Near-field Microlensing with Evryscope, the First Full-Sky, Gigapixel-Scale Survey

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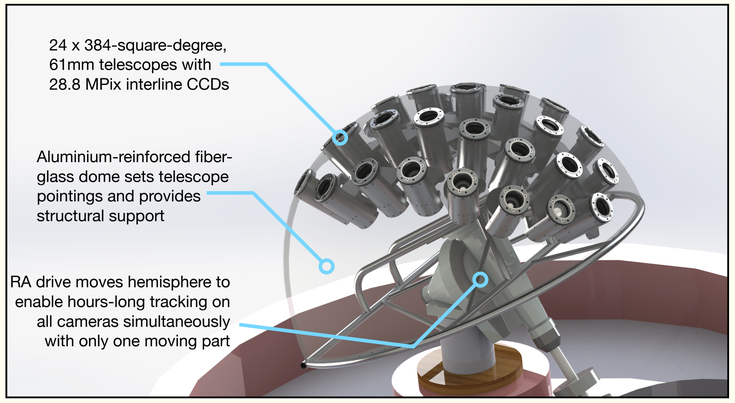
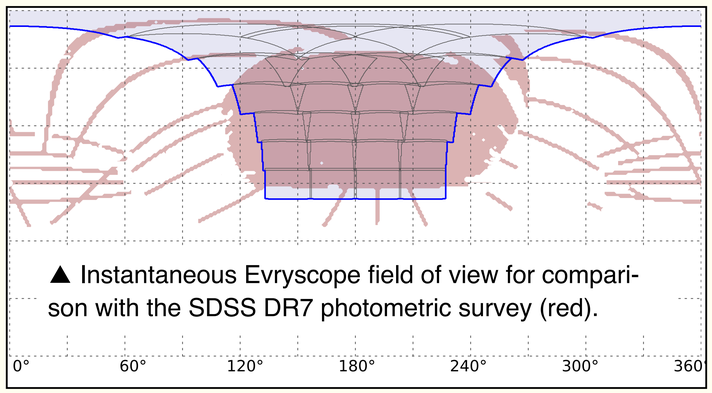
Overview and Microlensing Survey

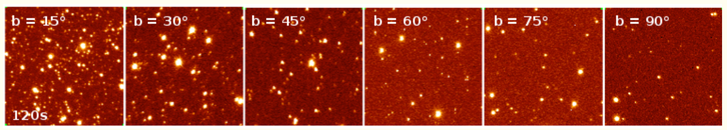


- Continuous two-minute cadence of 8000 square degrees of visible southern hemisphere sky, starting in May 2015
- Beginning summer 2017, a second instrument in the northern hemisphere will extend this footprint to encompass 12000 square degrees with a 4000 square degree overlap between sites.
- Simultaneous high-cadence multi-color photometry in the overlapping region will allow the Evryscope survey to both discover and follow up bright, nearby microlensing events
- Pre-magnification imaging of all events brighter than g' ~ 16

Field of View and Pixel Scale

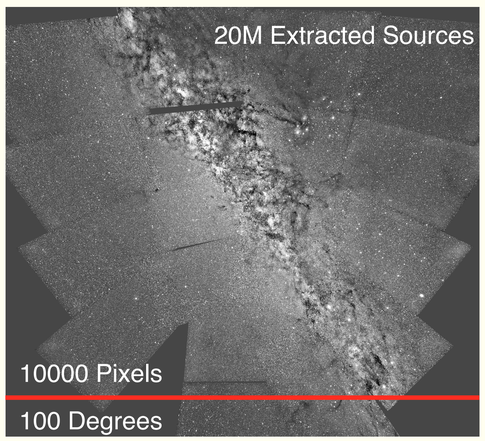


▲ Instantaneous Evryscope field of view for comparison with the SDSS DR7 photometric survey (red).



▲ Each cutout is 0.4 degrees on a side. Crowding does not affect at least 90% of stars above 20 degrees galactic latitude. **These cutouts show 0.014% of a single Evryscope image.**

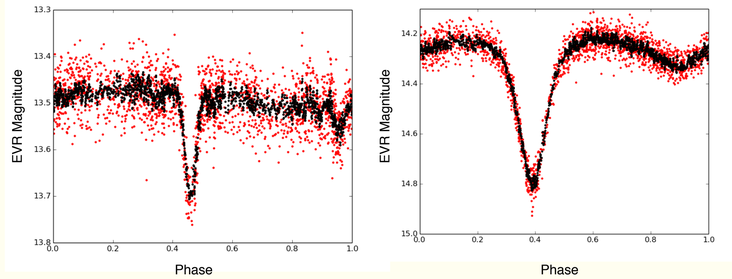
Evryscope Instrument Specifications



Evryscope Instrument Overview	
Field of View	8,000 square degrees.
Cadence	2 minutes
Pixels	691 Megapixels (13"/pix)
Aperture	61mm
Duty cycle	97% (whole-sky)
Detector	28.8 MPix CCDs
Tracking	2 hours at a time
Photometric performance	
Single-exposure	g=16 (3-sigma)
1-hour bins	g~18
Sub-percent precision	g < 12 every ~10 minutes
Sub-percent precision	g < 15 every hour

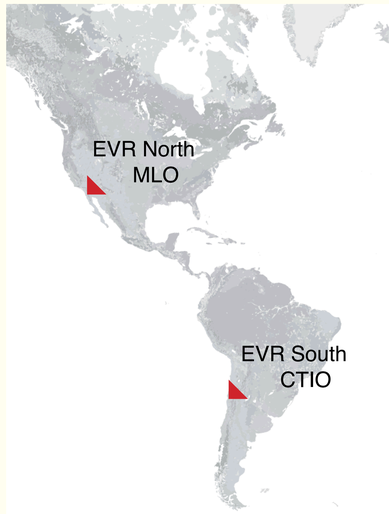
CTIO Evryscope Status

- Deployed in May of 2015 and is currently producing multi-year light curves with percent-level precision.
- To date, the system has collected over 100 TiB of data, including ~50,000 observations of every star brighter than g' ~ 16 in a 100 degree declination range.
- Data reduction and analysis pipeline in production, has so far discovered several short-period eclipsing binaries:



Mount Laguna Observatory Evryscope

A second site, located at Mount Laguna Observatory in southern California, is funded and on schedule for a mid-2017 deployment.



- Identical design to CTIO Evryscope, plus a second filter option in Sloan r'
- Field of view intersects that of the CTIO Evryscope by 4000 square degrees, providing simultaneous two-color imaging over many-year timescales
- Expands total survey footprint to 12000 square degrees with 1.4 gigapixel resolution

Acknowledgements and Collaboration

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