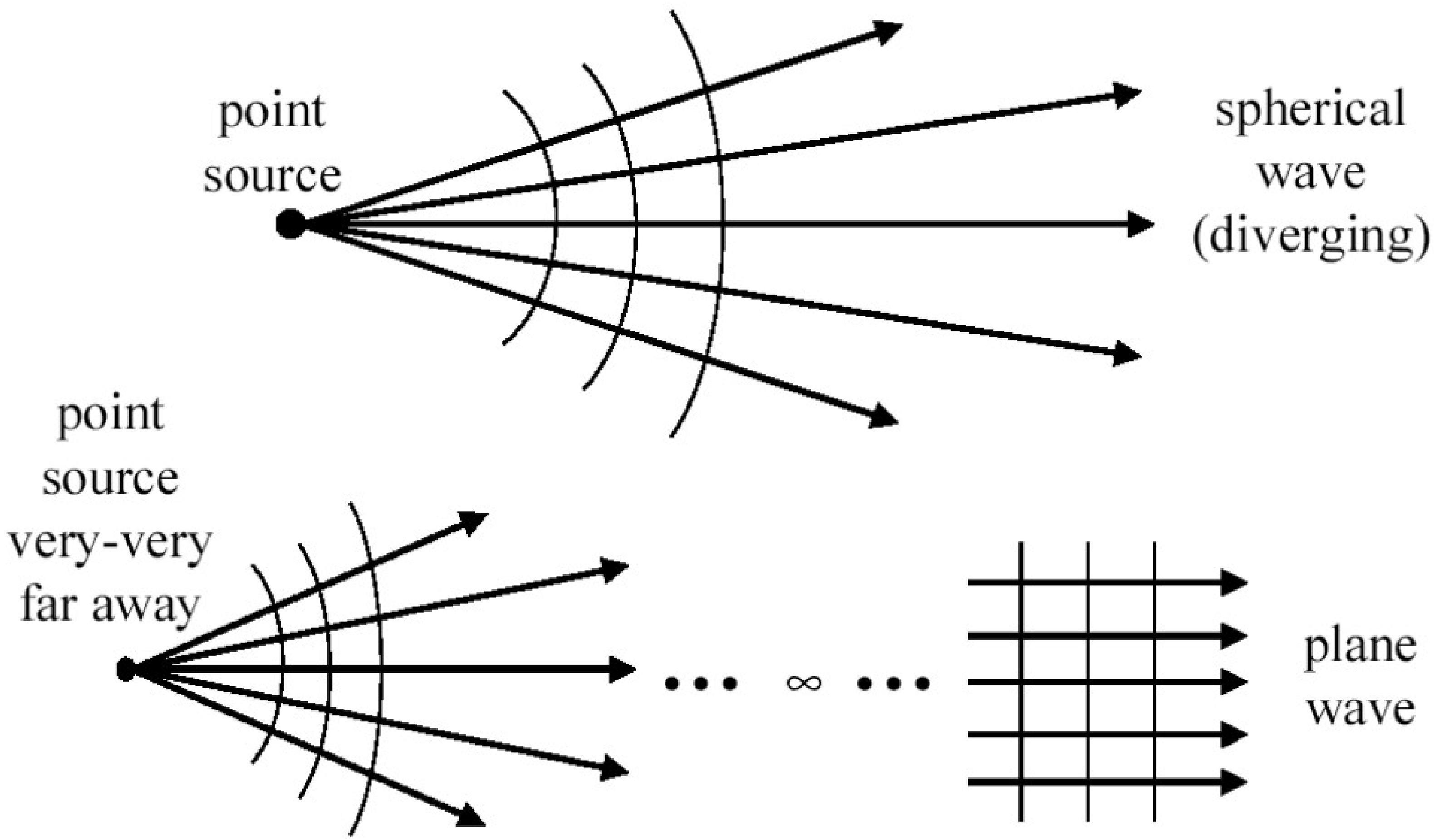
Dr. Onur ŞATIR

Uzm.Ast. Cihan Tuğrul TEZCAN

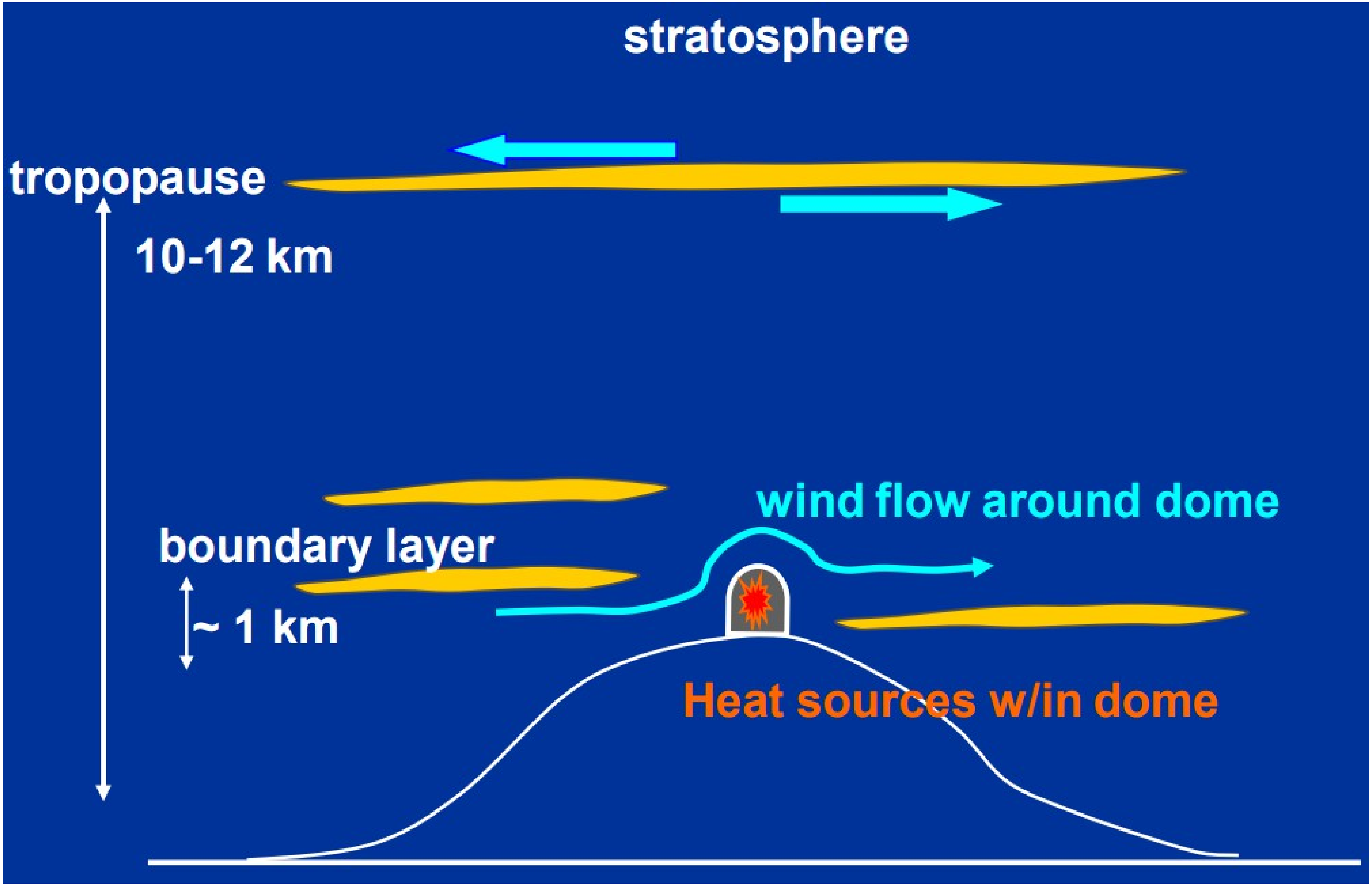
DAG: Astronomik SLODAR ve MASS-DIMM Sistemleri

