

VIRUS

VISIBLE INTEGRAL-FIELD REPLICABLE UNIT SPECTROGRAPHS



HETDEX
Hobby-Eberly Telescope Dark Energy Experiment

ILLUMINATING THE DARKNESS

Production and Alignment of the Visible Integral-Field Replicable Unit Spectrographs (VIRUS)

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THANKS TO:
DR. JENNIFER MARSHALL
DR. DARREN DEPOY

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VISIBLE INTEGRAL-FIELD REPLICABLE UNIT SPECTROGRAPHS

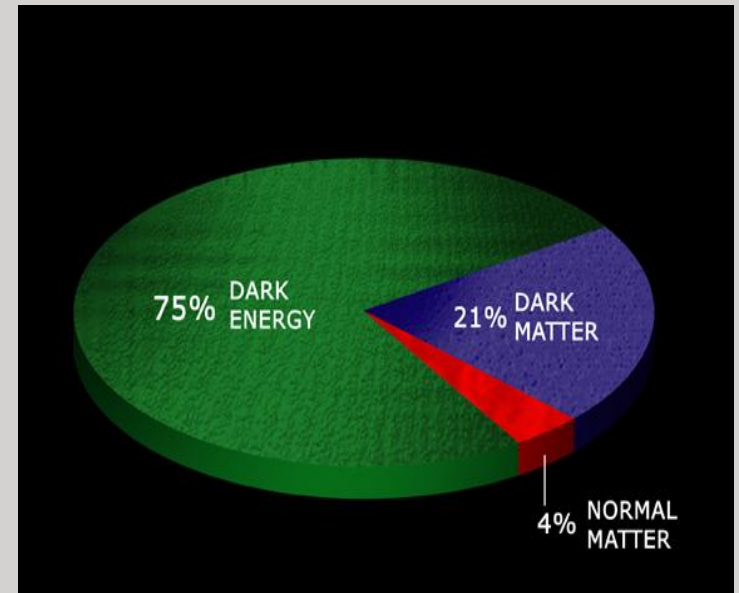


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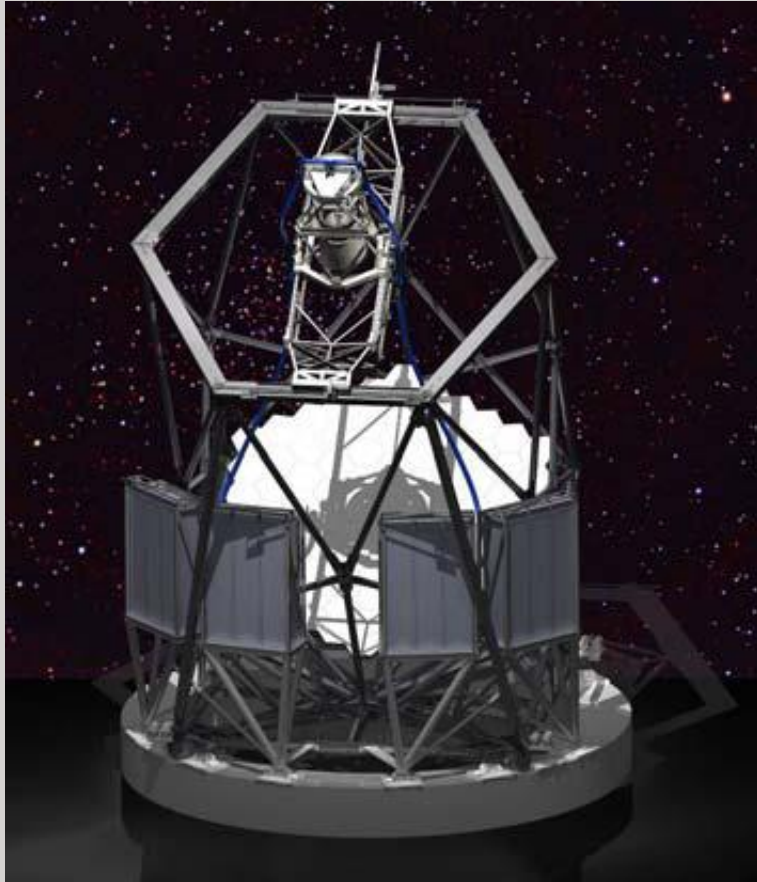
Dark Energy

- Universe is expanding at accelerating rate
- ~75% of Universe is made up of Dark Energy
- Thousands of theories to explain Dark Energy
- Several projects to investigate effects of Dark Energy upon the universe



