

# Testing G-CLEF Fiber Efficiency: the Impact of using Adaptive Optics

Henrique Lupinari

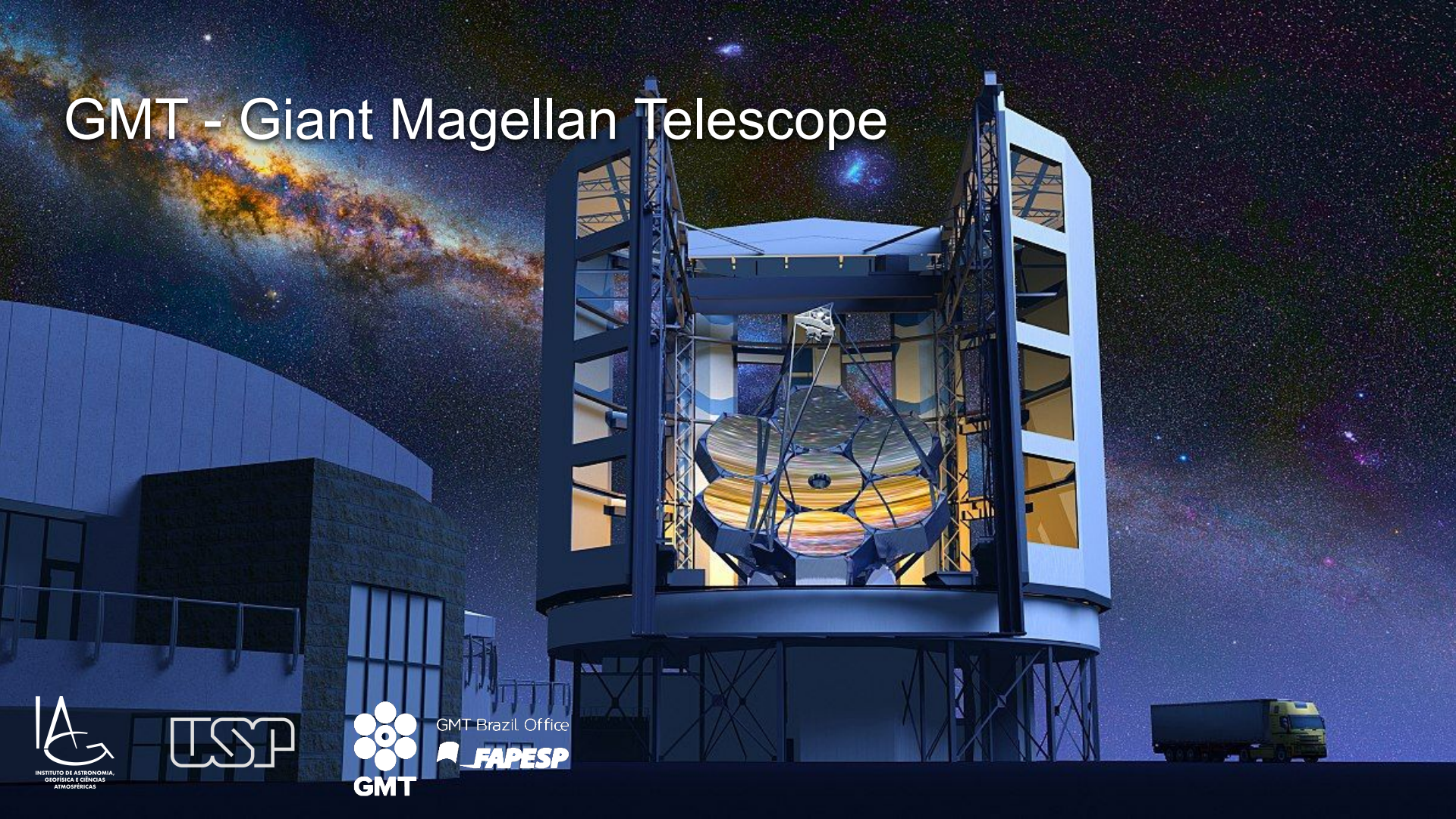
Advisor: Claudia Mendes de Oliveira



GMT Brazil Office



# GMT - Giant Magellan Telescope



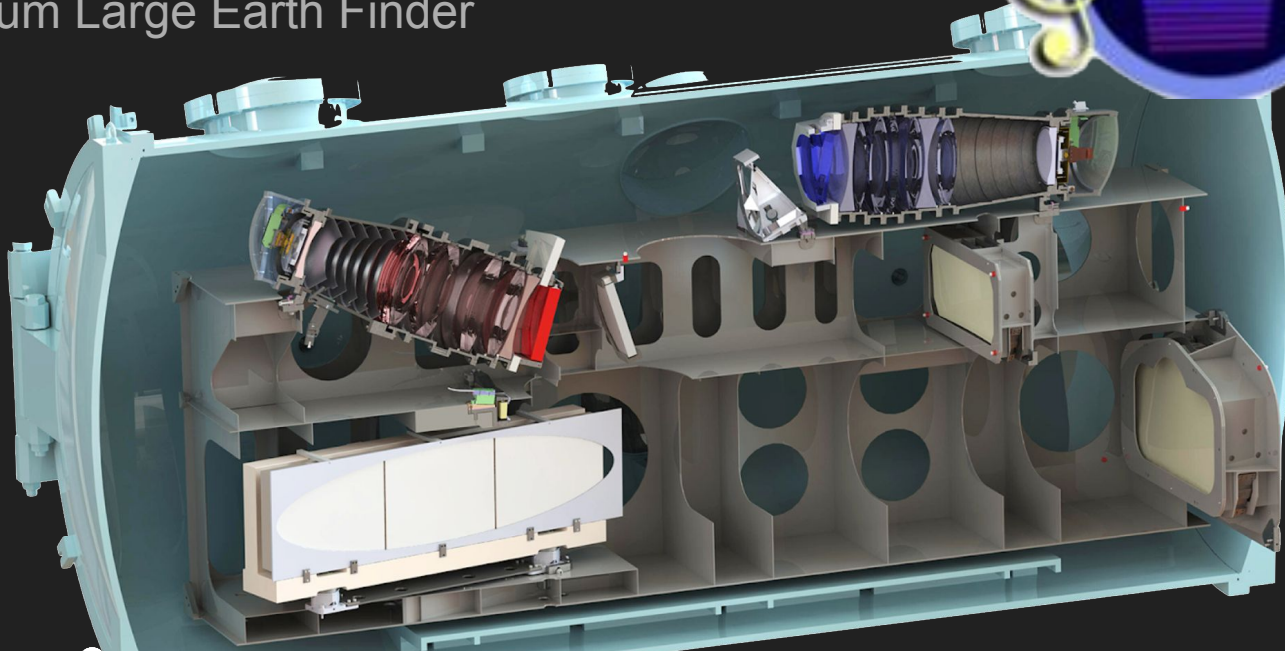
GMT Brazil Office





# G-CLEF

GMT - Consortium Large Earth Finder



# Exoplanetary Science

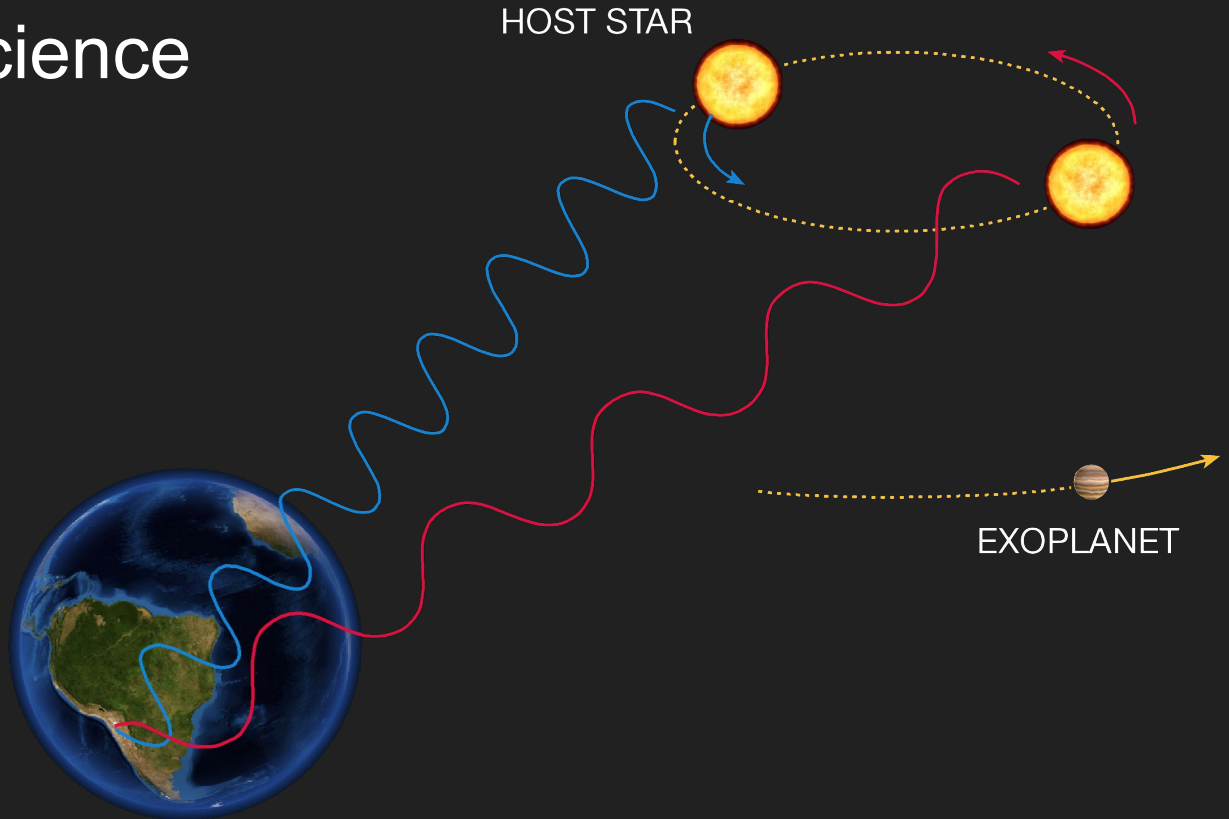
Methods of detection:

- Direct Imaging
- Microlensing
- Transit
- Doppler Radial Velocity

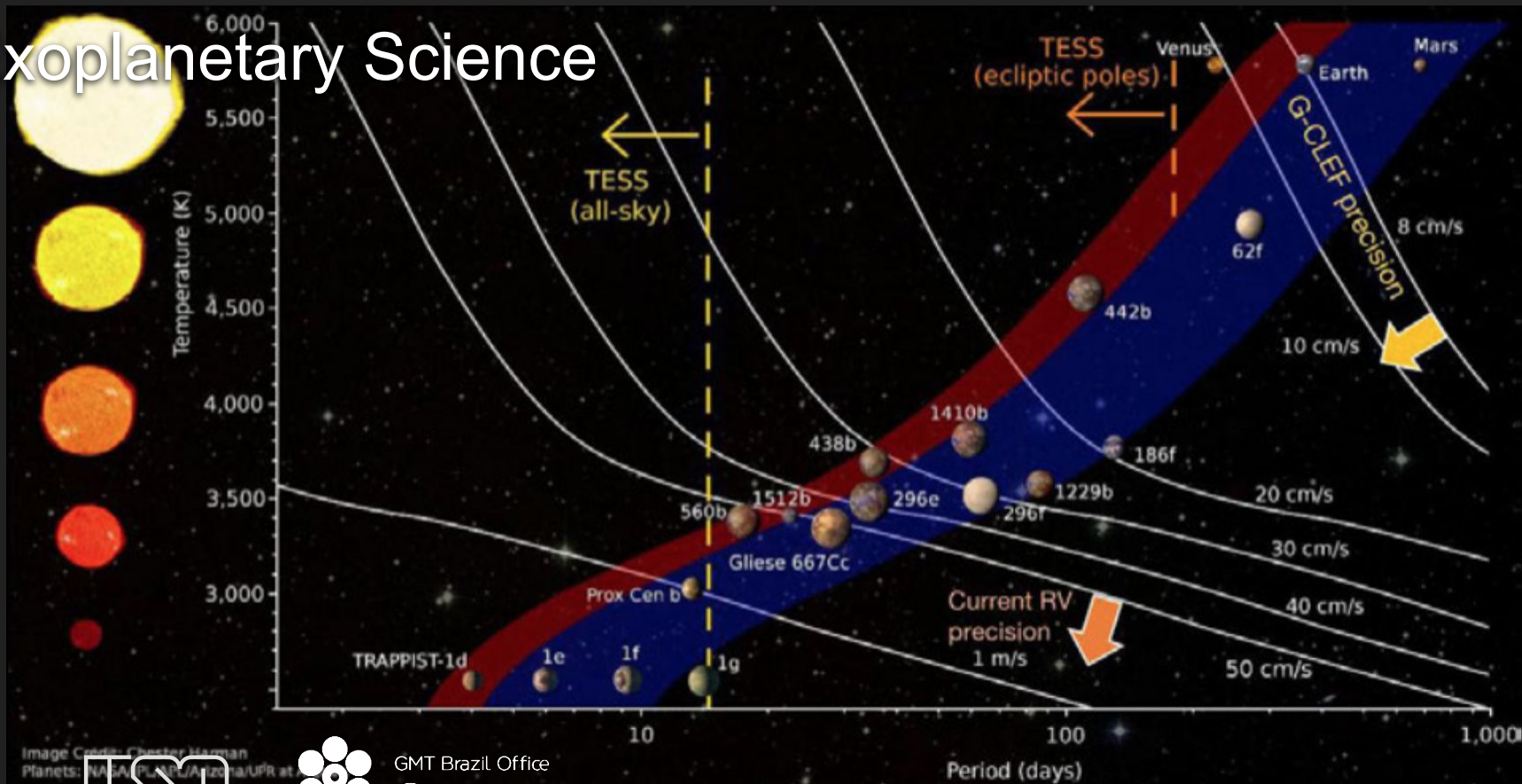
# Exoplanetary Science

## Methods of detection:

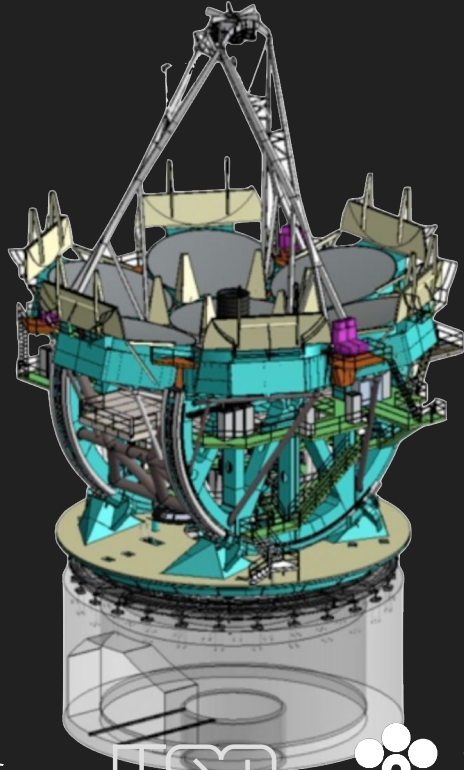
- Direct Imaging
- Microlensing
- Transit
- Doppler Radial Velocity



