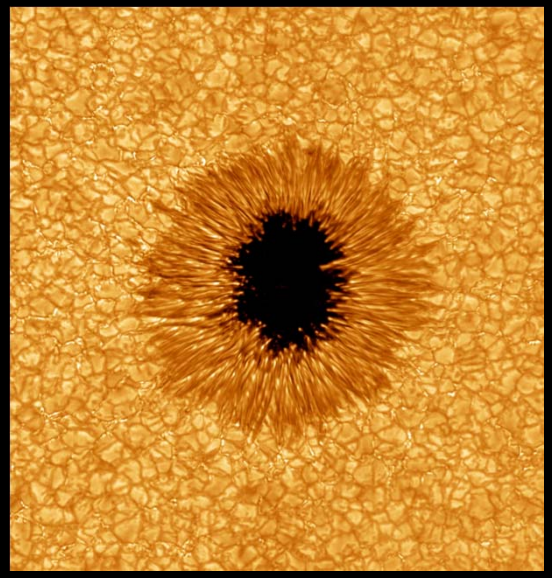
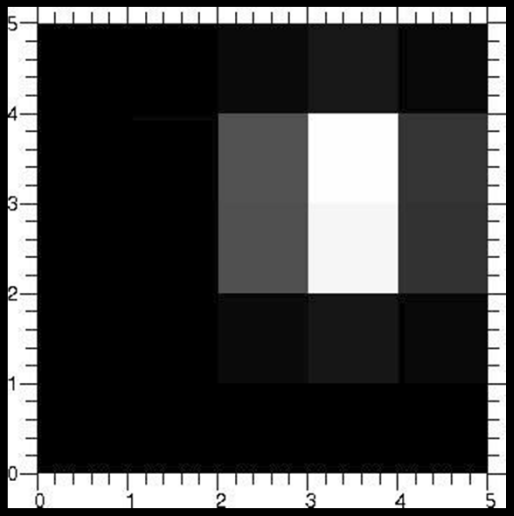


