The Optical and Mechanical Design for The Extreme AO System MagAO -X

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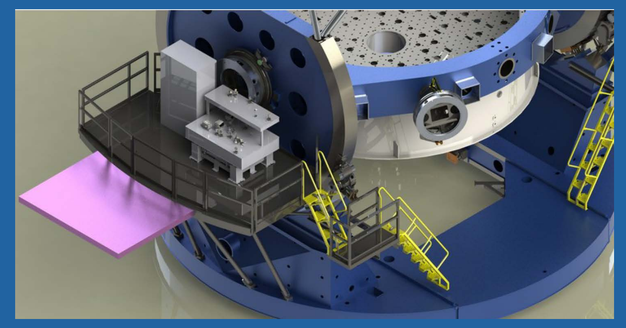
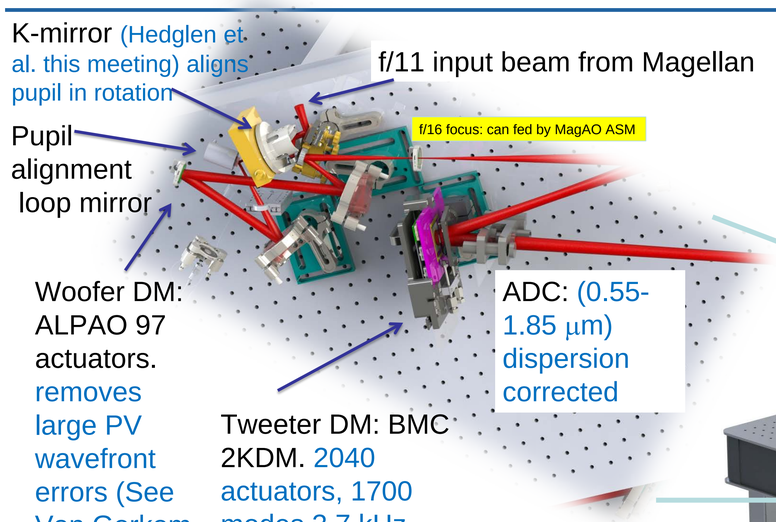
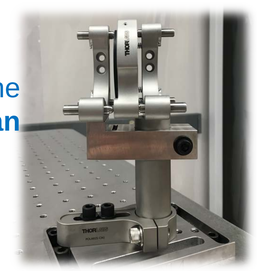
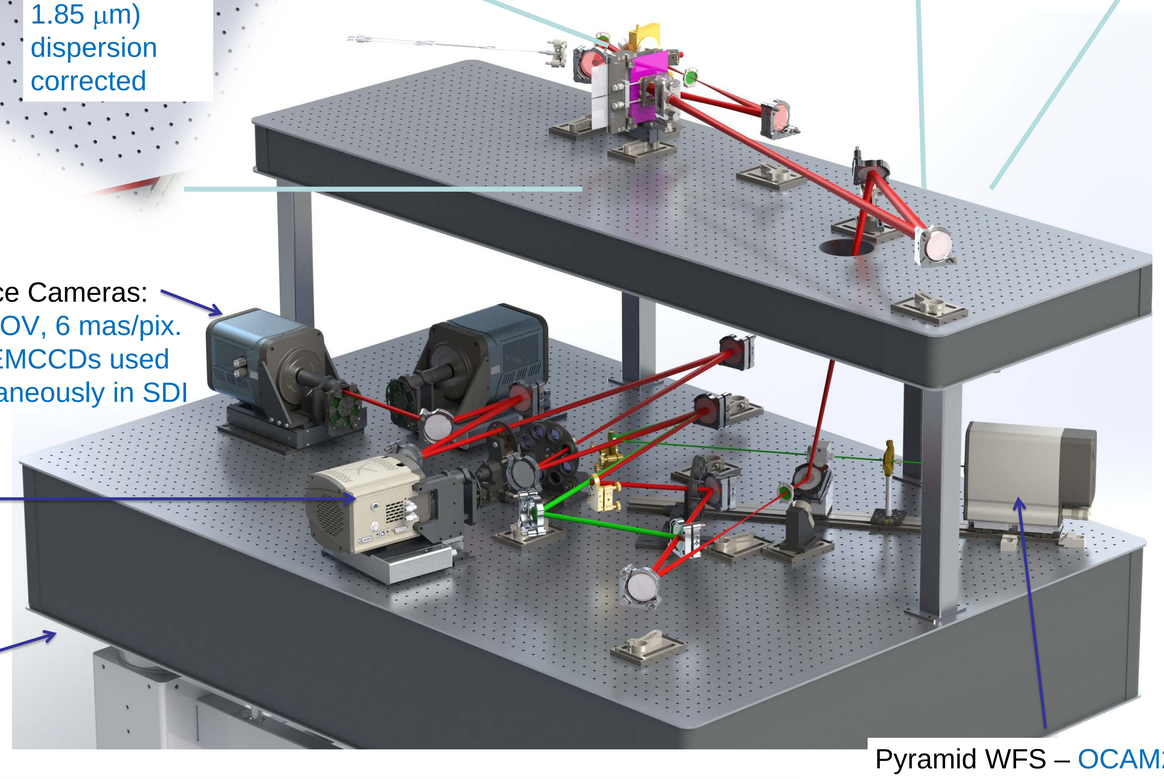