# Exoplanetary Science



# G-CLEF



GMT  
Gregorian Instrument  
Rotator

G-CLEF Front End

GMT  
Instrument Platform

GMT  
Azimuth Disk

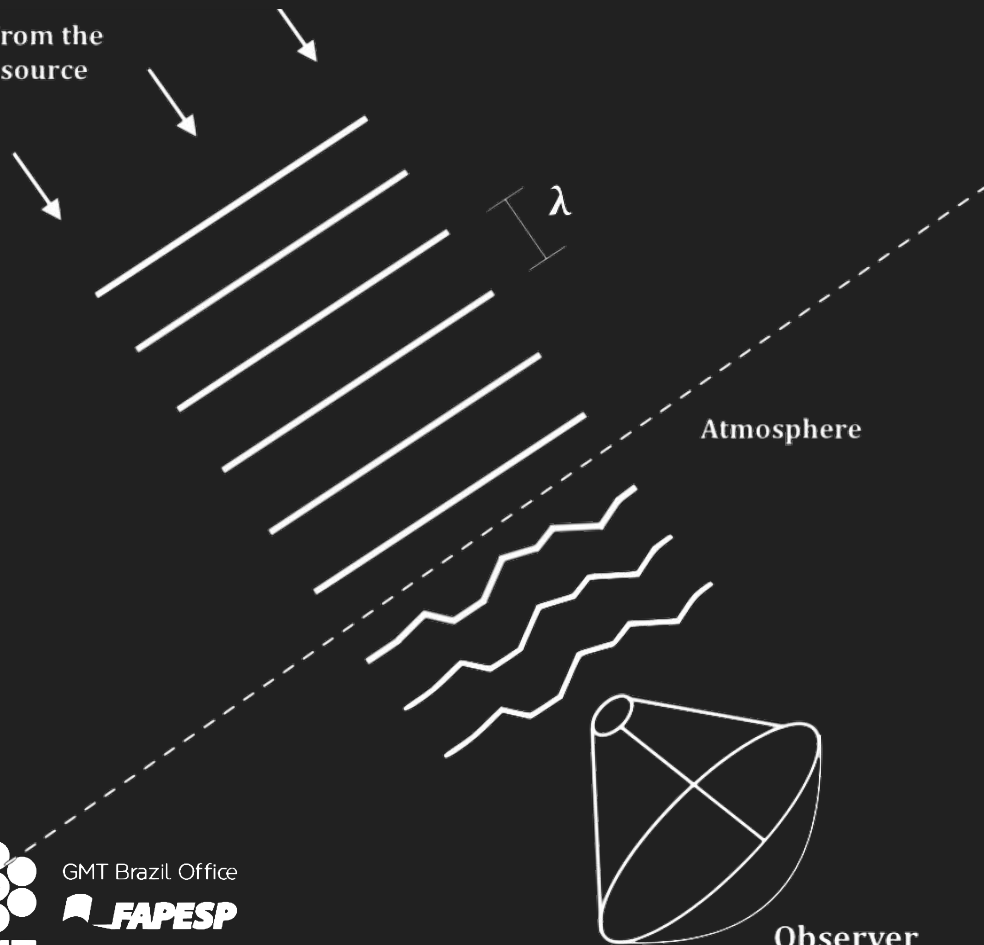
G-CLEF Spectrograph  
Enclosure



GMT Brazil Office  
**FAPESP**

# Turbulence

From the source

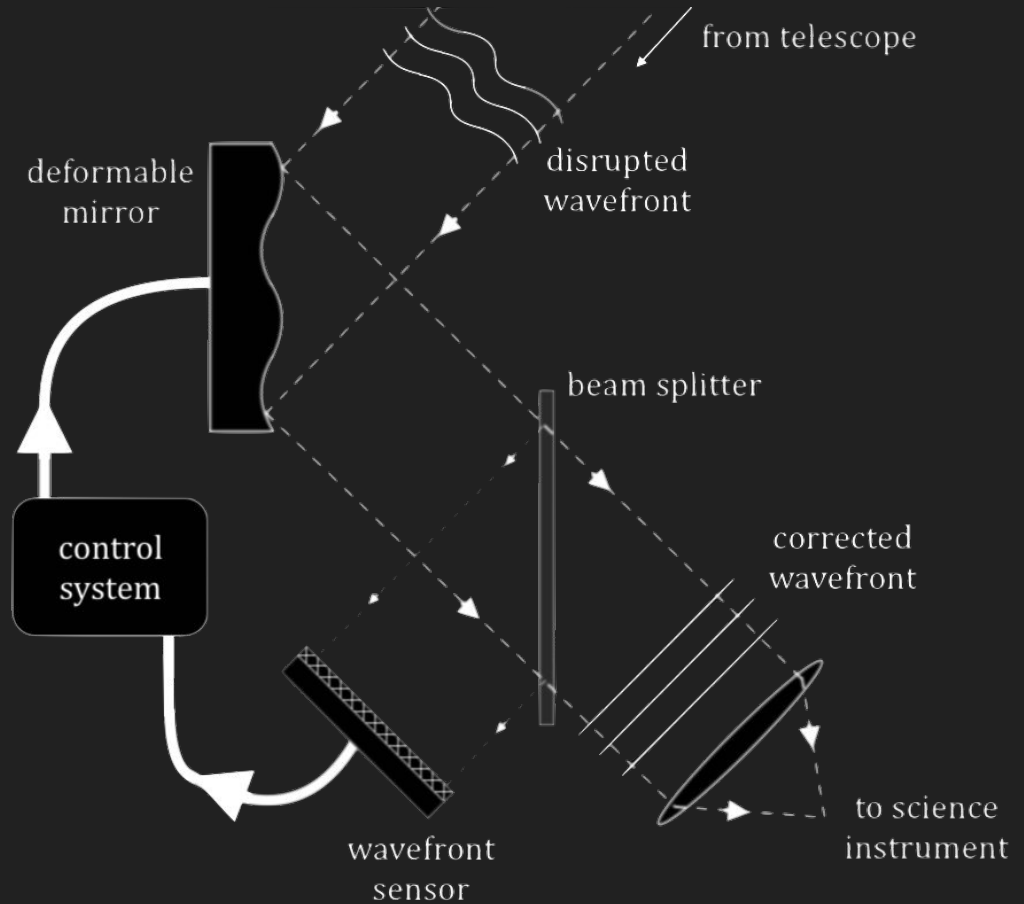


Atmosphere

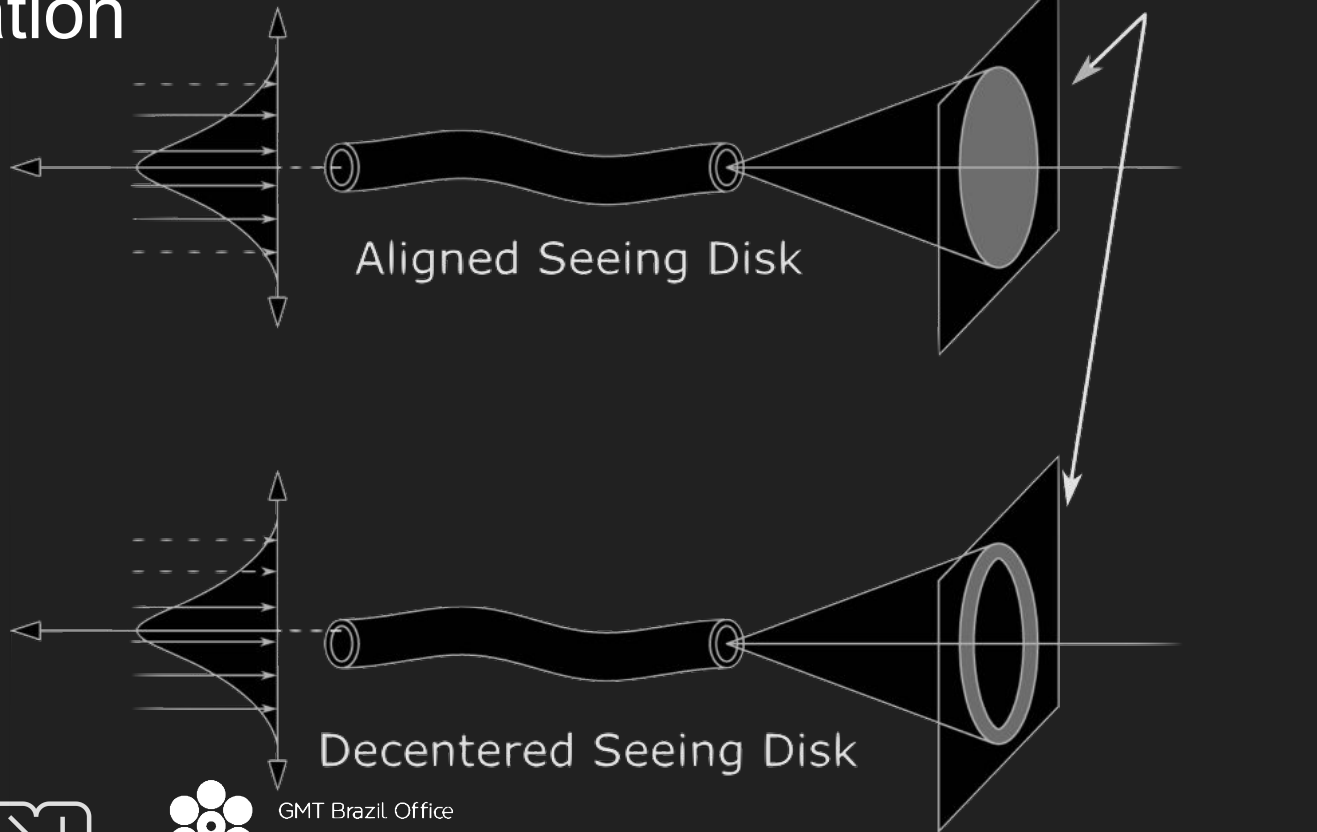
Observer



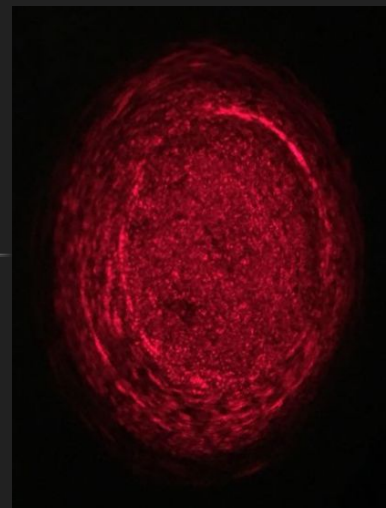
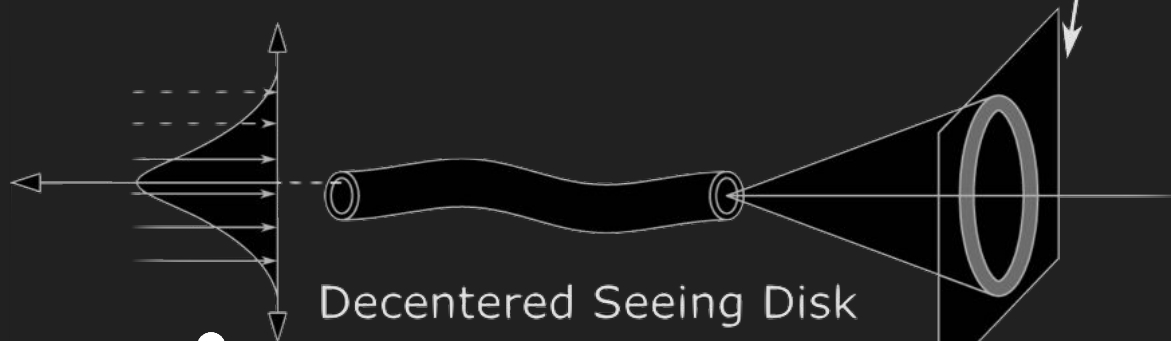
# Adaptive Optics