Layer-oriented MCAO for extended objects

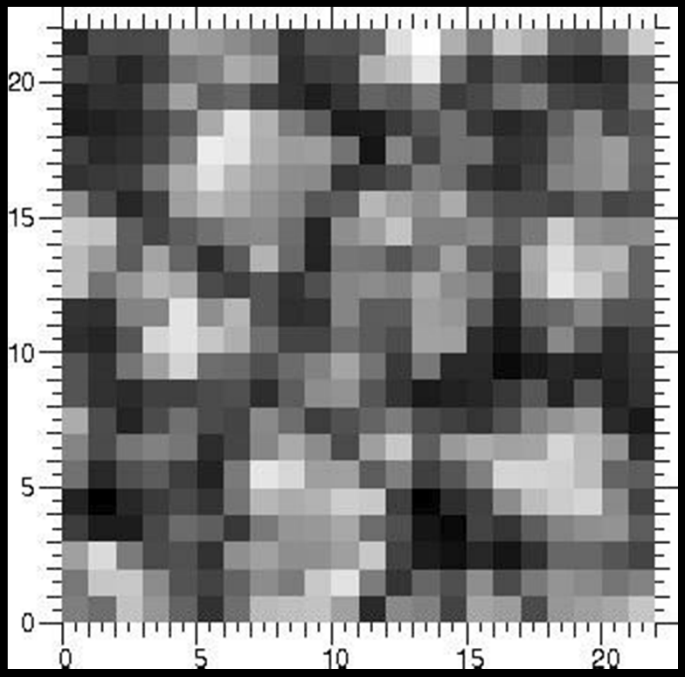
Aglaé Kellerer

Classic adaptive optics

Nighttime

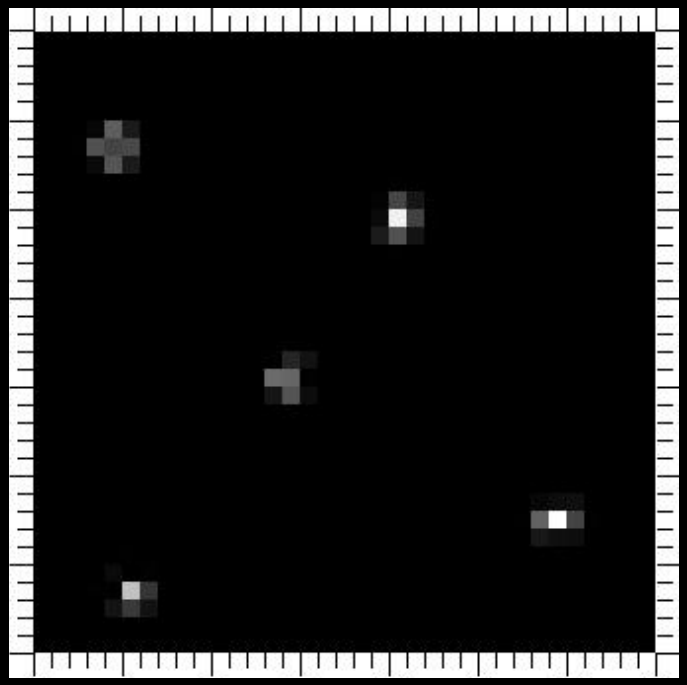


Solar

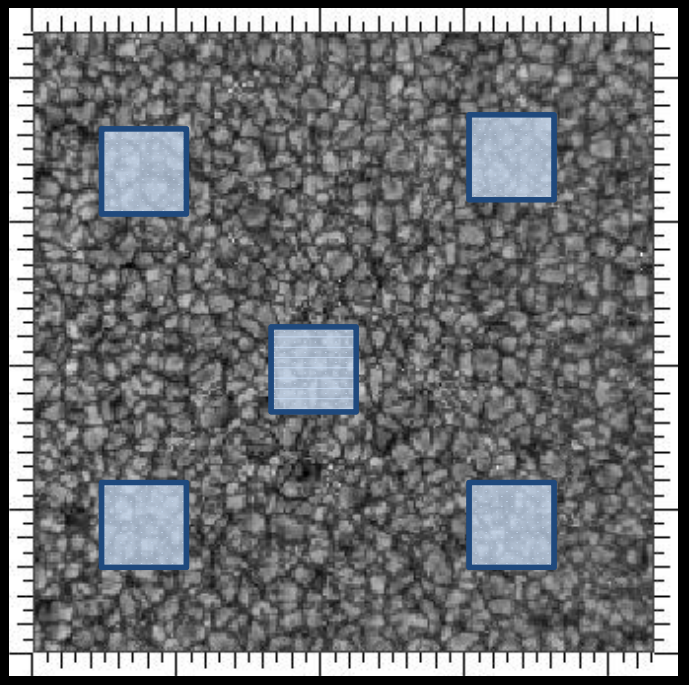


