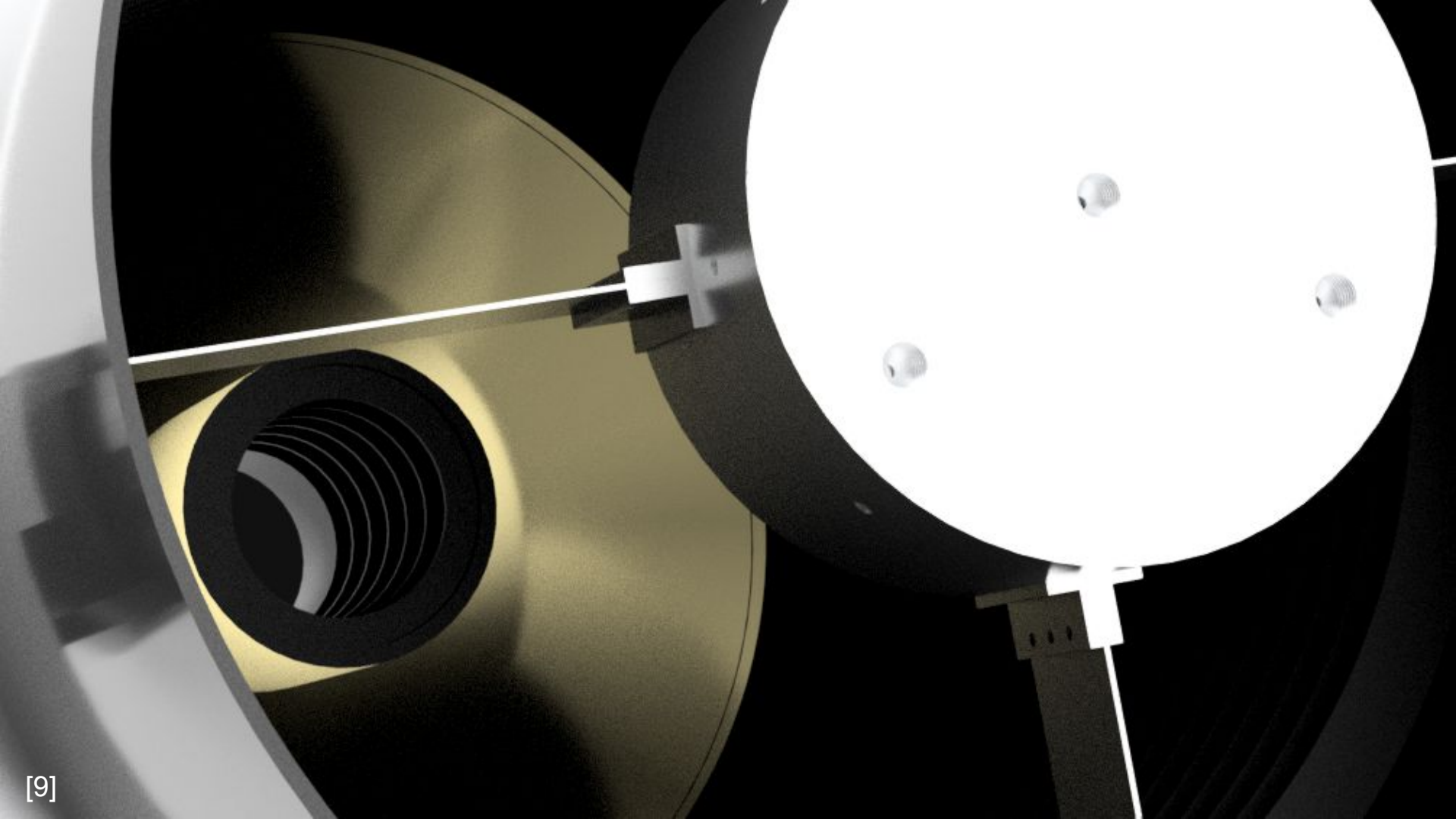
- Exoplanet candidates require dedicated telescope time to confirm light curves.
- TESS does not have spectrometers for doppler shift measurements.