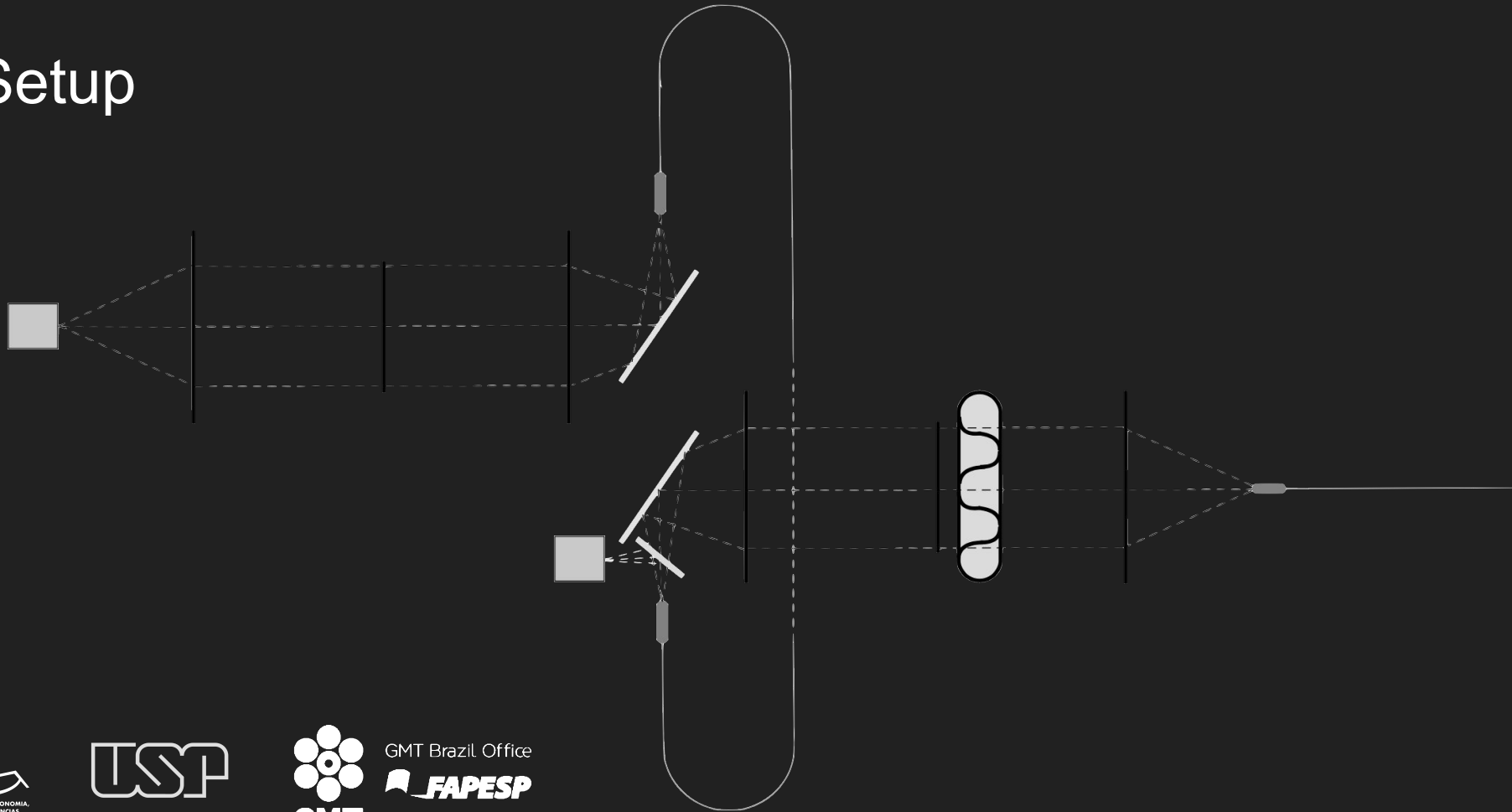
# Motivation



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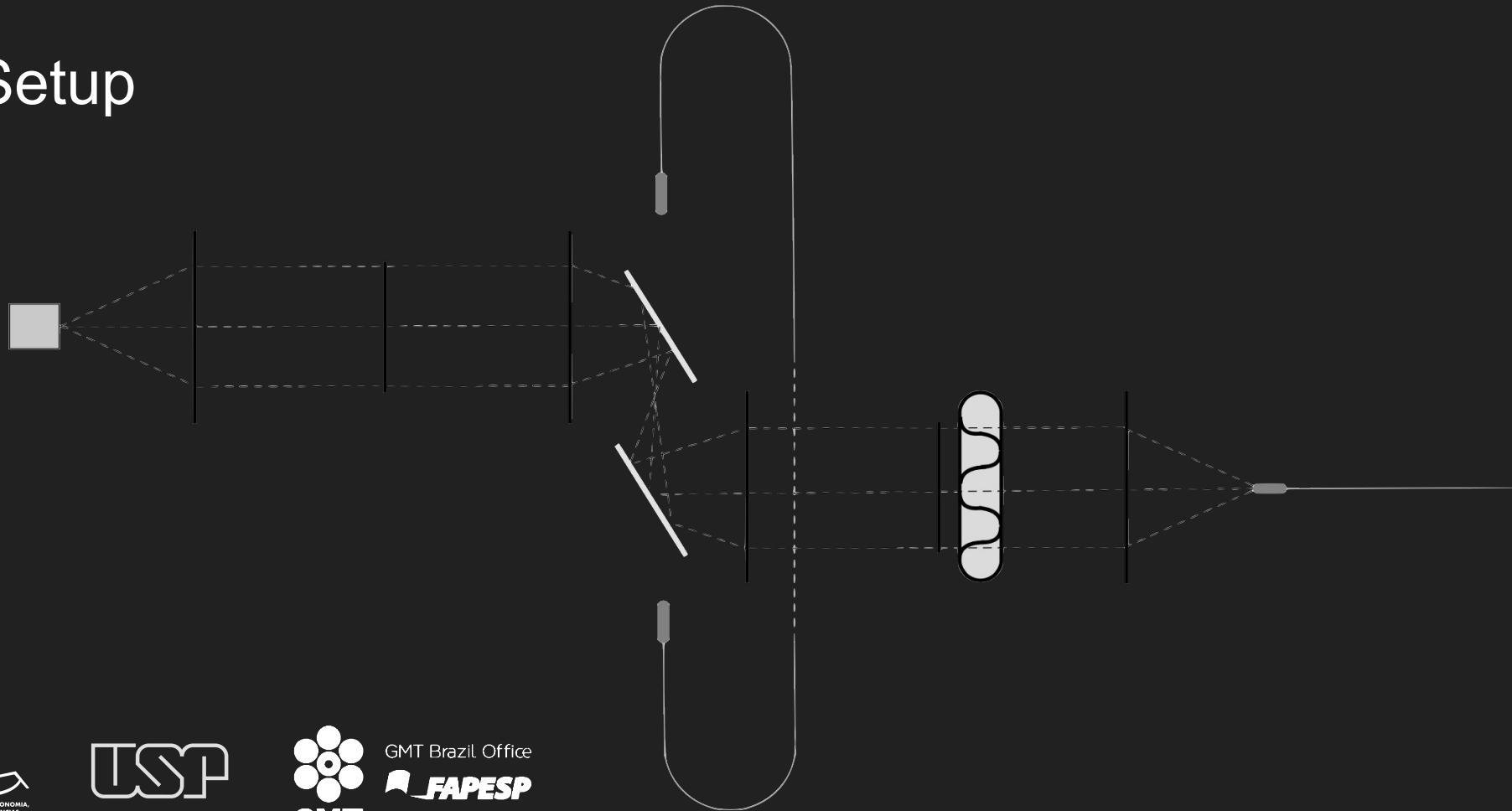


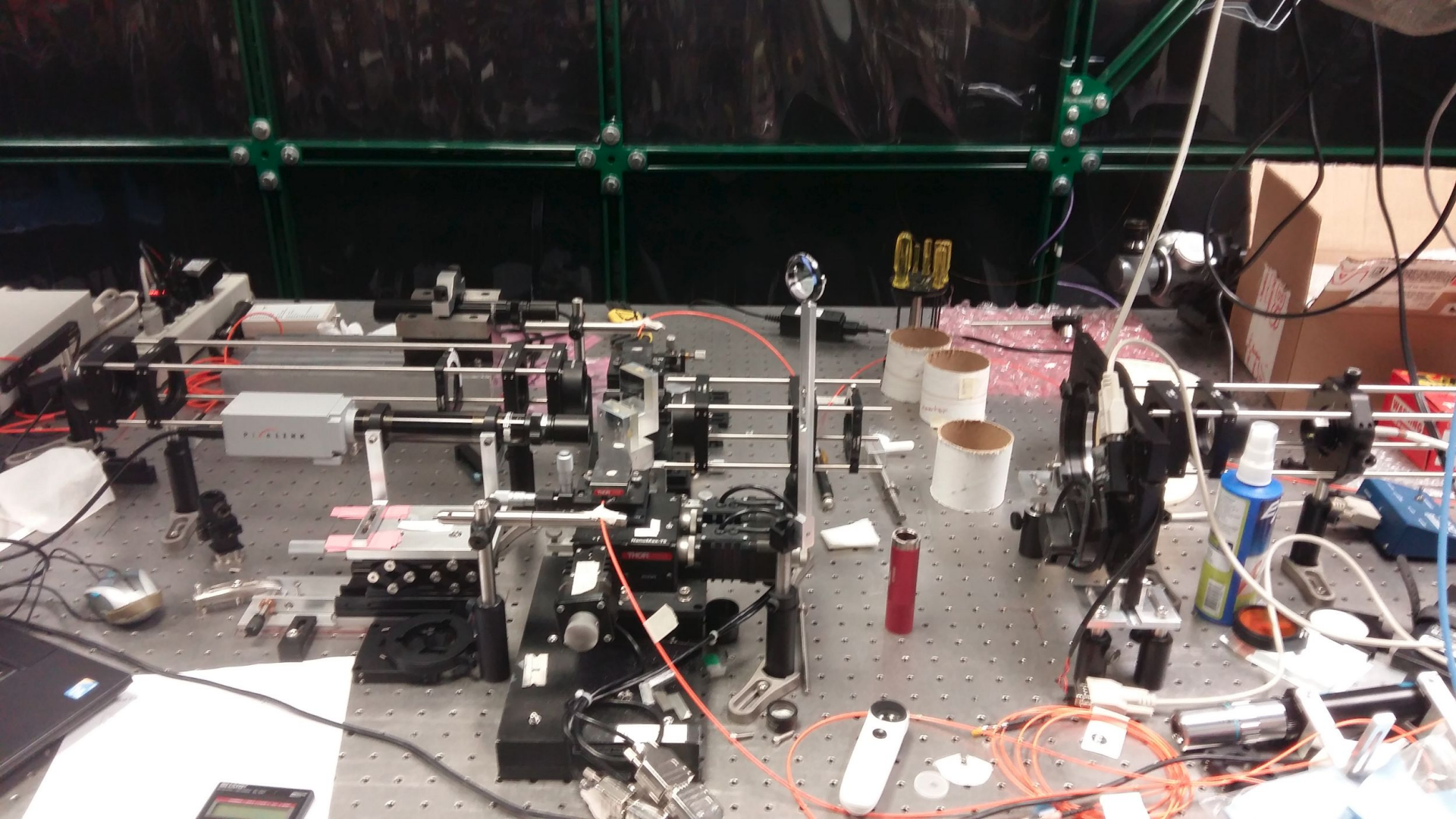
# Setup



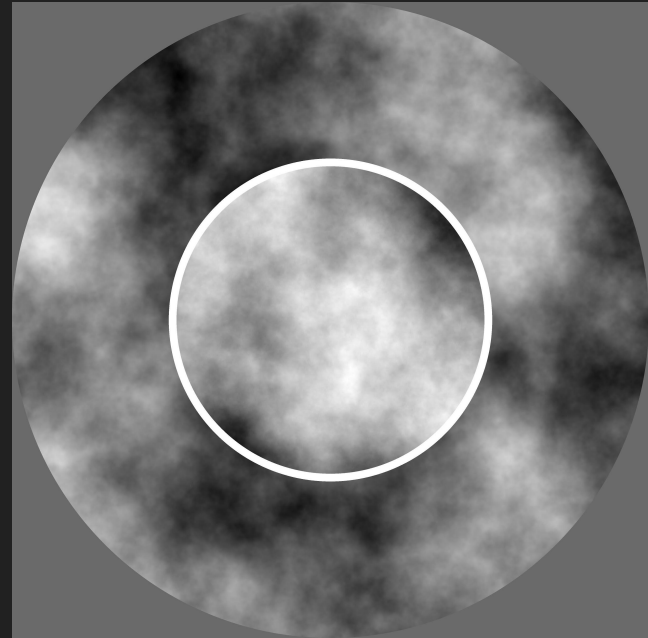
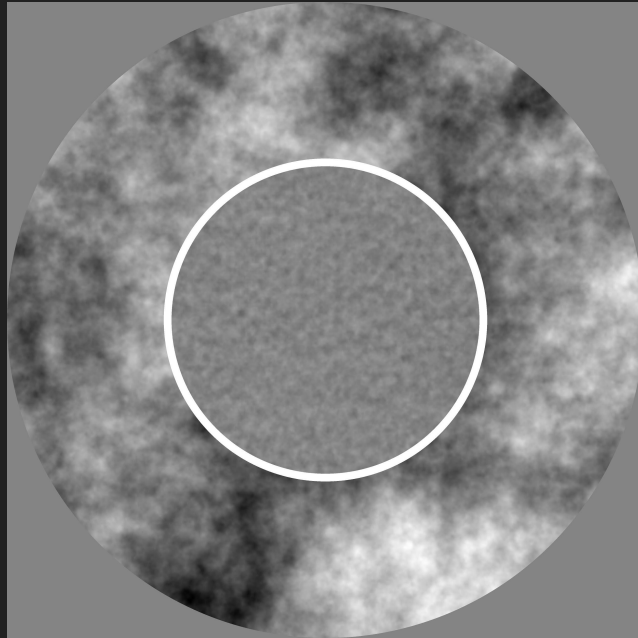


# Setup

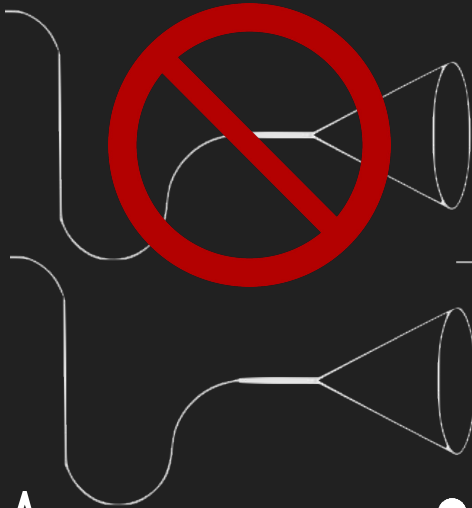
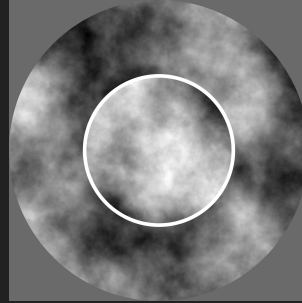
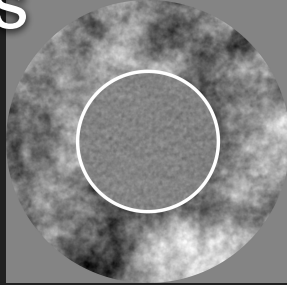