- Doç.Dr. Cahit YEŞİLYAPRAK
- Dr.Öğr.Üyesi Onur KESKİN
- Dr.Öğr.Üyesi Sinan ALİŞ
- Araş.Gör. Yavuz GÜNEY
- Uzm.Ast. Cihan Tuğrul TEZCAN
- Uzm.Ast. Mohammad SHAMEONİ NİAEİ
- Uzm.Ast. Recep BALBAY

Turbulence

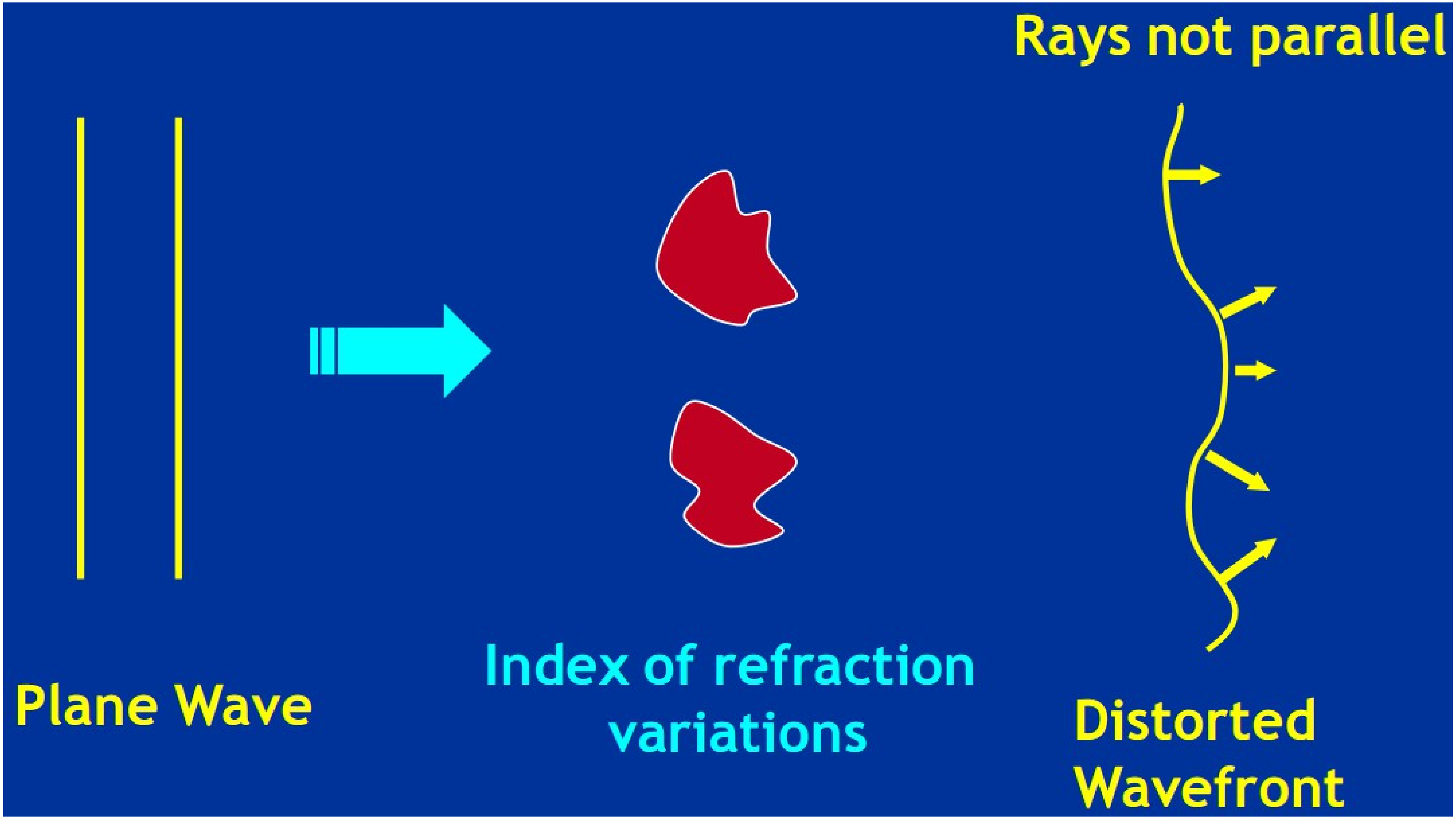

point
source
spherical
wave
(diverging)
point
source
very-very
far away
... ∞ ...
plane
wave

