VISION
OAP
Progress Report

Victor Garcia

August 26th, 2014

The VISION Collaboration

Victor Garcia

Lowell Observatory and Vanderbilt

- Dr. Matthew Muterspaugh (TSU)
- Dr. Gerard van Belle (Lowell)
- Dr. Dave Mozurkewich (Seabrook Engineering)
- Dr. John Monnier (U. Michigan)
- Jim Clark (NRL)
- Many others!

What is VISION?

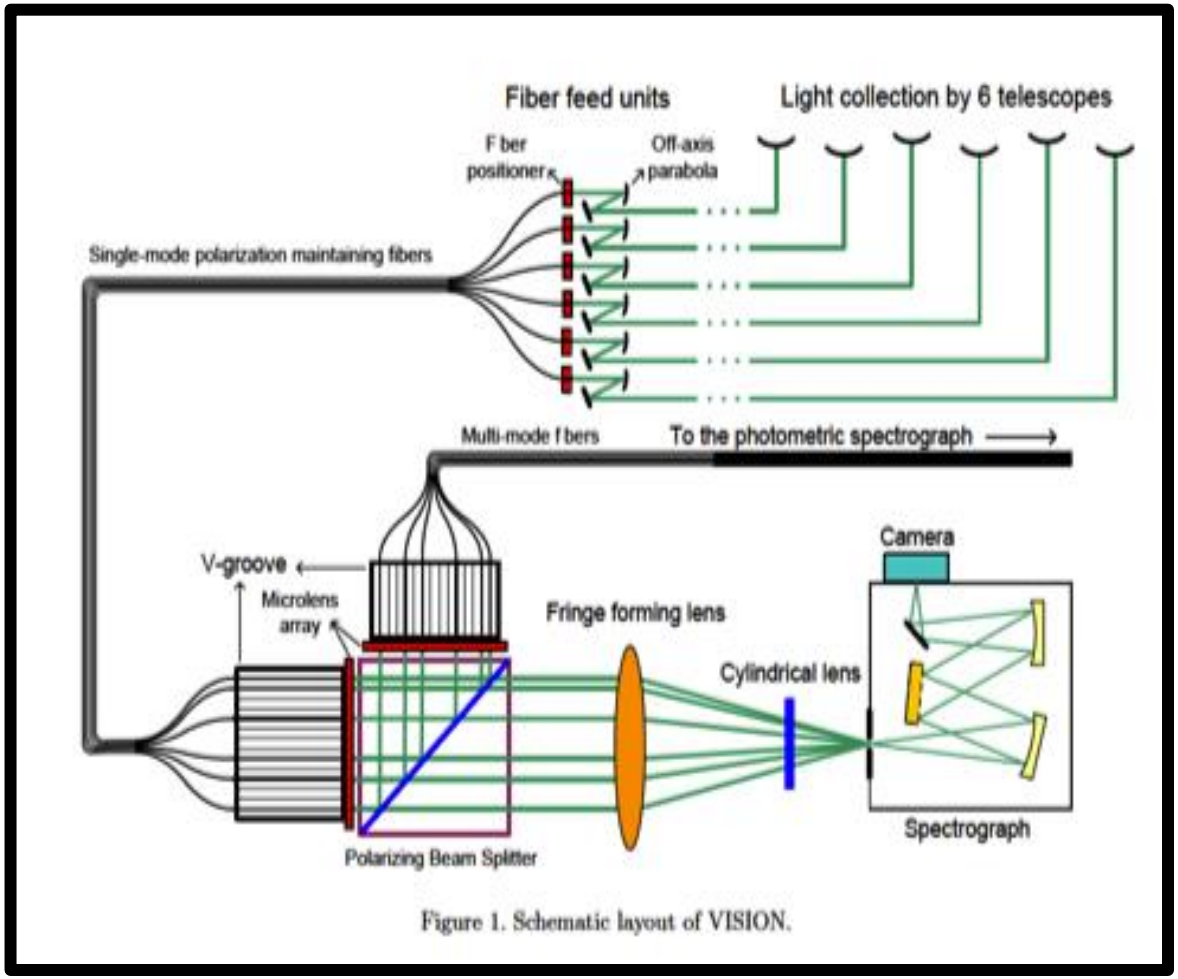


Figure 1. Schematic layout of VISION.