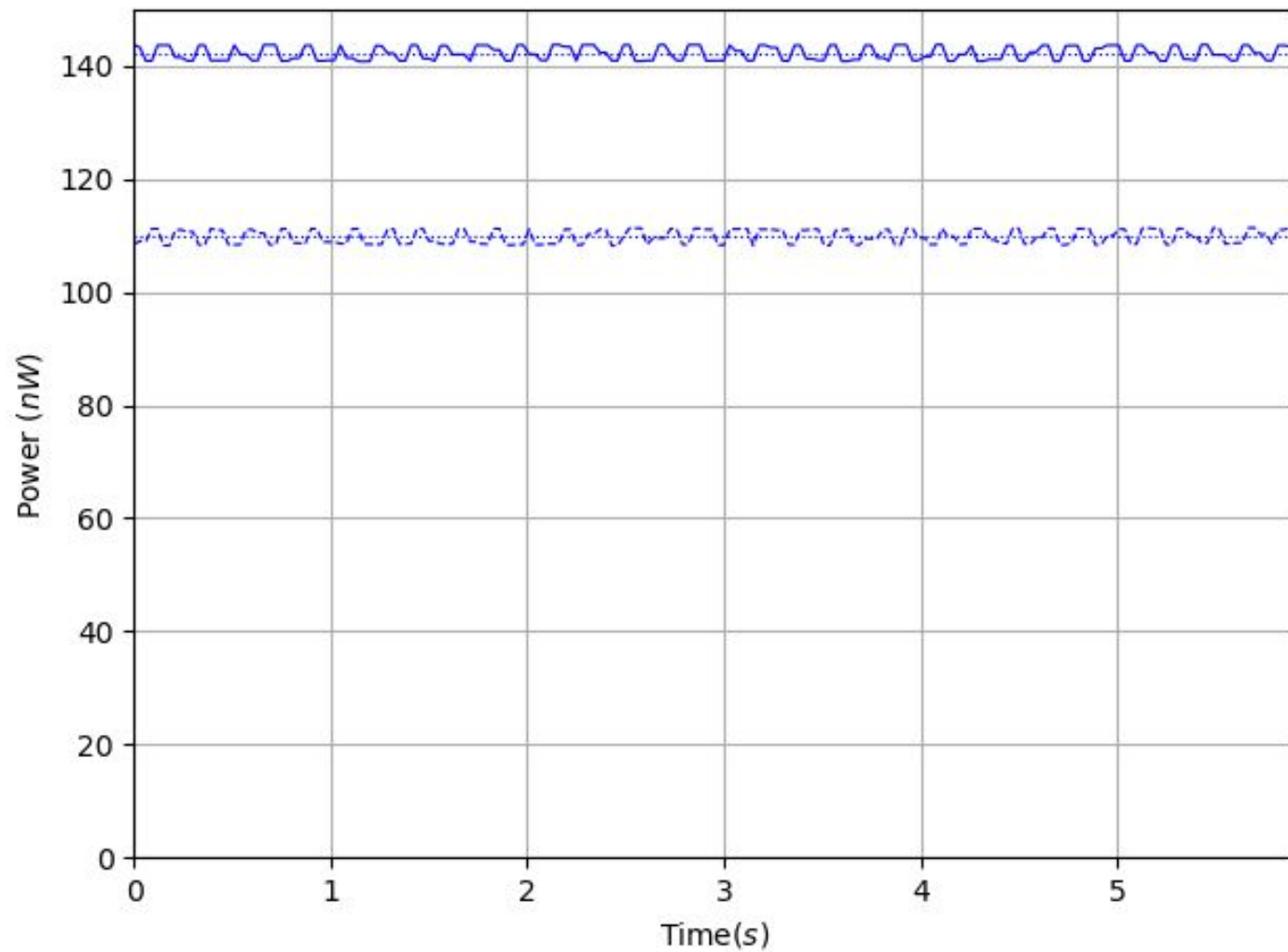
# Phase-screens

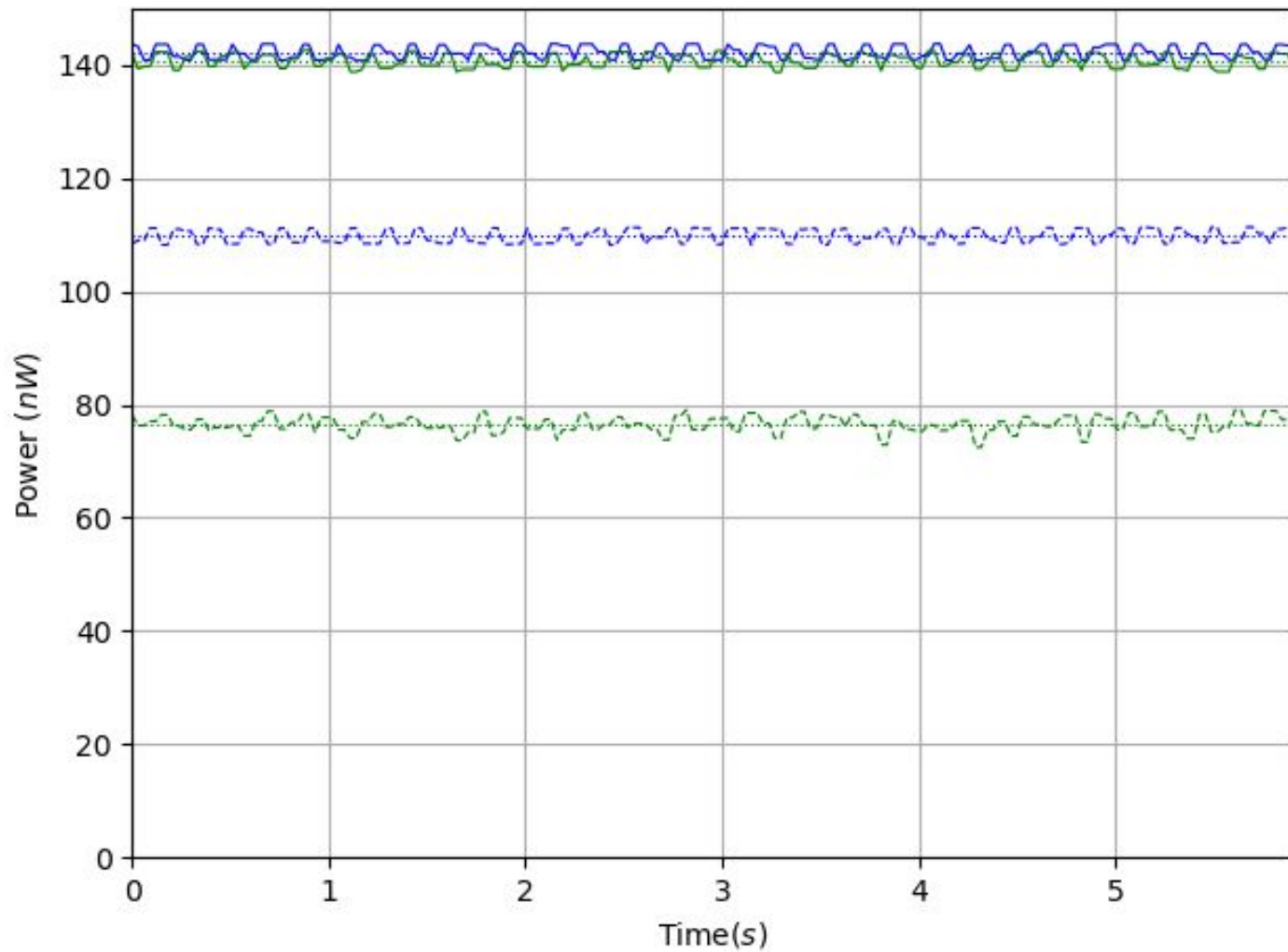


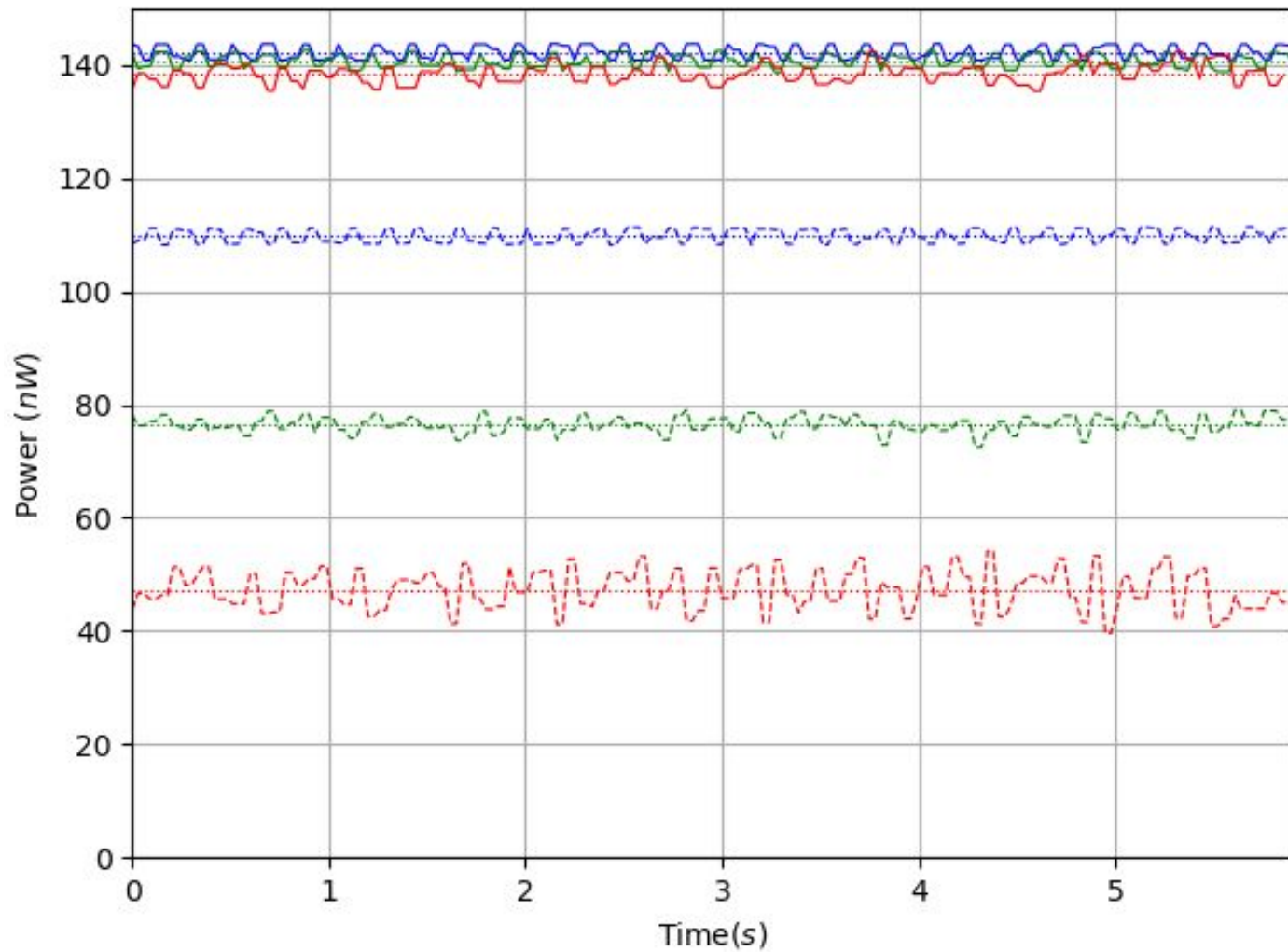
# 6 Configurations

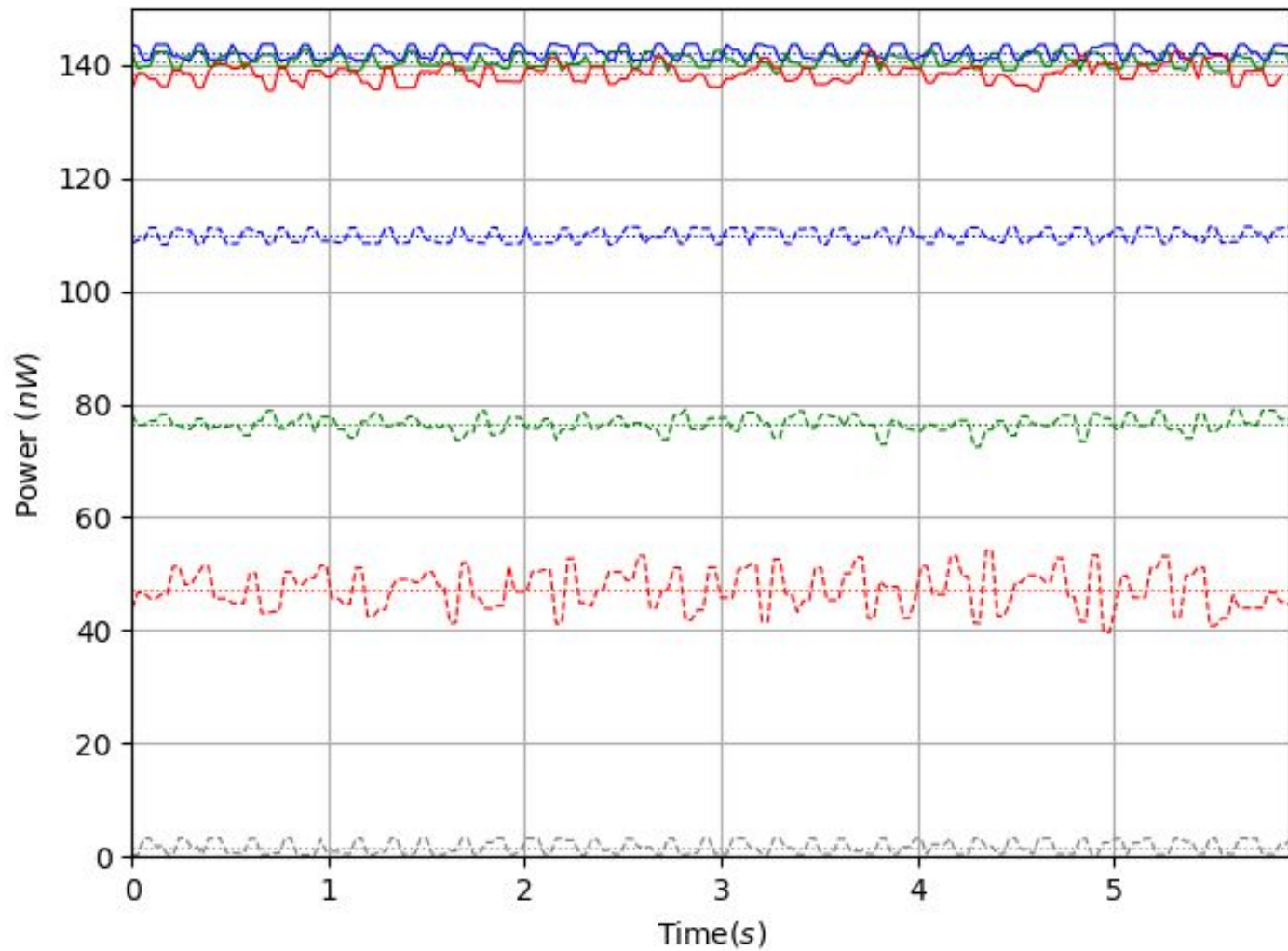




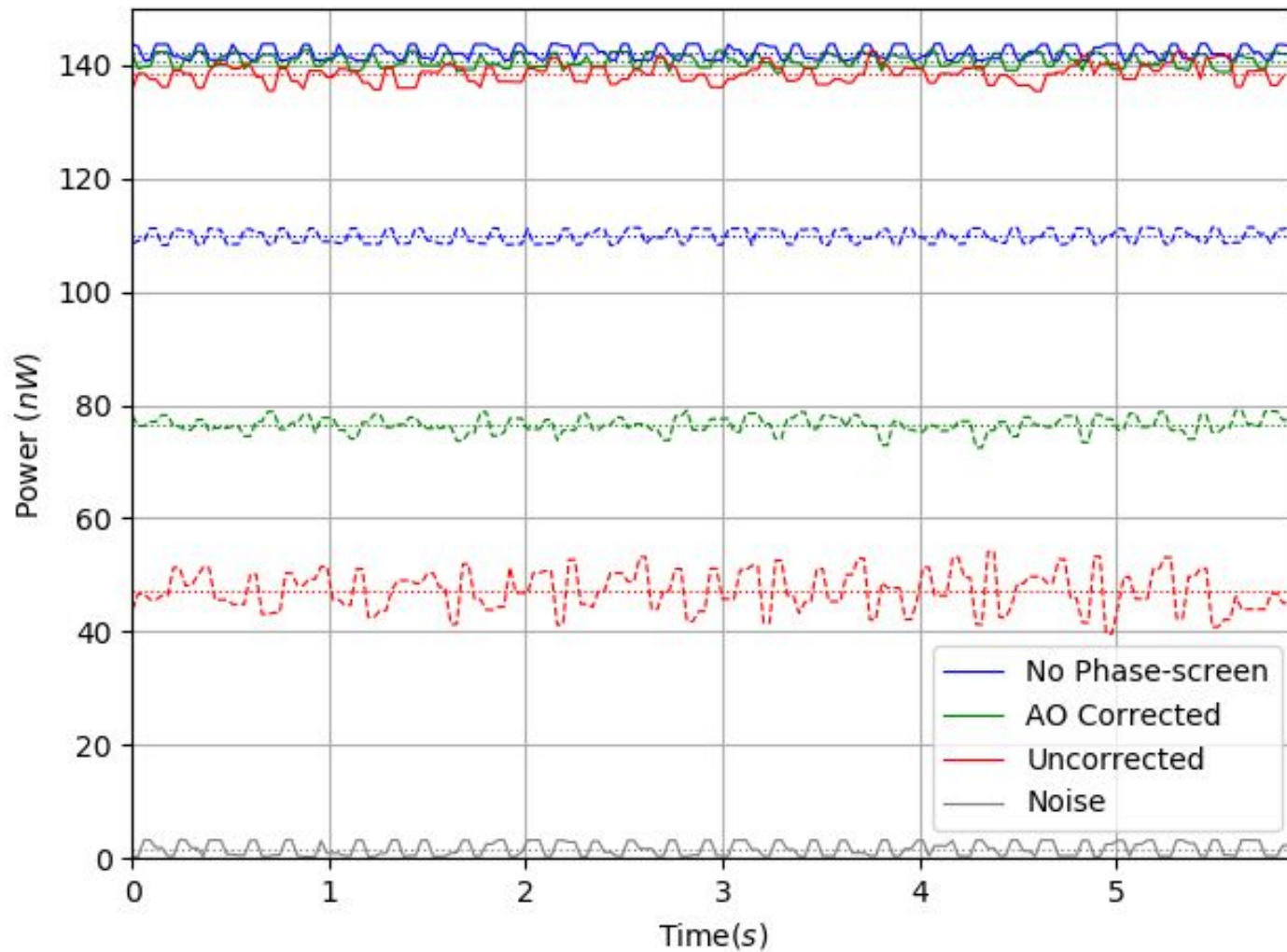


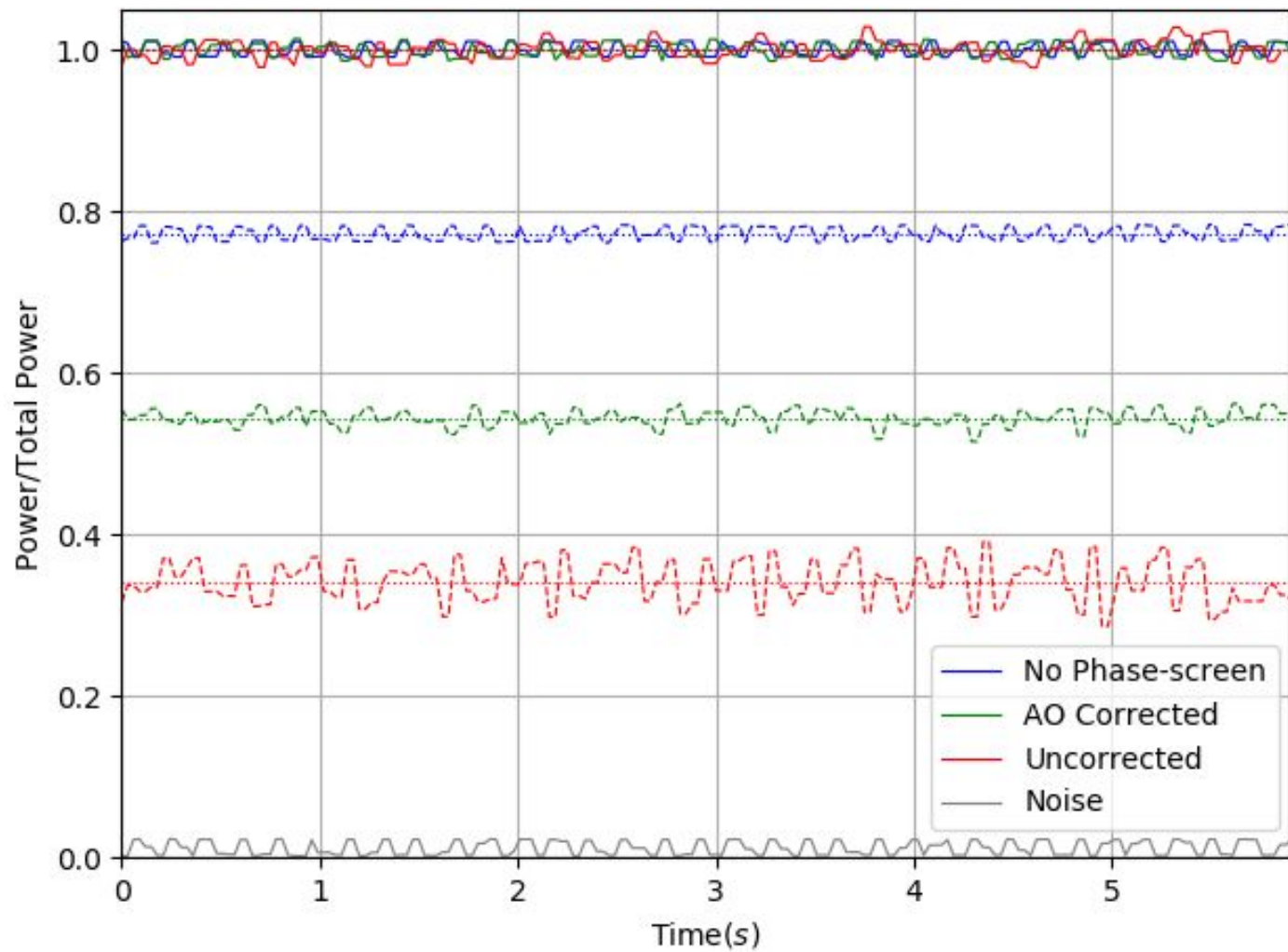












# Throughput and Stability

	No PS	AO Corr.	Uncorr.