Computational load much heavier in solar AO

Star-oriented MCAO correction



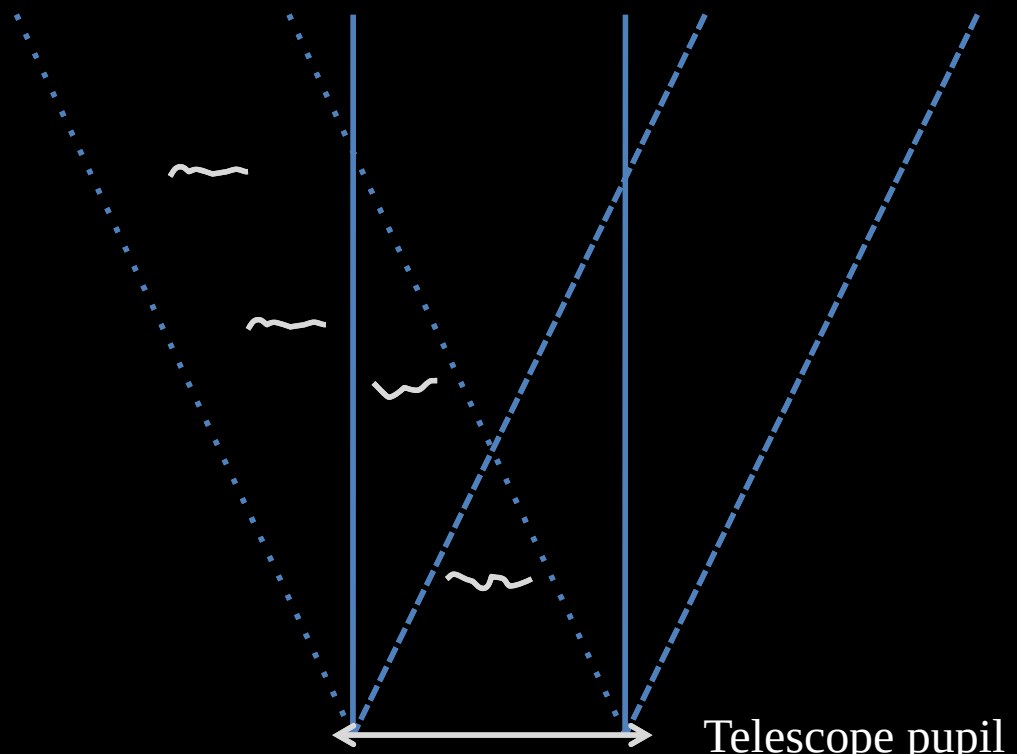
1-2 arcmin



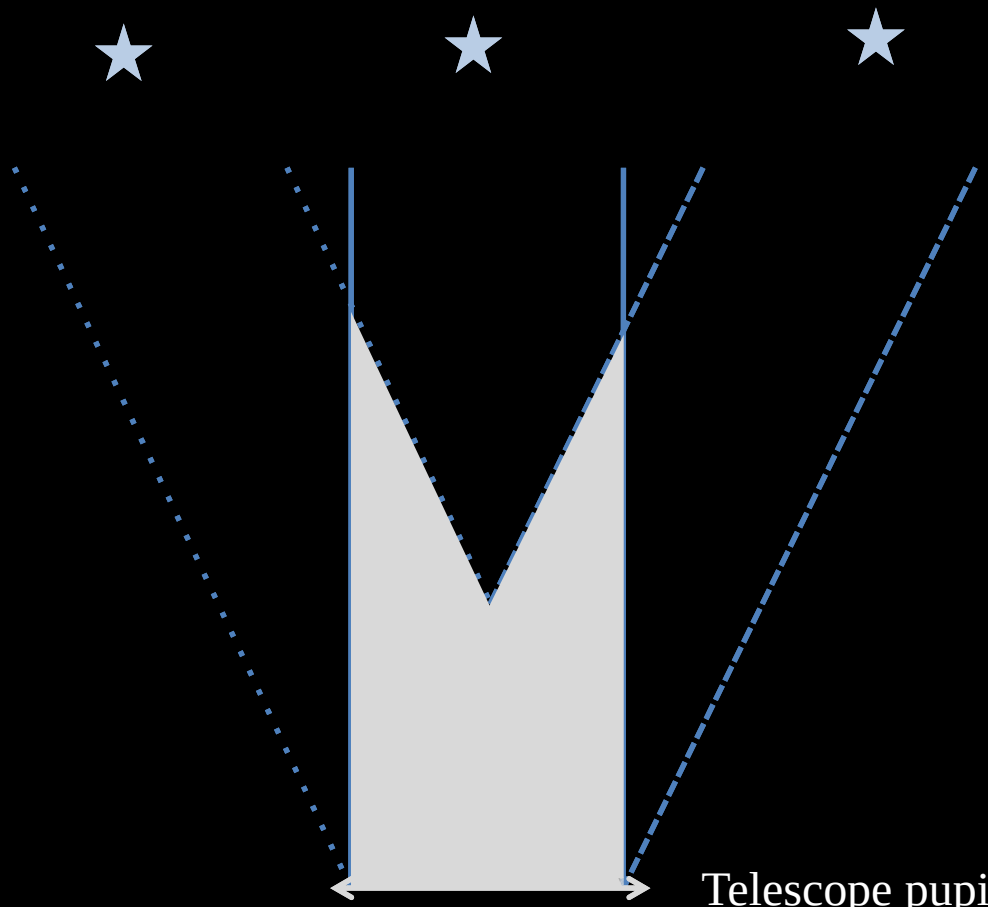
Up to 1 arcmin

Several SH sensors sense the wavefront distortions along different directions