Credit: NASA/CXC/M.Weiss

Hobby Eberly Telescope Dark Energy Experiment (HETDEX)

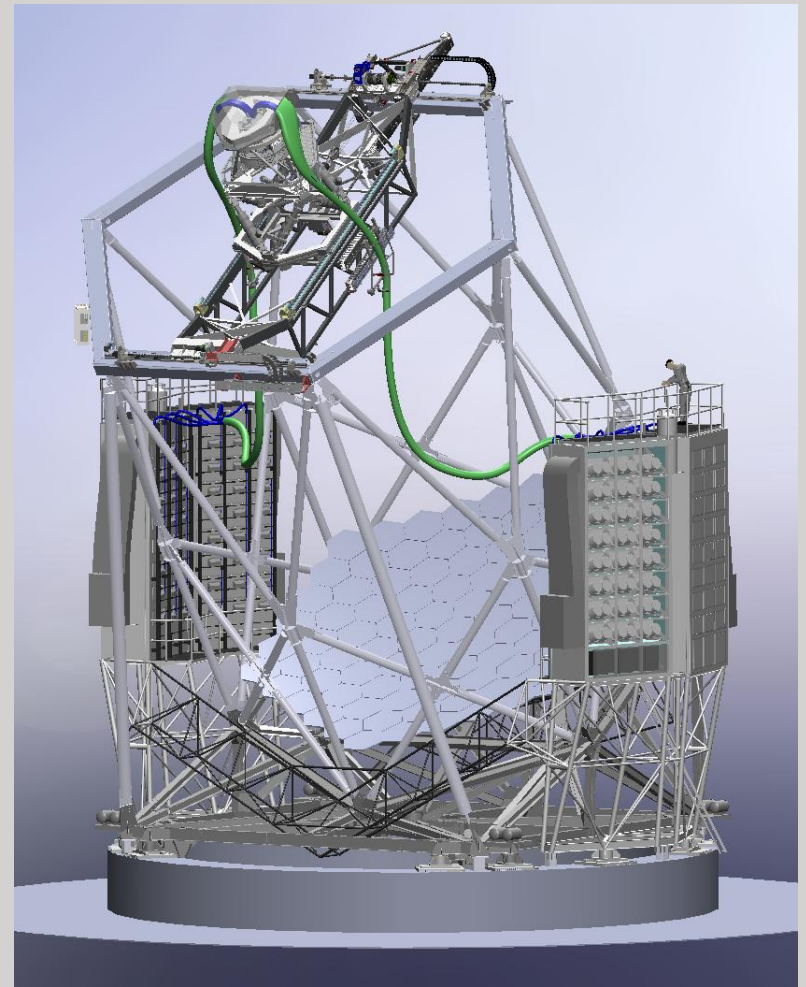


Credit: Proc. SPIE, Vol. 7735, 20

- Improve HET focal plane to 22 arcmin field of view
- Use of ~192 VIRUS spectrographs
- Large blind survey for LAEs $1.9 < z < 3.5$ starting in 2012
- Measurement of expansion rate of Universe to measure evolution of Dark Energy

Visible Integral-Field Replicable Unit Spectrographs (VIRUS)

- First large scale replication of spectrographs
 - Simple design
 - Cost efficient
 - Interchangeable parts
- Over 33,000 fibers will be fed into the spectrographs
- 2 spectrographs per unit



Credit: Proc. SPIE, Vol. 7735, 20

VIRUS

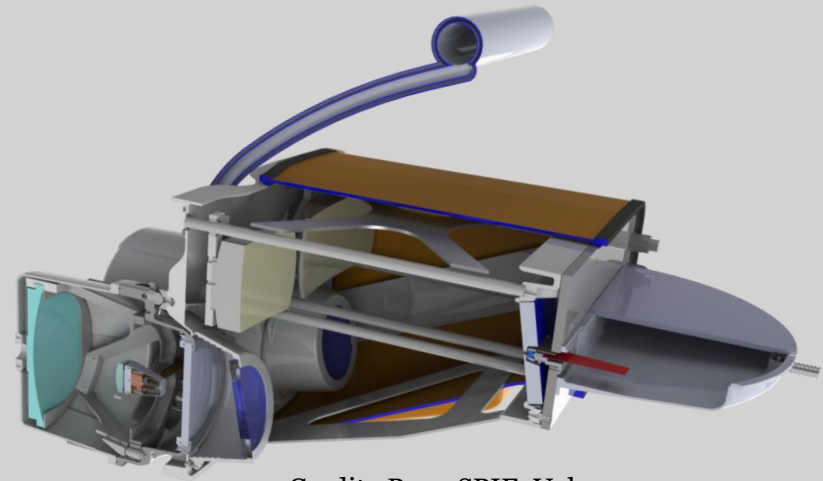
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- Spherical collimator and fold flat mirror
- Vacuum housed Schmidt camera
 - 2 lenses
 - Spherical mirror
 - CCD
- VPH grating with wavelength range of 350-550 nm
- Resolving Power, $R \sim 700$