# LSST Data

“The science archive will consist of 400,000 sixteen-megapixel images per night...”

- 0.3-1 micron imaging.
- Approximately 10 million alerts will be generated per night.
  - With huge of samples of data observatories will have a difficult time keeping up.





A close-up photograph of the internal components of a telescope. The image shows a brass-colored metal housing with a black threaded opening on the left. A white cylindrical component is visible on the right, secured with three screws. A thin white wire or fiber optic cable runs across the scene. The background is dark, and the overall lighting is dramatic, highlighting the metallic textures and the precision of the assembly.

# The WIKEE Telescope



# What's so special?

- 0.7 meter (~27.5 inch) primary mirror.
  - Similar systems run upwards of \$40,000
- Multi-instrument capable.
  - Images can be taken at very different wavelengths at the same time.
- Self contained unit.
  - Integrated motion, pointing, imaging and data processing.

Anyone can use it!

# The Unseen Horizon

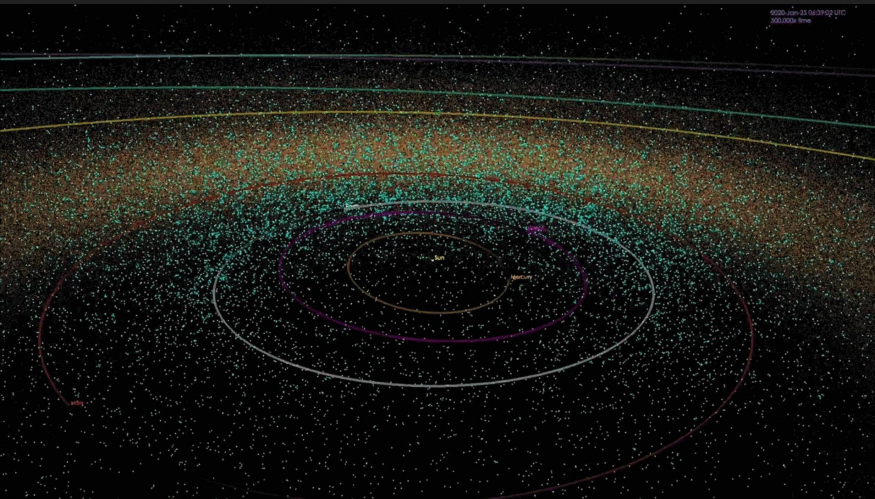
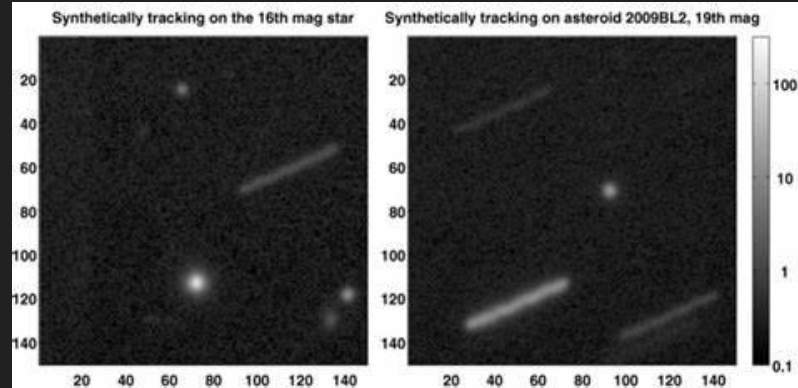
- Geared toward professional astronomers and amateurs.
- Time can be bought or given depending on circumstance.
- All activities can take place remotely.





# Probabilistic Synthetic Tracking (PrSynT)

Synthetic tracking takes many fast frames and aligns them with the asteroid.