Turbulence



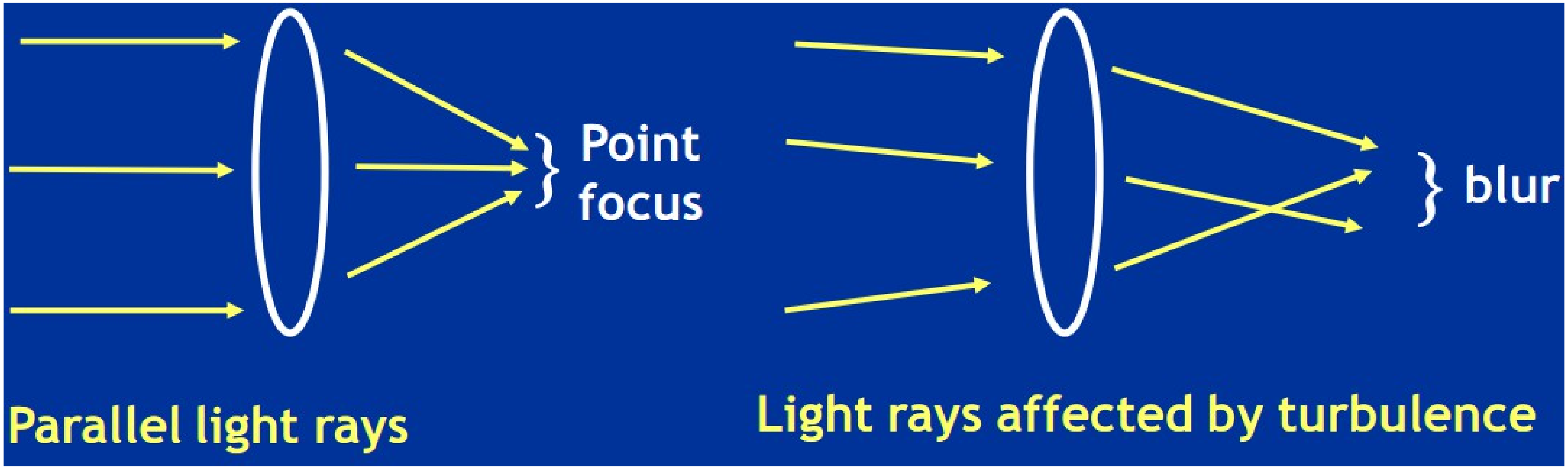
stratosphere
tropopause
10-12 km
wind flow around dome
boundary layer
~ 1 km
Heat sources w/in dome