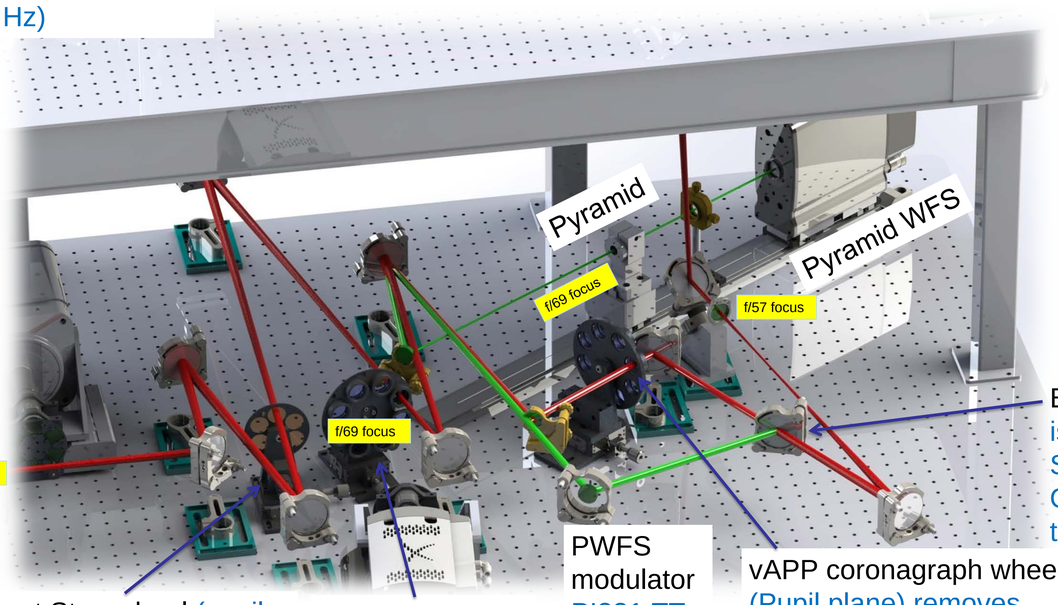
MagAO-X Optical and Mechanical Design



All optics in MagAO-X use custom locking kinematic optical mounts: where the front clamp locks down the spring loaded mirror cell. **Better than 2μrad/C thermal stability.**
Provisional Patent **#62/632,544**
See Kautz et al. this meeting for details.







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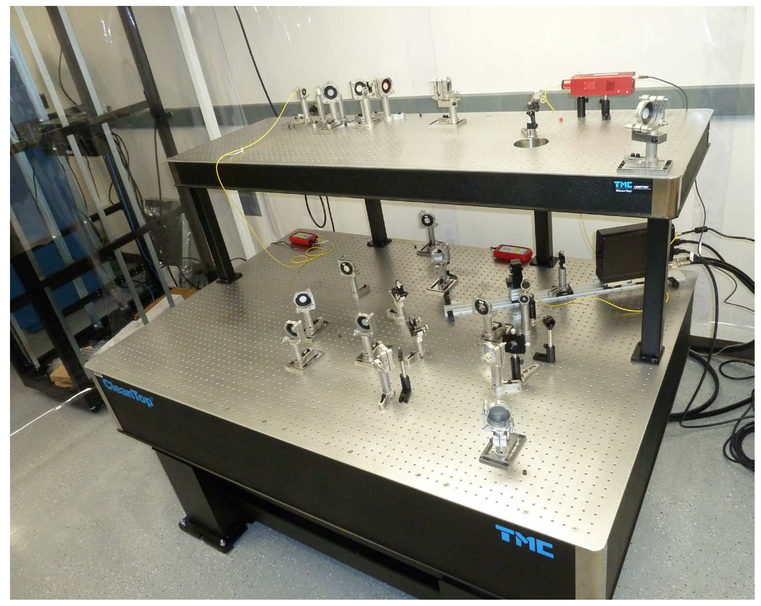
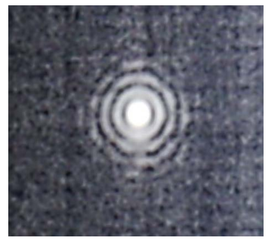
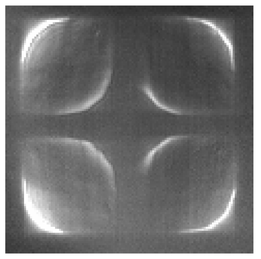


The Current view of the MagAO -X Instrument in the Clean Room Steward Observatory's High-Contrast Lab (PI Jared Males).



The f/69 focal plane PSF. This is the same PSF that exactly hits the tip the Pyramid WFS. This image suggests the initial alignment is reasonable.



The 4 Pupil Image formed by the pyramid and camera lens on the OCAM PWFS. This is the expected shape from an unmodulated PWFS with no wavefront error. See Schatz *et al.* for more detail.

SUMMARY

MagAO-X has passed its PDR last year and has moved past the design phase and procurement phase to the integration and testing phase (See Males et al. for more details). Today all the long lead time optics, DMs, and fabricated parts have been fabricated and delivered (or will be so within weeks). Initial optical alignment and testing of our off-axis parabolas is excellent (see images above), and all our super polished optics look within spec. (P-V<λ/40; surface roughness < 0.1 nm rms). We are planning for the first commissioning run in 2019A at the Magellan Clay telescope.

Acknowledgements

MagAO-X could not have been possible to build without the support of the NSF Major Research Instrumentation program grant #1625441 *Development of a Visible Wavelength Extreme Adaptive Optics Coronagraphic Imager for the 6.5 meter Magellan Telescope* (**PI:**Jared Males). Laird Close was supported by the NSF's AAG program #1615408 (PI Laird Close).

REFERENCES

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Van Gorkom K., *et al. proc SPIE 10703* (this meeting)