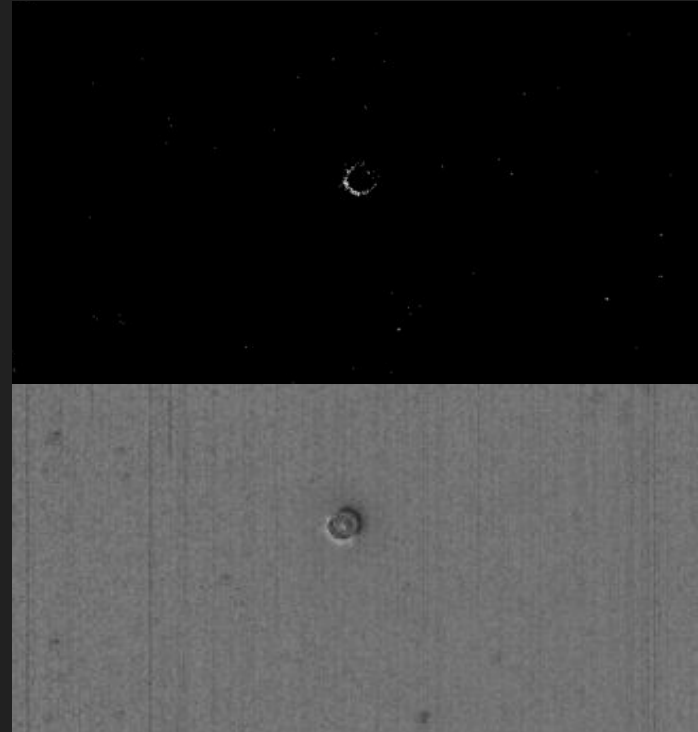
PrSynT works by taking long exposures and changing the tracking rate of the a WIKEE system to match that of the expected transit rate of TNO's.

# Automated Motion Detection.

Traditional stacked  
output.



Motion detection  
program.



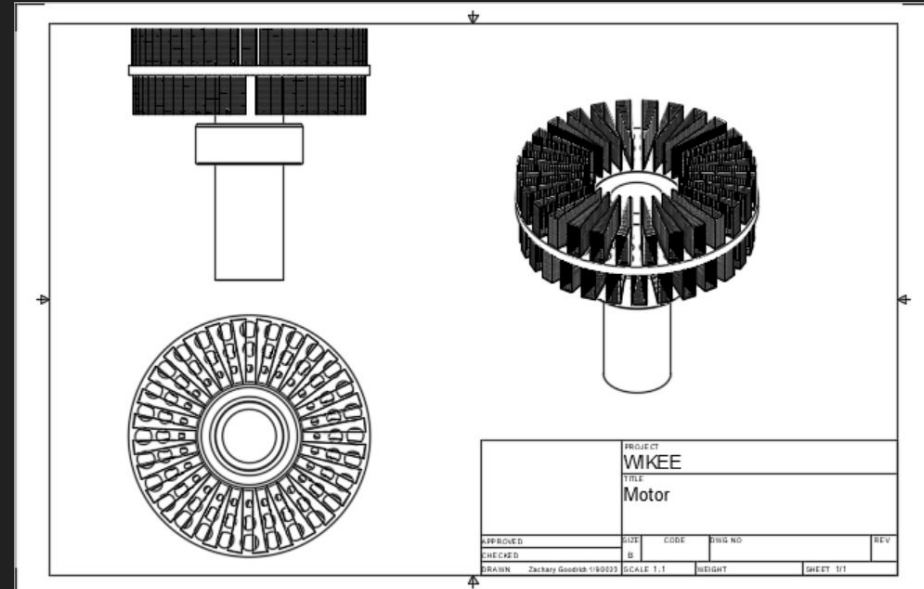
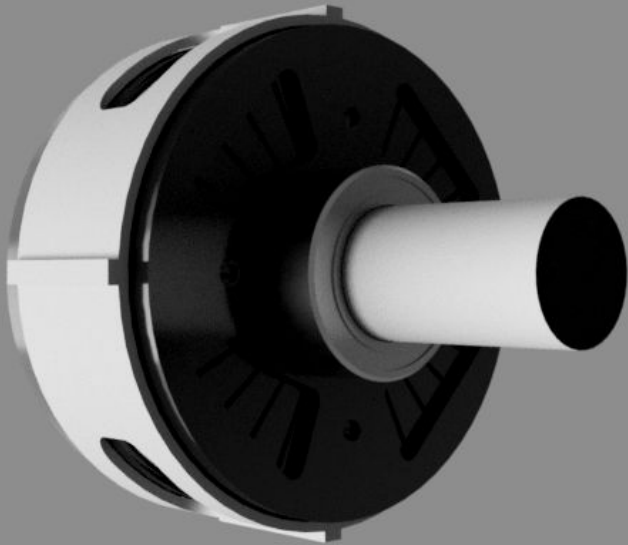
# Early development.