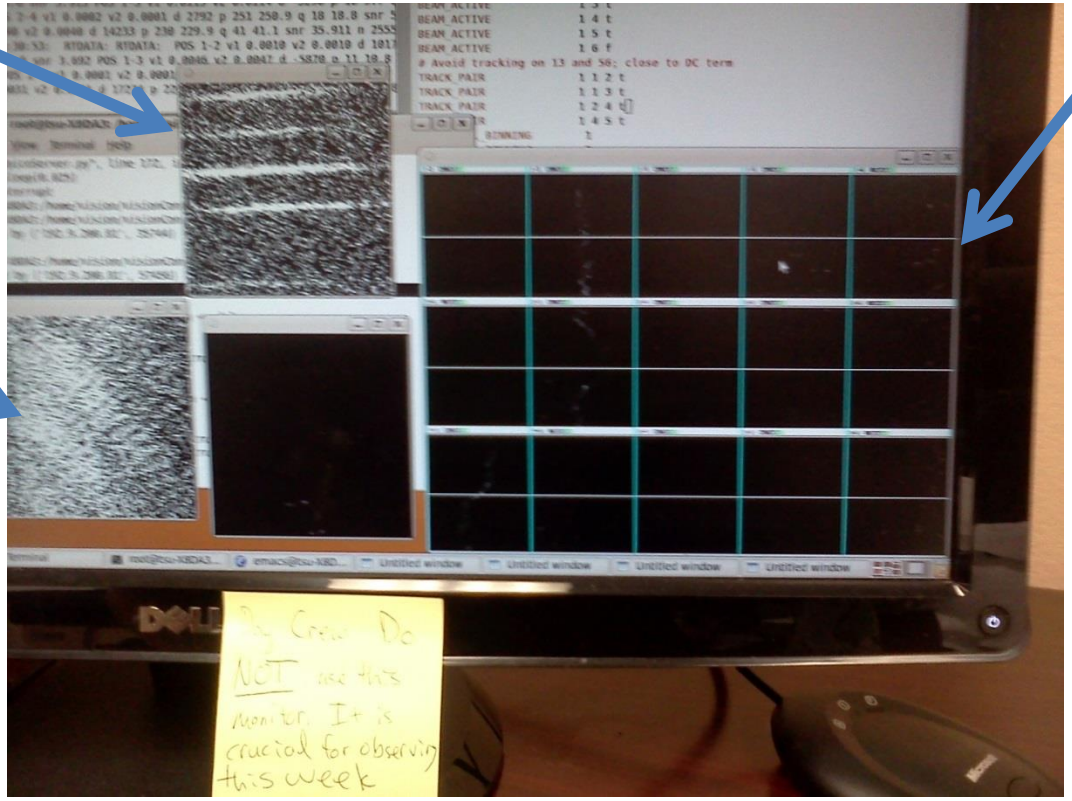
- 6-way simultaneous beam combiner.
- Simple design: Fringes are made directly on a modern EMCCD.
- Photometric channels on an EMCCD for calibration.
- Fast fringe searching from an R=200 spectrograph.
- Single mode polarization maintaining fibers spatially filter light for increased visibility precision.