Turbulence

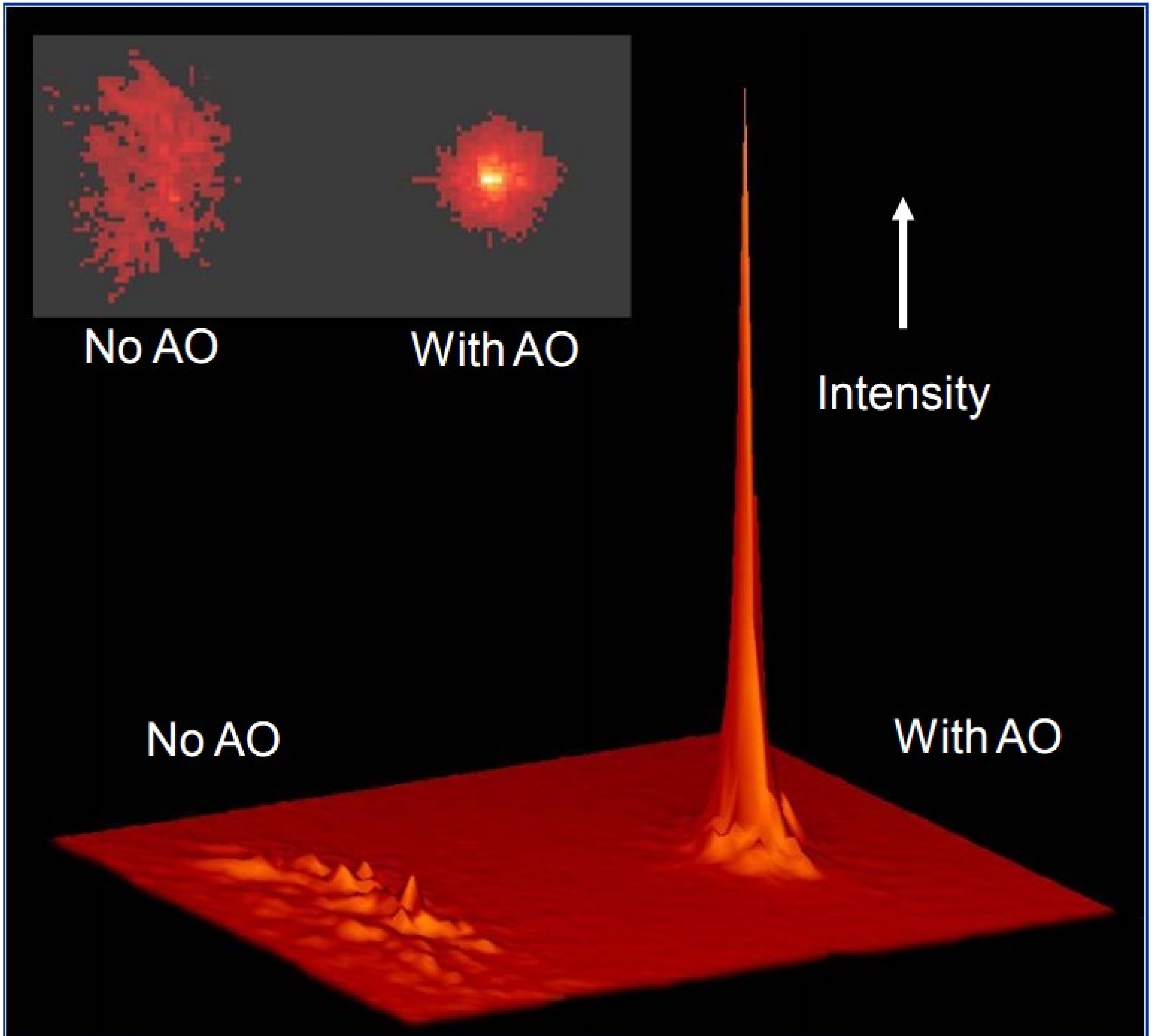


Rays not parallel
Plane Wave
Index of refraction
variations
Distorted
Wavefront

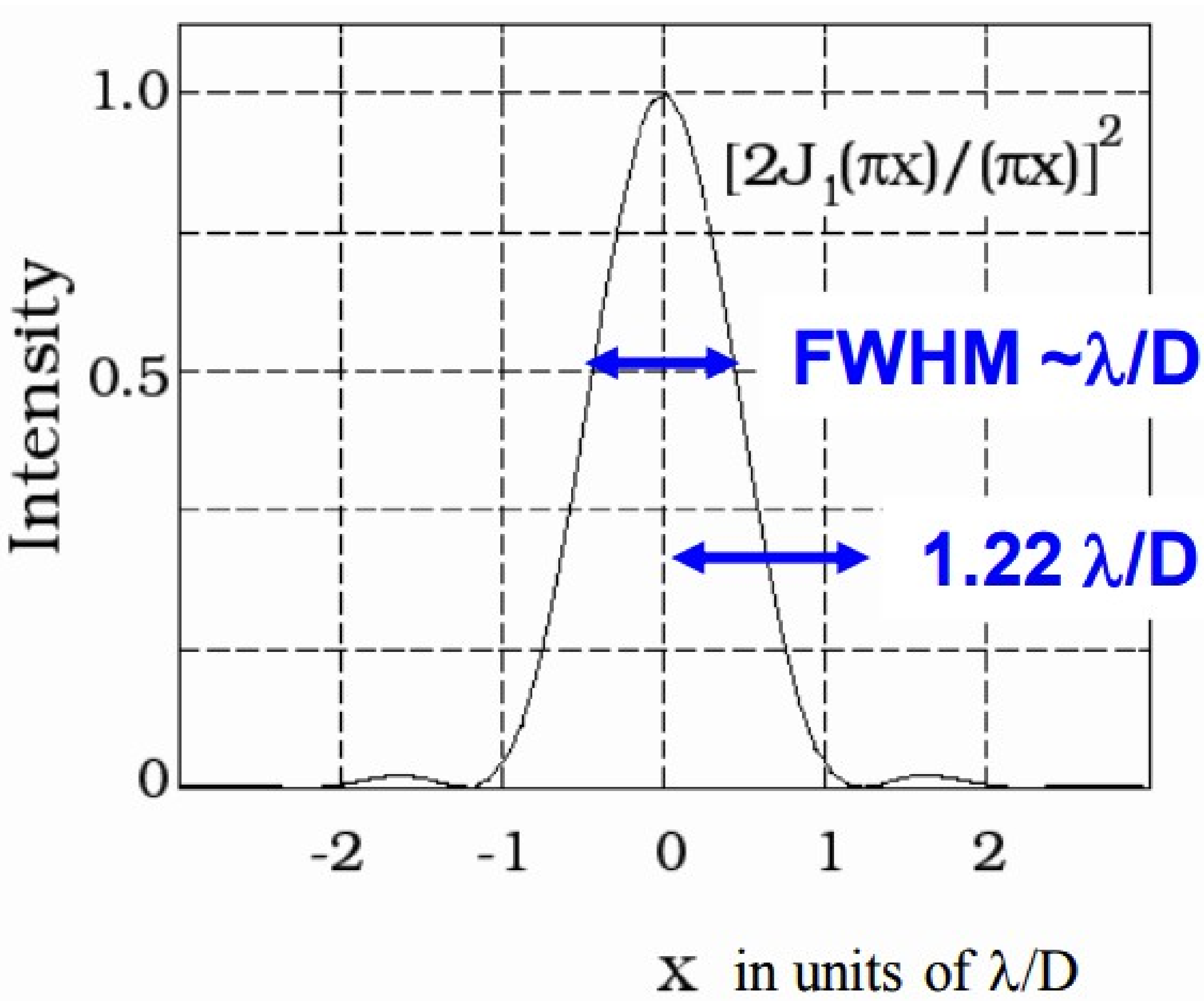
Turbulence

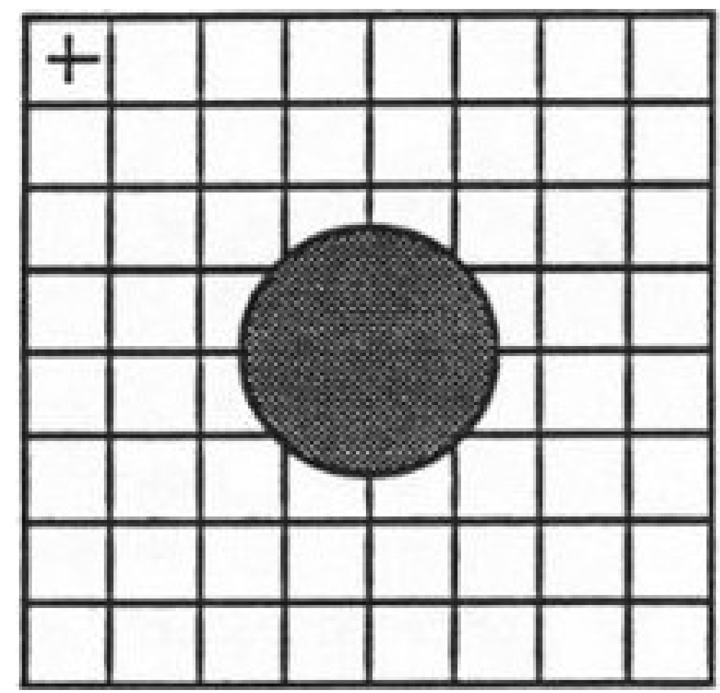

Point
focus
Parallel light rays