The small, refracting style prototype will serve as a test bed for experimentation with a new mounting system, recently developed motors, and inter-telescope communication.



# Stacked Coil Stepper Motor.

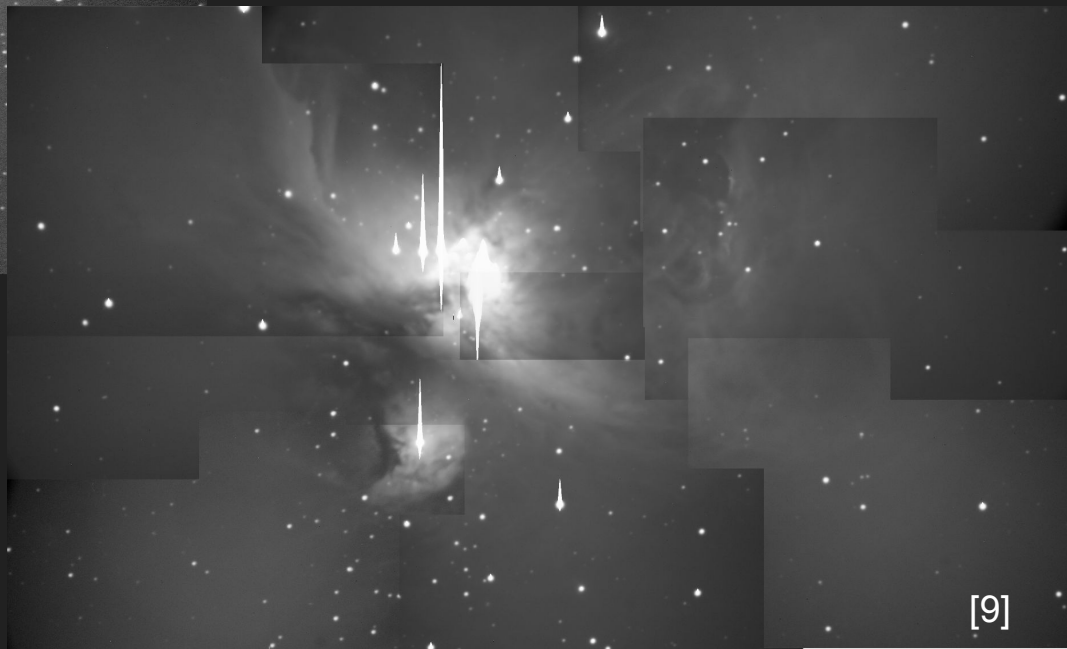
This permanent magnet stepper motor has two “stacks” of coils offset from each other to increase resolution of the motor system and allow for heavier loads.