Improvement #1:
Multi baseline bootstrapping

Photometric Camera

15 “Waterfall” plots

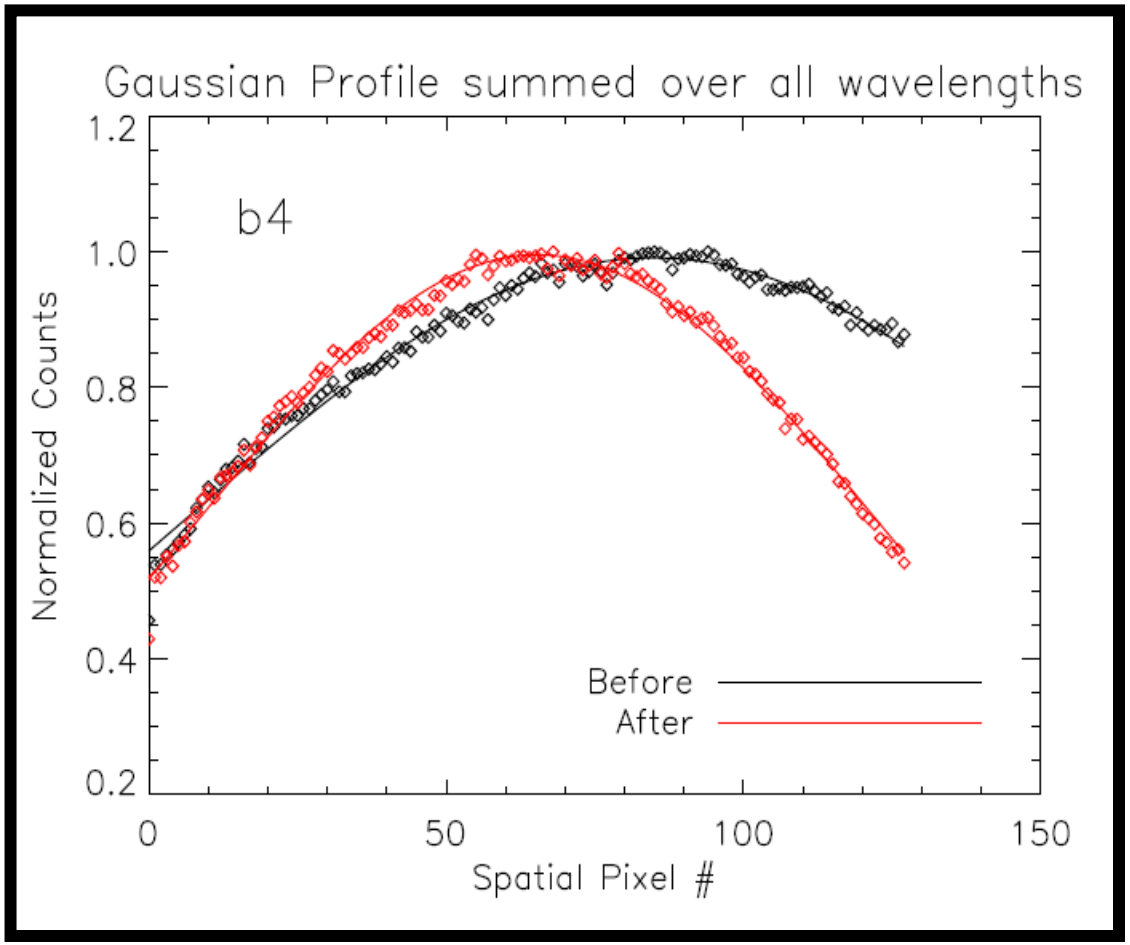
Fringing Camera



VISION can baseline bootstrap long baselines (E6, W7, E7) using short baselines (AC, AE, AW, AN)