blur
Light rays affected by turbulence

~~Turbulence~~

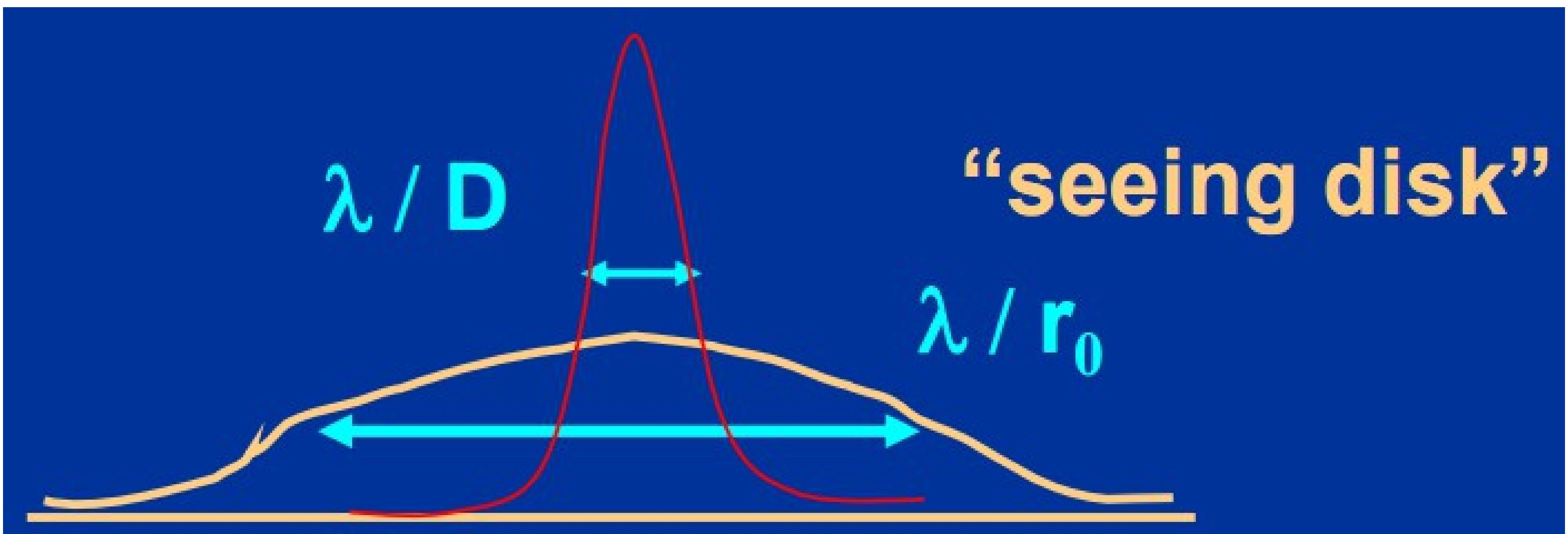


Seeing

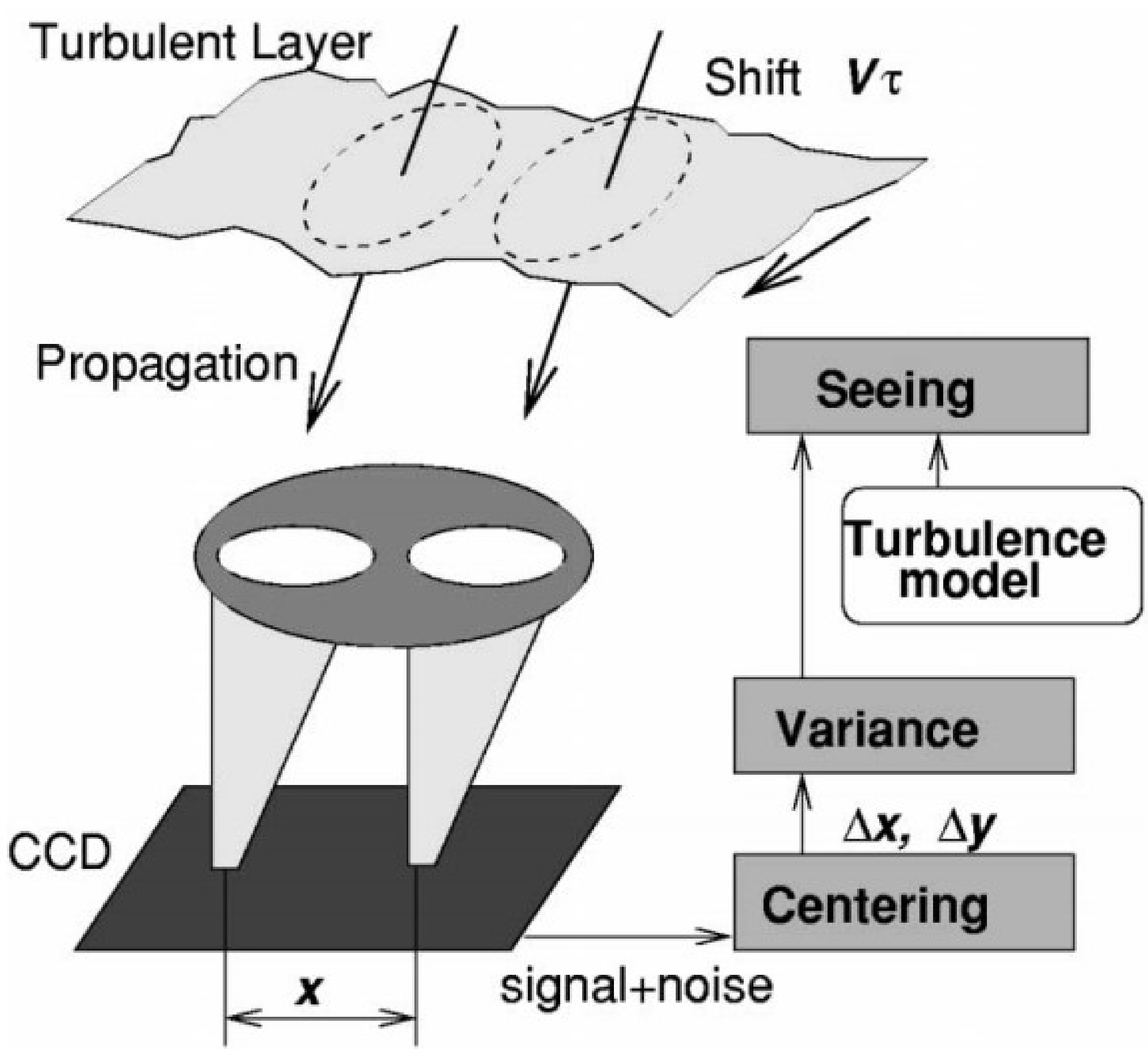

1.0
0.5
0
Intensity
$[2J_1(\pi x)/(\pi x)]^2$
FWHM ~λ/D
1.22 λ/D
-2
-1
0
1
2
x in units of λ/D