Tomographic reconstruction

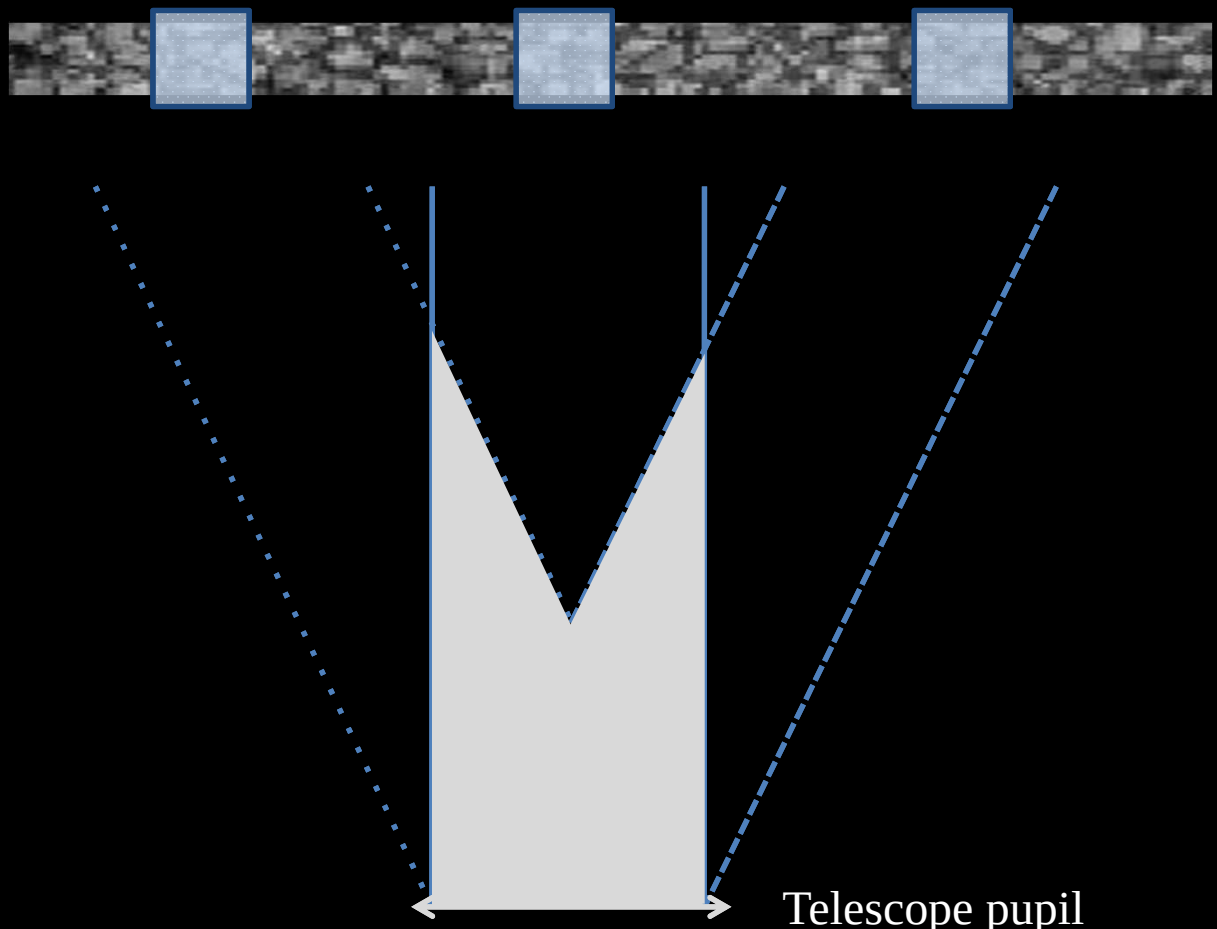


Star-oriented MCAO correction



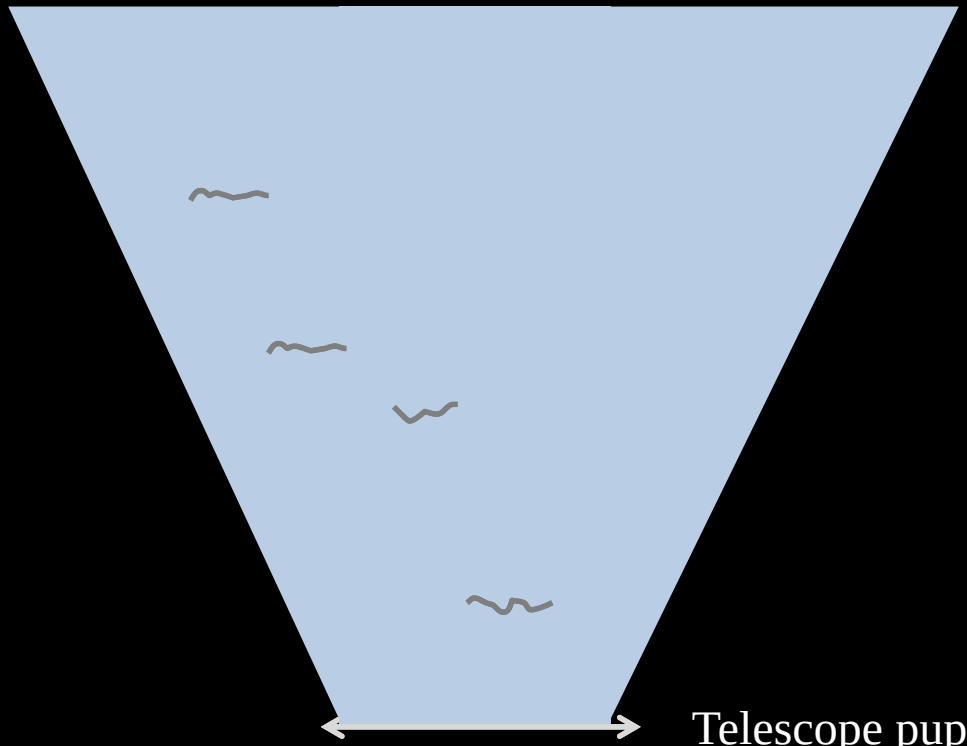
Reconstruction algorithm is fed with added information on atmospheric profiles