Credit: Proc. SPIE, Vol. 7735, 20

Integral Field Units (IFUs)



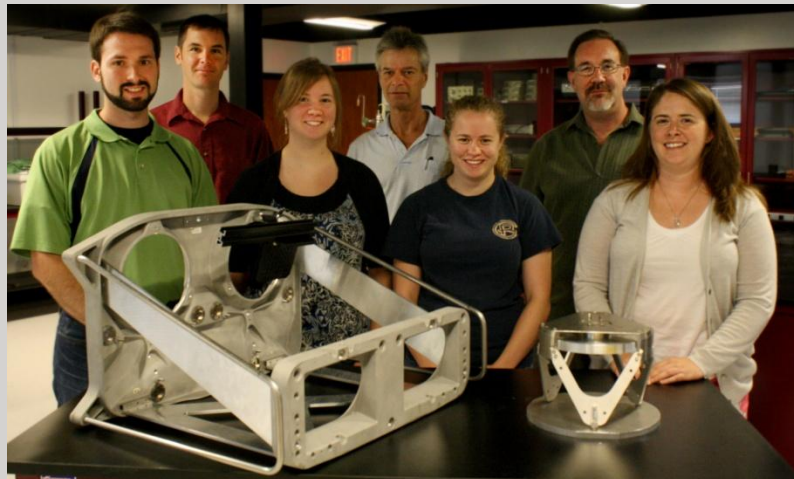
- Developed by Astrophysical Institute Potsdam
- ~450 fibers per unit head, split between spectrograph pair