+

Seeing



Differential Image Motion Monitor

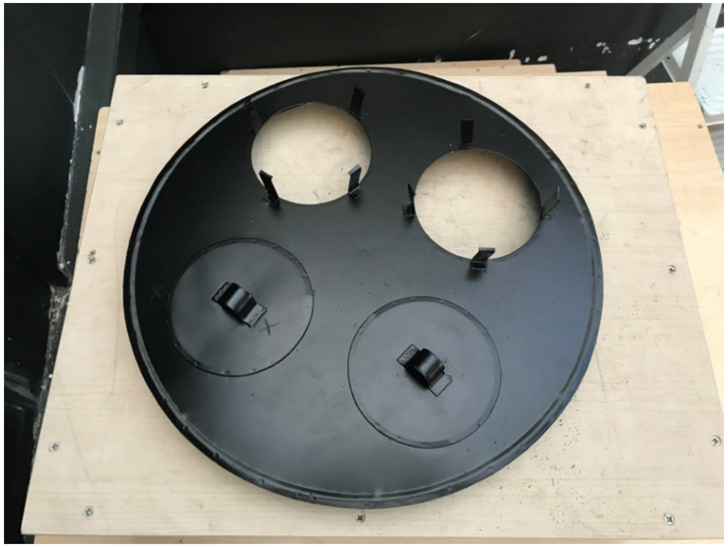


Seeing

Fried parameter

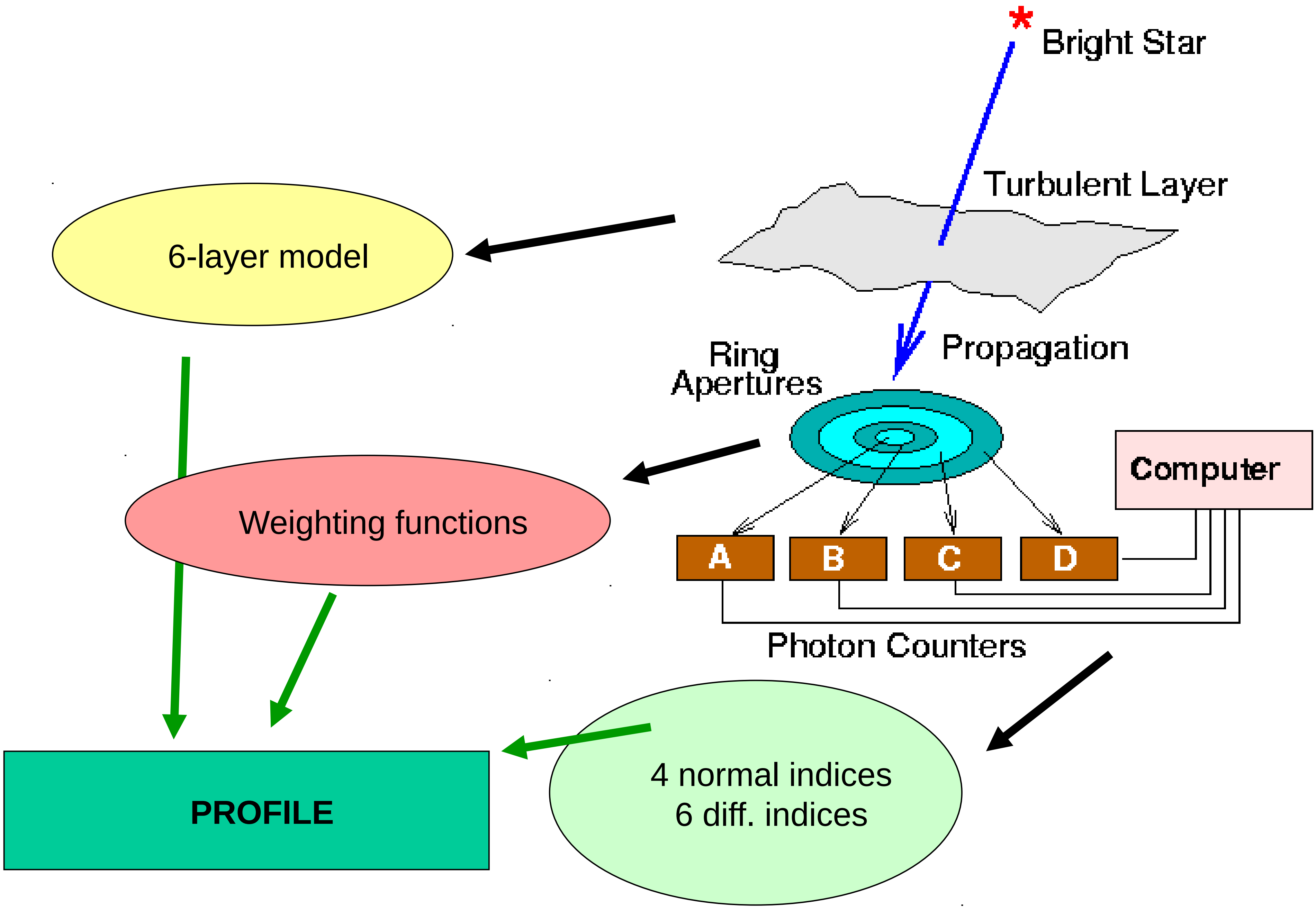
r_0

Differential Image Motion Monitor



Differential Image Motion Monitor

MultiApertureScintillationSensor

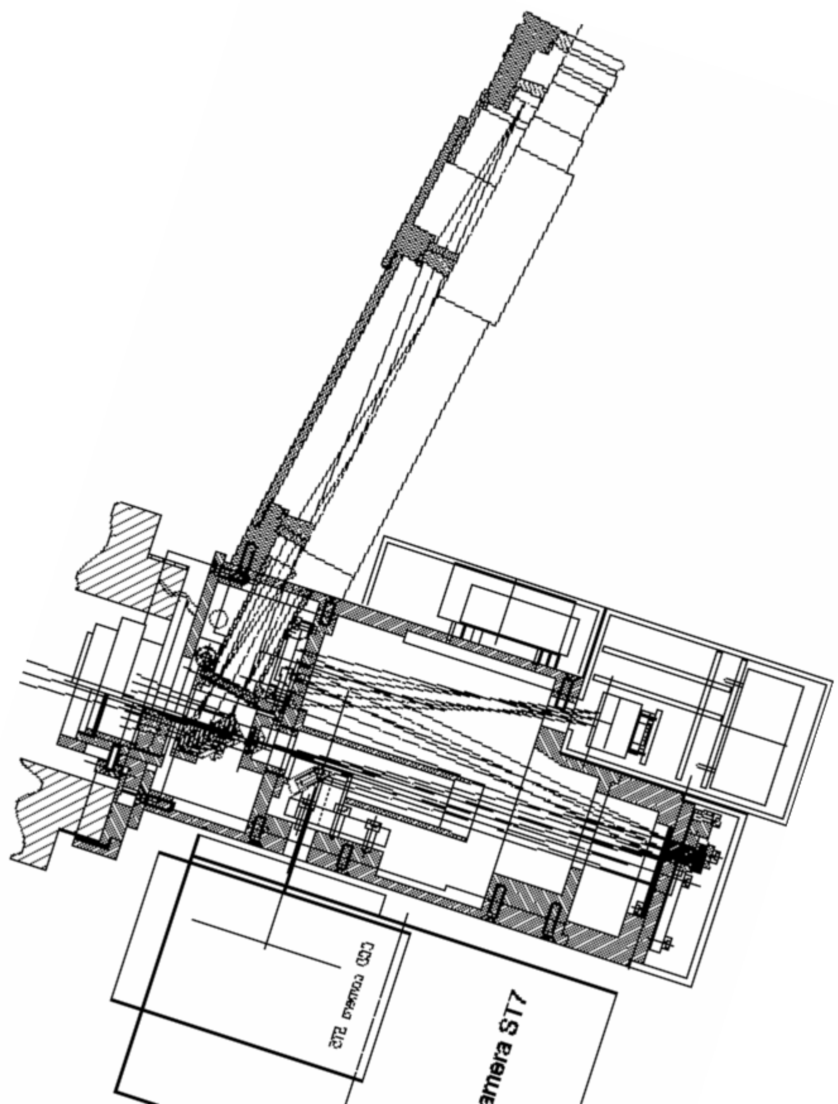


M~ulti~ A~perture~ S~cintillation~ S~ensor~

- Seeing (Fried parameter, r_0)
- Free-atmosphere seeing
- Isoplanatic angle, θ_0
- AO time constant, τ_0 (without ground layer)
- Low-resolution profile: 6 layers at 0.5, 1, 2, 4, 8, 16km