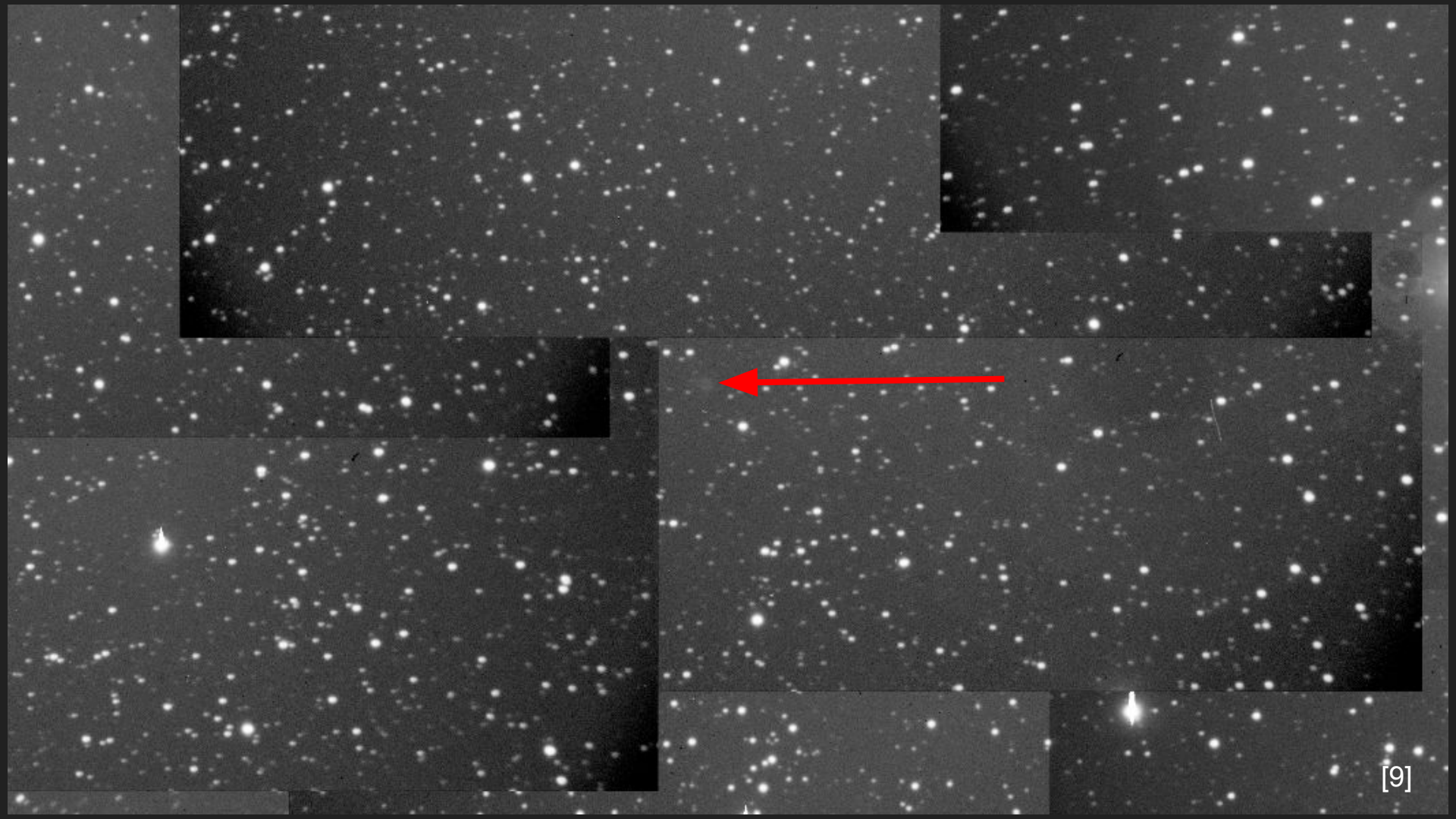
## *Messier 17*

*150 second exposure taken  
with a 14" cassegrain at the  
Etscorn campus observatory.*



## *Messier 42*

*9x50 second exposure  
composite with a 14"  
cassegrain at the Etscorn  
campus observatory.*



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