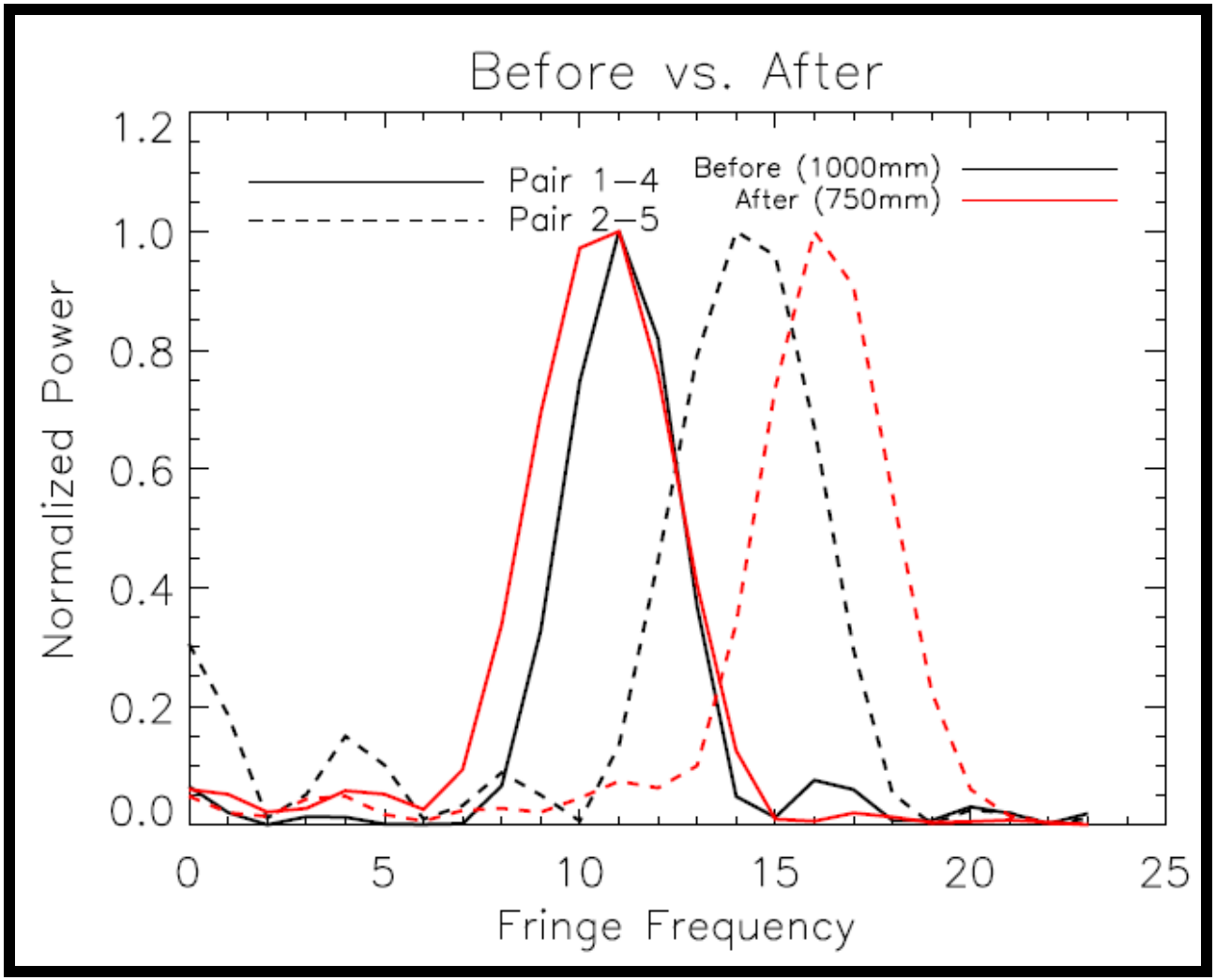
Improvement #2a: Shorter Focal Length Lens

- Switched from a 1000mm to 750 mm focal length lens
- Higher throughput on the detector by up to 50%+: We sample a larger portion of the fiber profile