No Fiber	$100.00 \pm 0.87$	$100.00 \pm 0.88$	$100.00 \pm 1.20$
With Fiber	$77.21 \pm 0.88$	$54.37 \pm 1.05$	$34.11 \pm 2.61$

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S/N:

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S/N: 97.09

**Throughput: 1.6**

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S/N:	97.09	13.87

**Throughput: 1.6**

**Flux stability: 7**



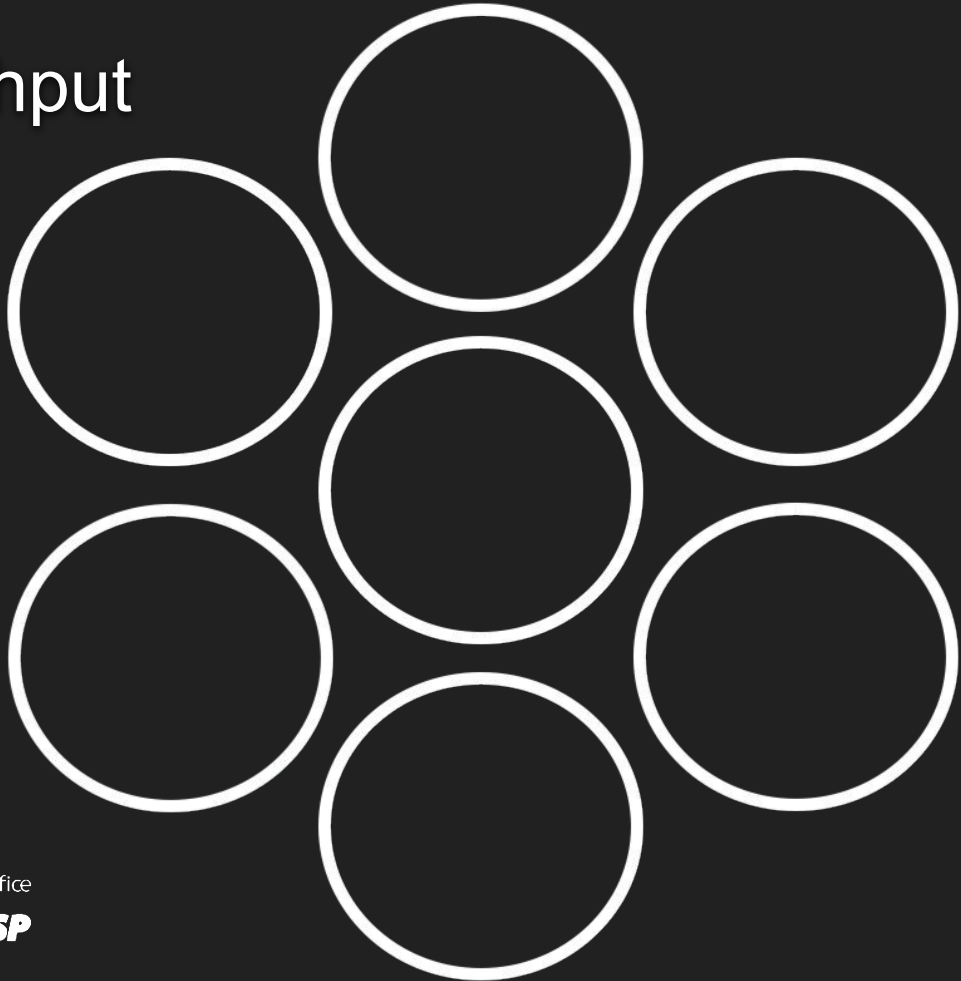
# 60% gain in throughput



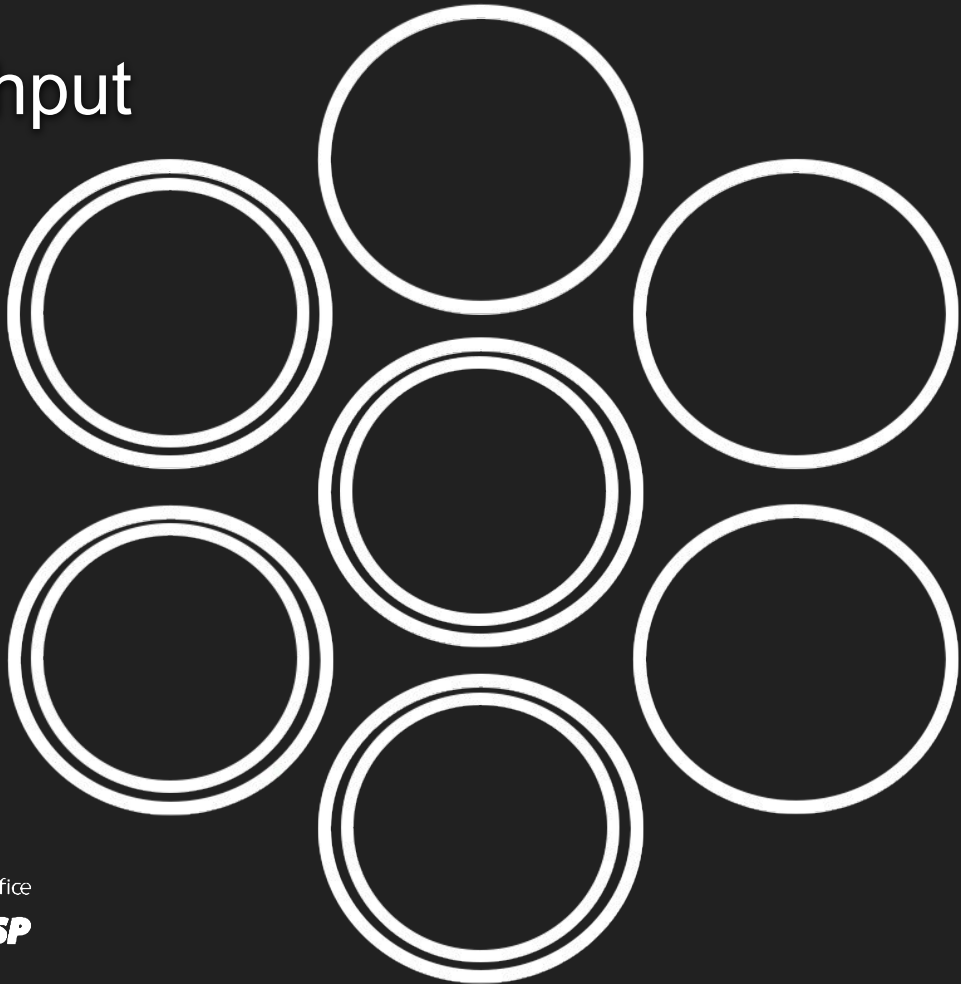
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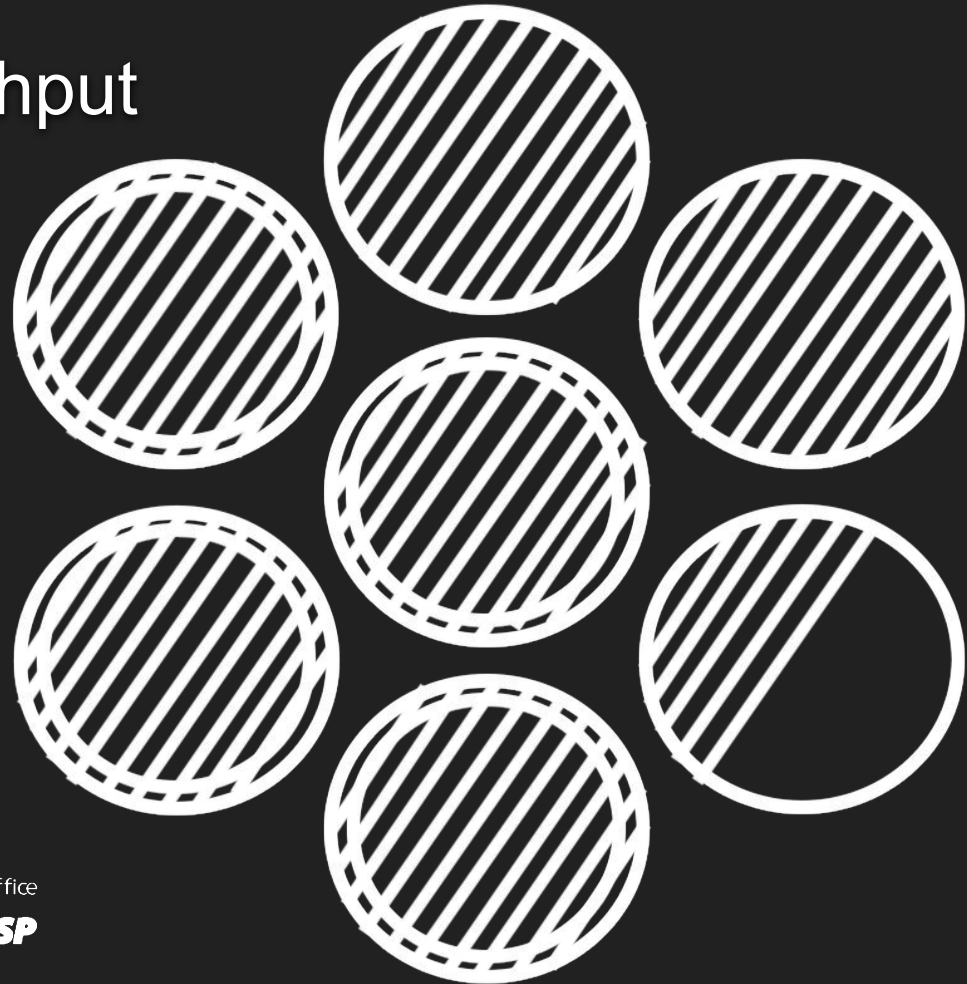
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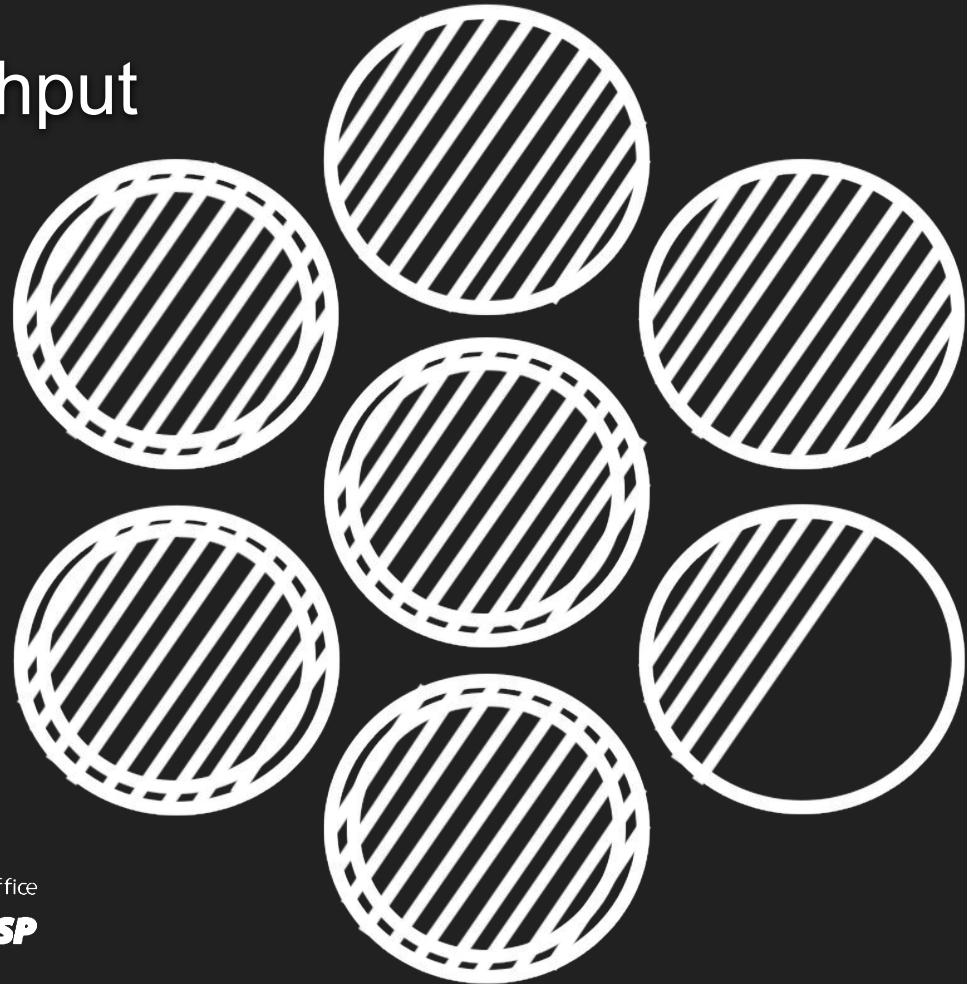