- ~~Outer scale~~
- ~~Detailed profile~~
- ~~Wind~~

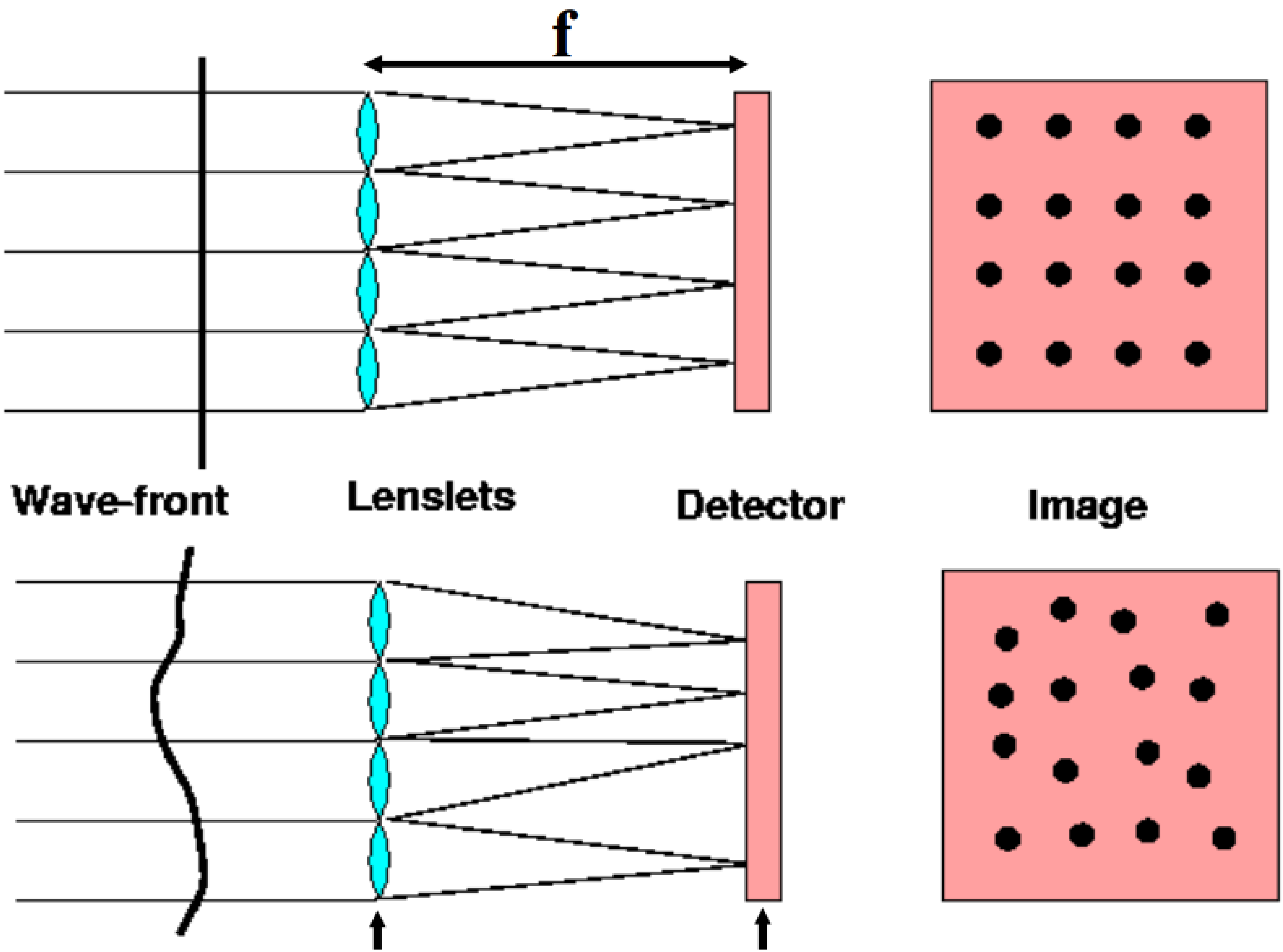
MASS-DIMM



SLO$_{pe}$ D$_{etection}$ A$_{nd}$ R$_{anging}$

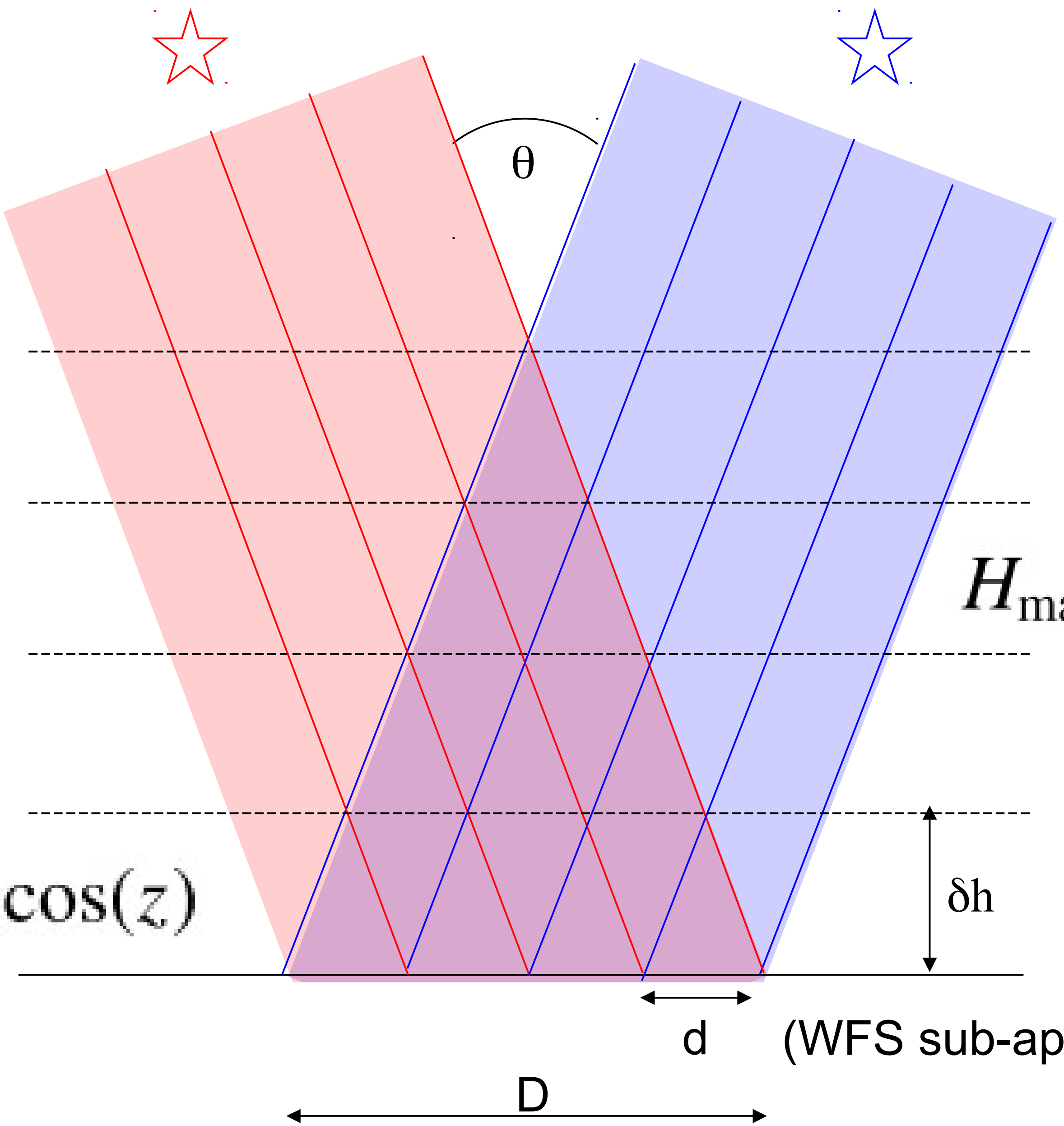
- Observe double stars
- Shack-Hartmann wavefront sensor(s)
- Recover $C_n^2(h)$ from the WFS data
- Estimate the altitude, strength and velocity of each turbulent layer

SLO$_{pe}$D$_{etection}$A$_{nd}$R$_{anging}$



SLO$_{pe}$D$_{etection}$A$_{nd}$R$_{anging}$

$\delta h \propto d/\theta$



$$H_{max} = n_{sub} \delta H$$

$$\delta h = \frac{D}{n\theta} \times \cos(z)$$

SLO$_{pe}$D$_{etection}$A$_{nd}$R$_{anging}$

Telescope diameter (m)	Subaperture size (cm)	Wide mode separation range (arcmin)	Narrow mode separation range (arcsec)	Limiting V-magnitude
0.5	6.0	2.0 – 12.0	8.8 – 17.6	6.5
0.6	7.2	1.7 – 10.0	7.3 – 14.7	7.2
0.7	8.4	1.4 – 8.6	6.3 – 12.6	7.8
0.8	9.6	1.3 – 7.5	5.5 – 11.0	8.4
0.9	10.8	1.1 – 6.7	4.9 – 9.8	8.8
1.0	12.0	1.0 – 6.0	4.4 – 8.8	9.3

SLO_{pe} D_{etection} A_{nd} R_{anging}

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pt5m telescope
Scintillation, Photometry and Exoplanets

SLODAR

CFAI developed the SLODAR (SLOpe Detection And Ranging) technique for characterization of the vertical profile of atmospheric optical turbulence.