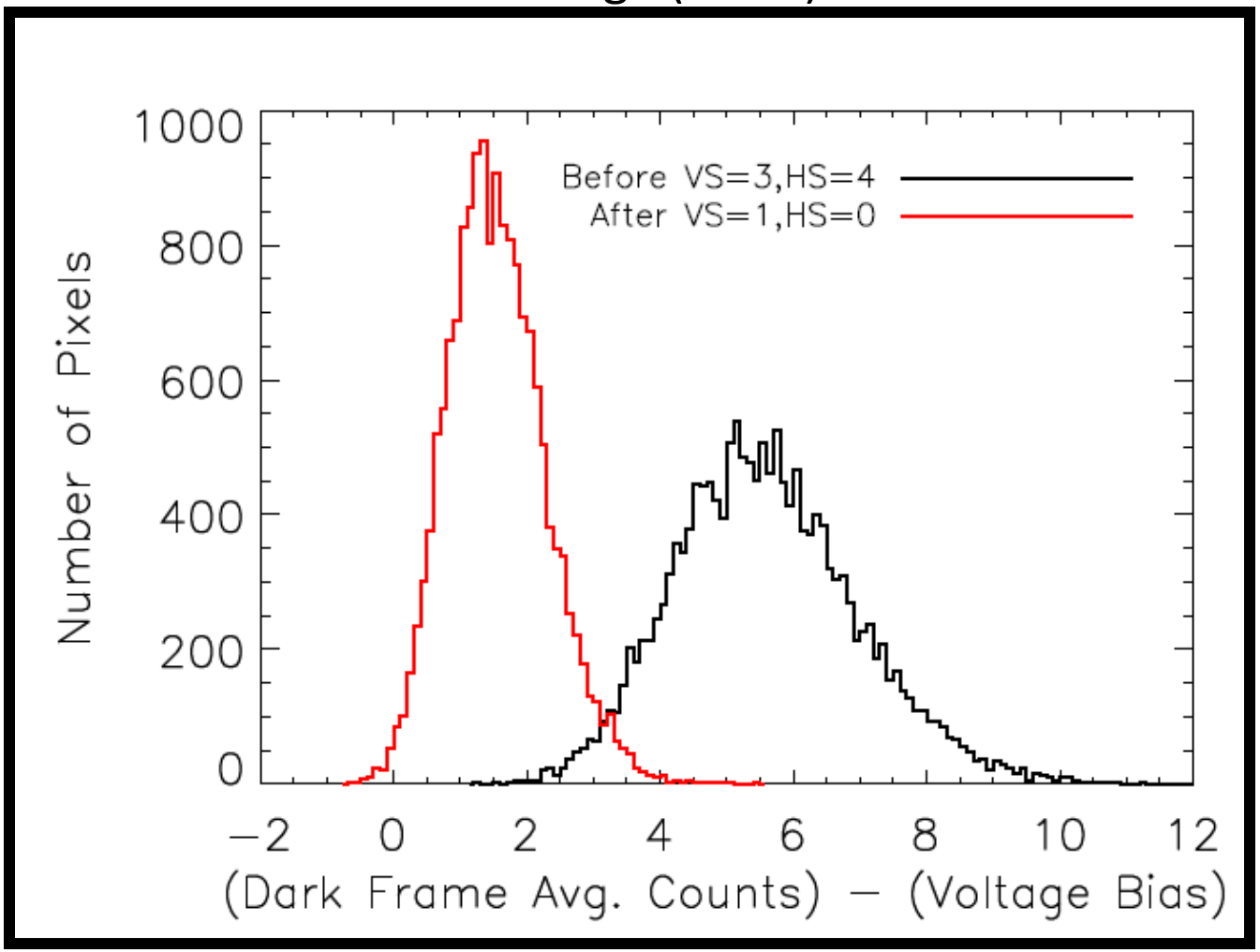
Improvement #2b: Shorter Focal Length Lens Continued

- Less cross talk between the fringes.