Production Status

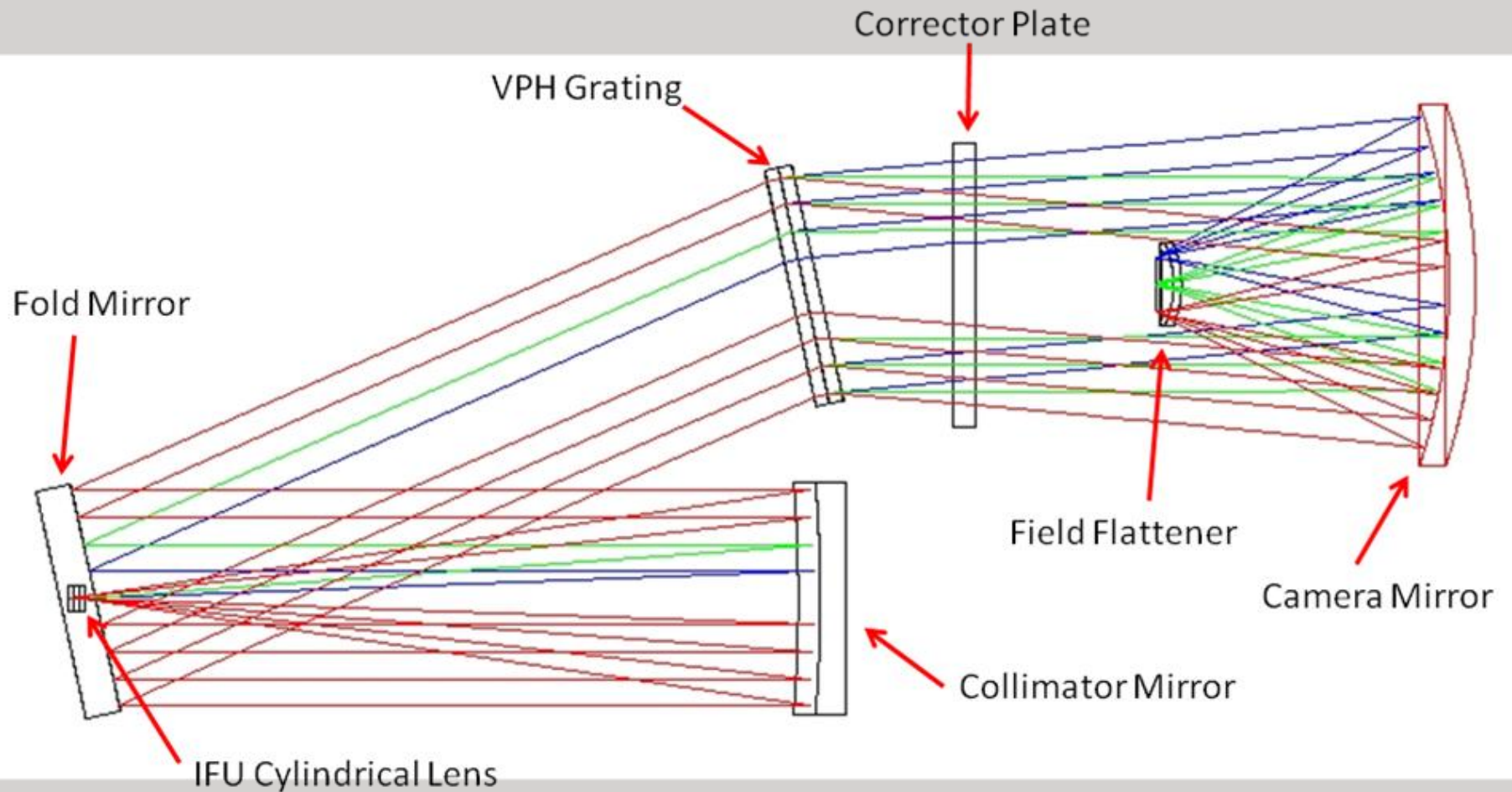


- 3 VIRUS structures have been made
- Various parts ordered in quantities of 200
- Most optical components ordered, including 200 CCDs
- 9 IFUs have been made and are being tested



Texas A&M VIRUS team

VIRUS 3D Layout



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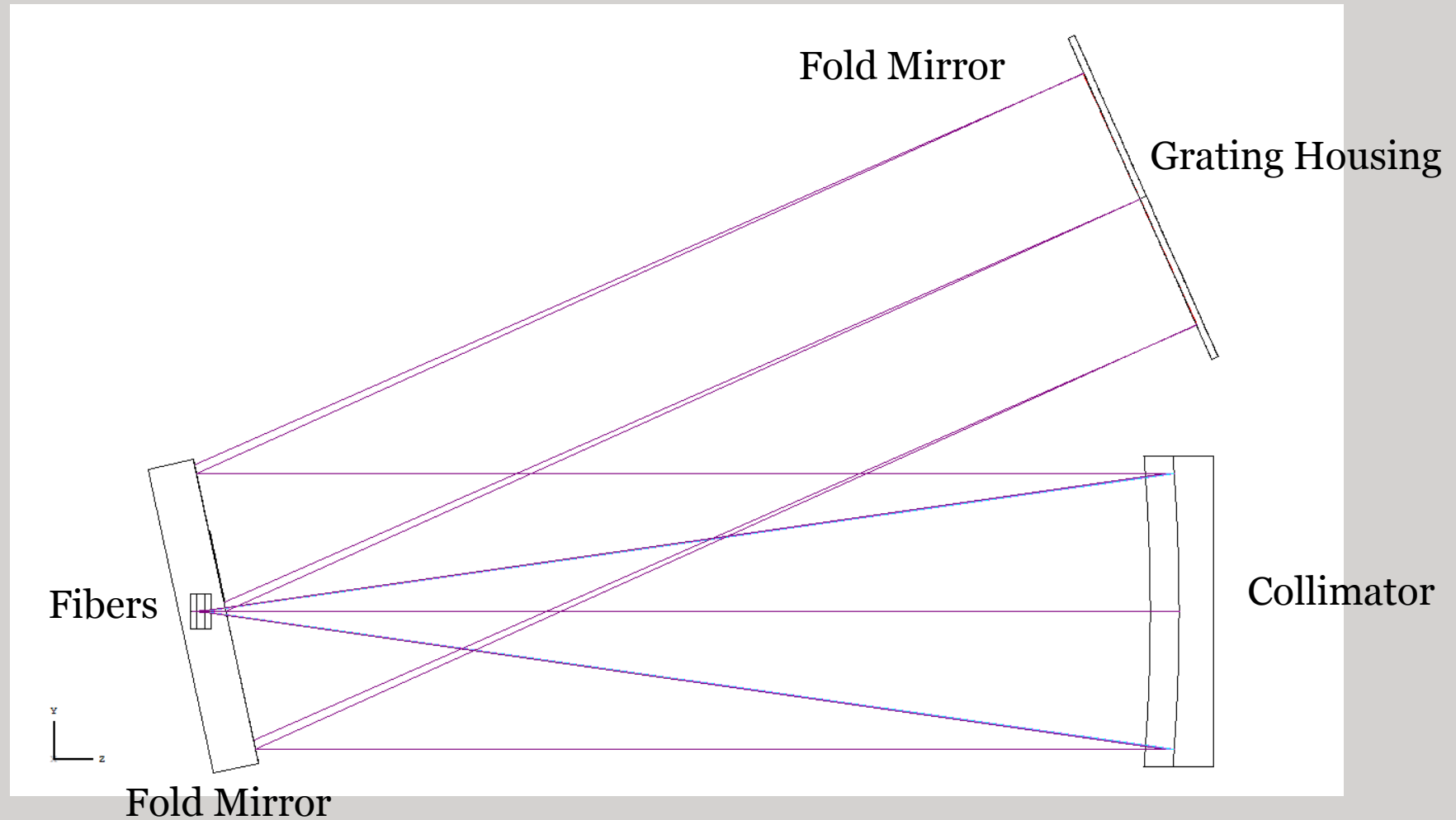
Illuminating the Darkness