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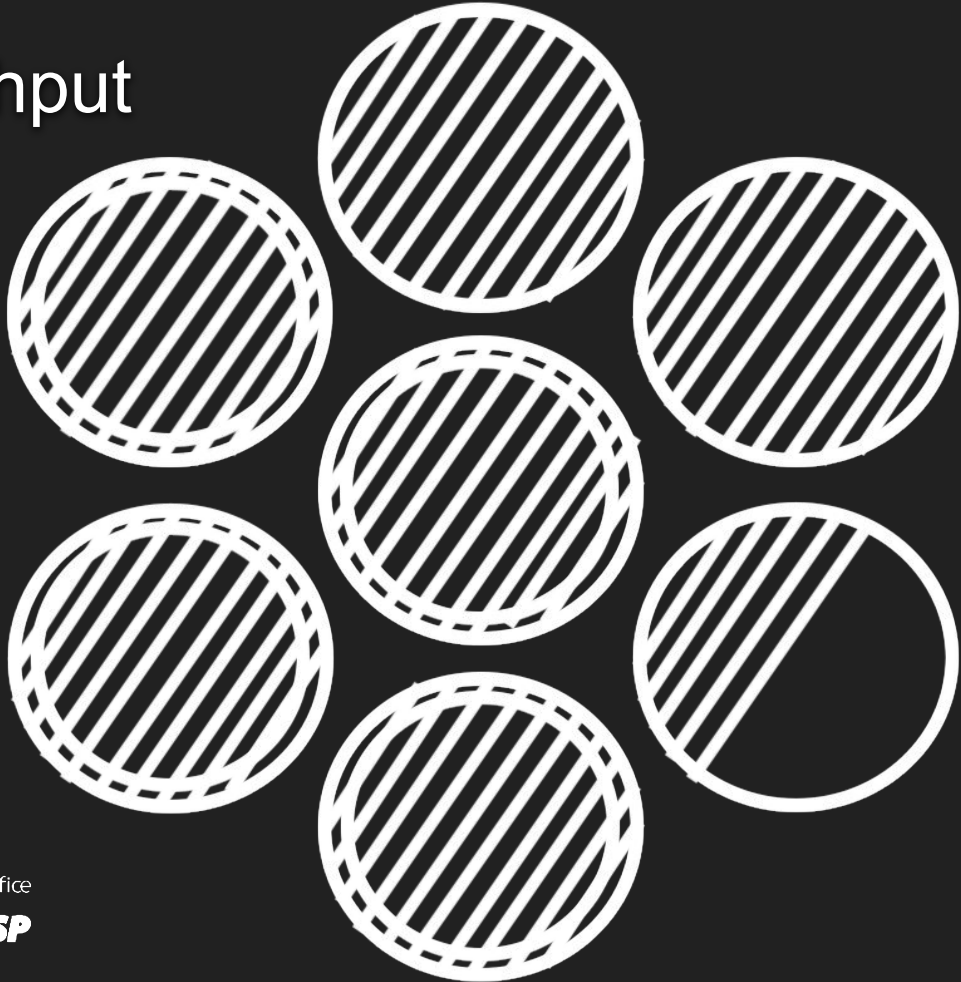
# 60% gain in throughput

- Fainter objects



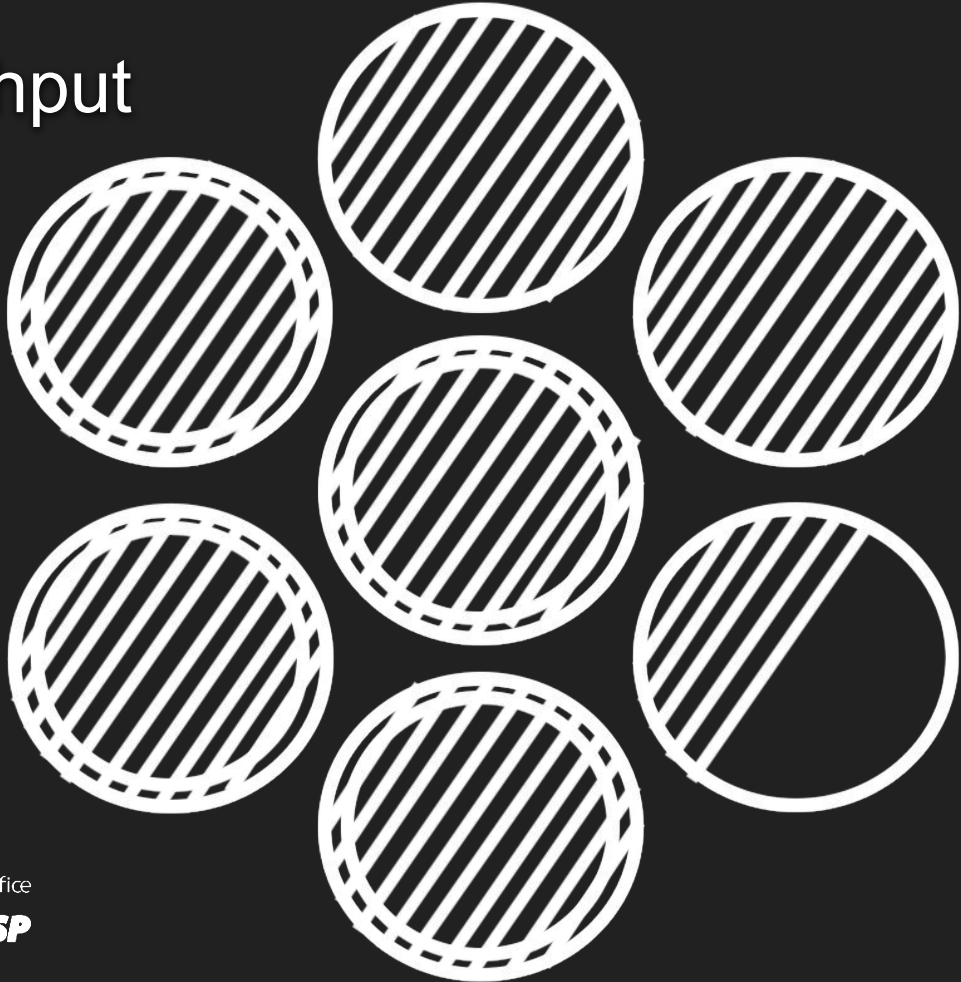
# 60% gain in throughput

- Fainter objects
- 38% shorter exposures



# 60% gain in throughput

- Fainter objects
- 38% shorter exposures
- Precision of PRV throughput of HT





# Conclusions

- AO yielded a factor of 7 in flux stability
- G-CLEF gained 60% more throughput by using AO

Thanks !



Henrique Lupinari