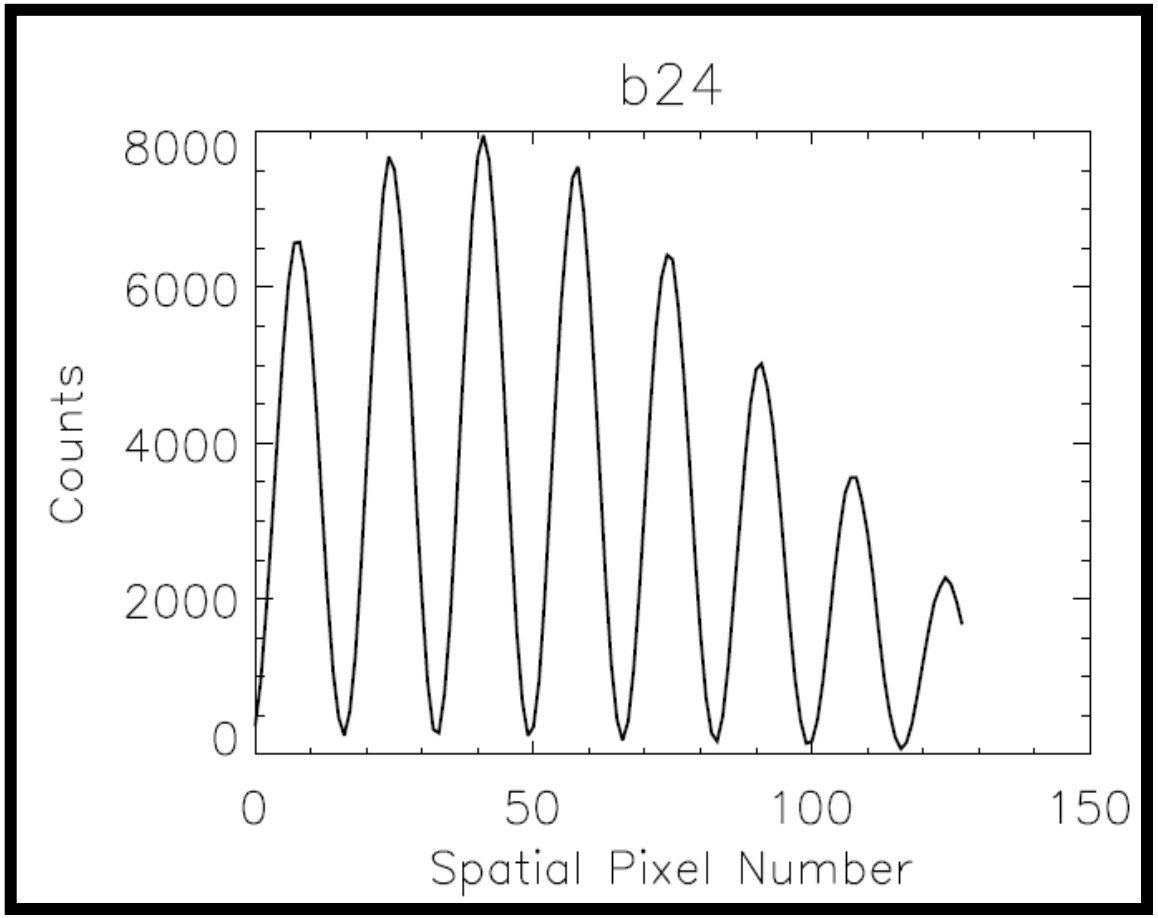
Improvement #3: Lower noise on the detector

- We changed vertical and horizontal shift speeds on our EMCCDs to decrease the clock induced charge (noise) on the detector.



Confirmed 90% Internal Visibilities

- We confirmed 90% visibilities for (almost) all beam pairs using the 632 HeNe frequency stabilized laser.
- Fibers are mutually aligned to ≤ 7 degrees.



VISION & Satellite Imaging

- VISION optimized to produce multi-pixel reconstructed images.
- Large coherence length for VISION $R\lambda = 0.142$ mm means fast fringe searching in time pressure situations.
- 6 way simultaneous combination = better image reconstruction.
- Improved calibration with photometric channels and modern EMCCDs = better image reconstruction.

Timeline for next several months

- **August-Sept 2014:** Characterize throughput carefully, align the photometric cameras, measure on-sky sensitivity, develop post-processing pipeline
- **August-Sept 2014:** Carefully document the VISION observation procedures for observers
- **Sept-Dec 2014:** Measure the system visibility on sky
- **November 2014:** Apply for funds for newer cameras (DURIP, NSF)
- **January 2015+:** Develop a GUI for the control system