Collimator Alignment

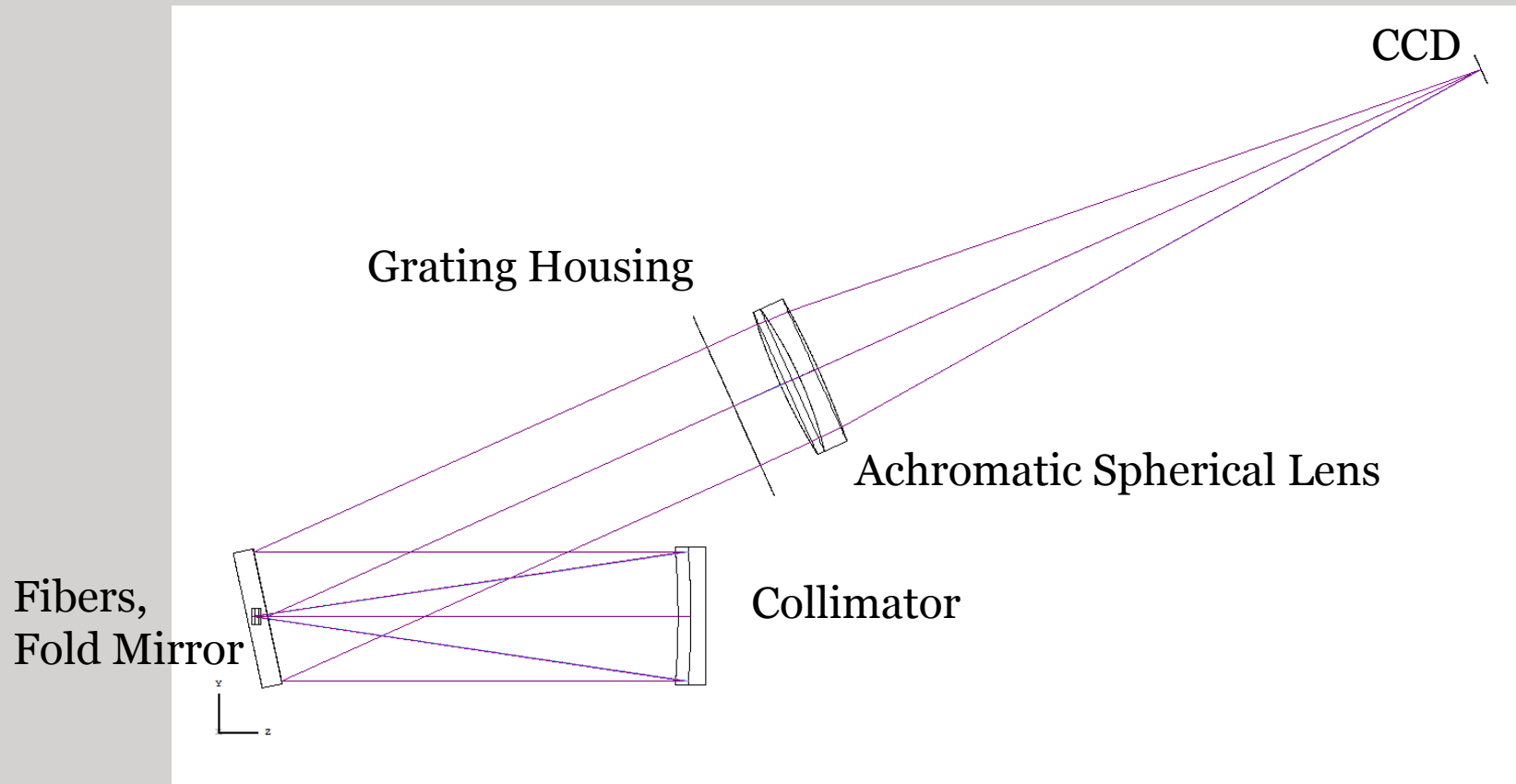
The process:

1. Auto-Collimation using a 6" round flat mirror in the grating housing
2. Final Adjustment using a large spherical lens to focus the collimated light on a CCD

Auto-Collimation



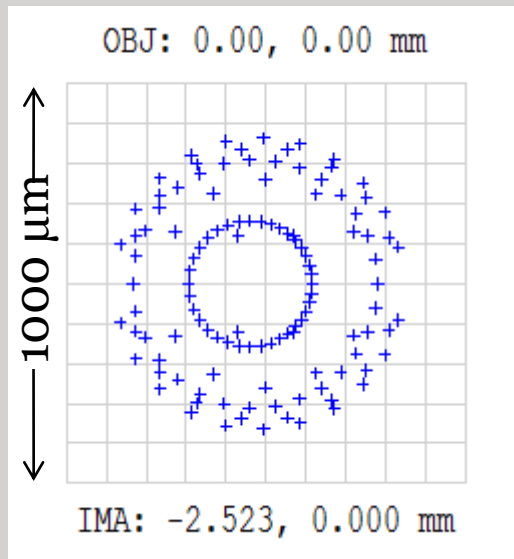
Final Adjustment



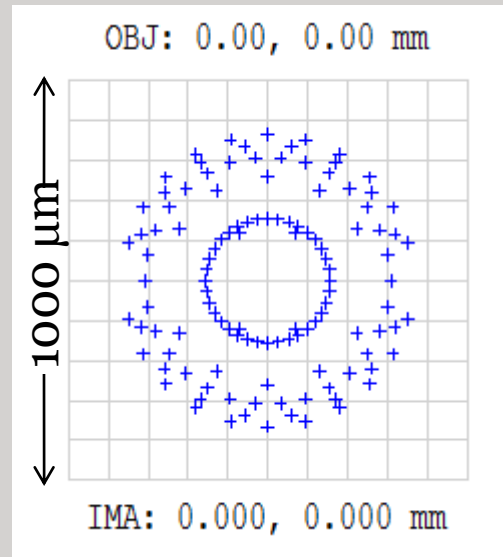
3D Layout

VIRUS (115 mm $f/3.65$ $f/1.33$, CRN, 350–550 nm)
8/25/2011

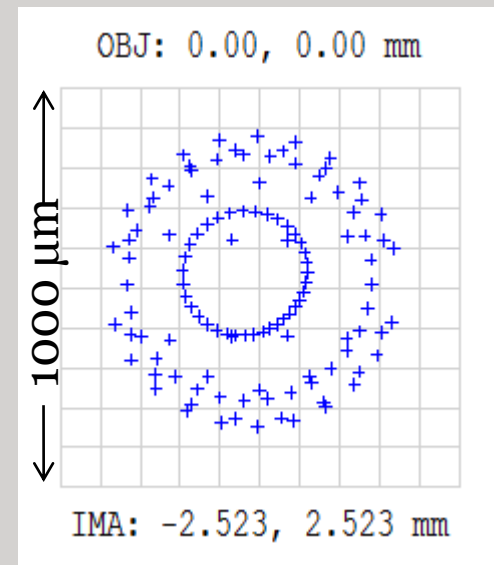
Spot Diagrams



Collimator displaced by
 0.1° on Y axis



Perfectly Aligned
Spot Diagram



Collimator displaced by
 0.1° on X and Y axes

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What's Next?

- Parts arriving from Oxford
- Epoxy/RTV testing on collimator and fold mirror
- Alignment of optical components in coming months
- Mass assembly of VIRUS collimator units

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Thank You!