SLODAR is a crossed beams method based on observations of double stars using a Shack-Hartmann wavefront sensor. The optical turbulence profile (OTP) is recovered from the cross-correlation of the wavefront slope measurements for the two stars.

SLODAR systems, based on small telescopes (typically 50cm aperture) , have been employed for characterization of the optical turbulence at the Paranal, ORM (La Palma), Mauna Kea and SAAO observatories. These studies have mainly concentrated on characterization of the 'ground layer' of turbulence in the first kilometer above the site, relevant to the development and application of ground-layer and multi-conjugate adaptive optics systems.

Publications describing the details of the SLODAR technique and its applications can be found here.

SLODAR Installations

- ESO Paranal Observatory
- La Palma
- Bhoyun Observatory, South Korea
- Previous Durham SLODAR Installations
- SLODAR installations and development by other groups

Kurulacak olan DAG-SLODAR'ın *neredeyse* ikizi

La Palma

The automated SLODAR system at La Palma supports operation of the Canary adaptive optical system at the William Herschel telescope.

The system is based upon a robotic 0.5m telescope which can also operate in photometric mode, for applications such as transient astronomy.

Bizimki
DAHA
BÜYÜK
olacak!

Şaka bir yana, 60cm ana ayna hariç tüm özellikleri neredeyse aynı olacak.

SLODAR @ La Palma

SLODAR @ La Palma

Teşekkürler