Star-oriented MCAO correction



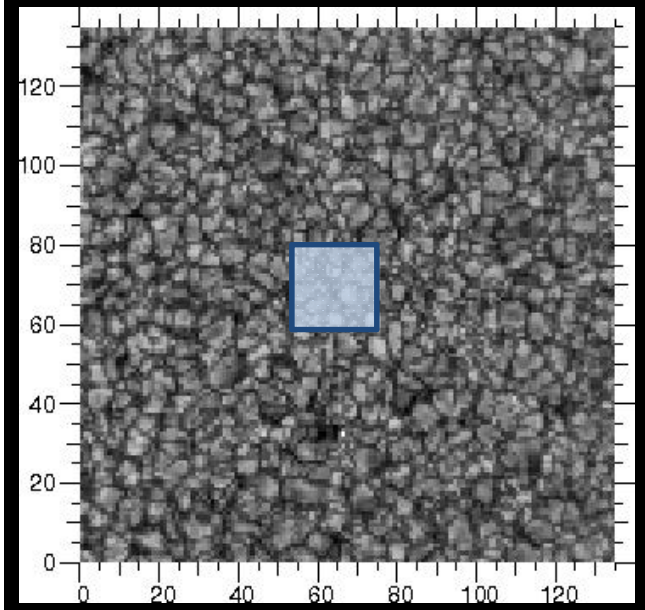
The star-oriented approach on extended objects does not make use of the entire field information

Layer-oriented MCAO correction

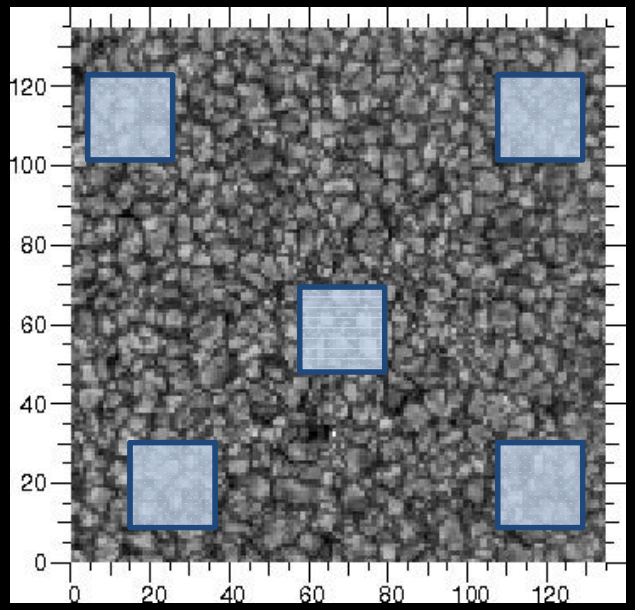


Triangulation is possible in the entire atmospheric volume

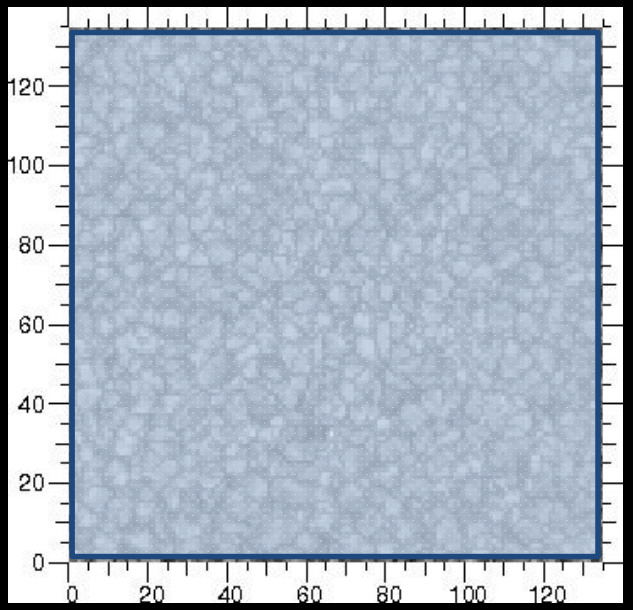
Conventional AO



Star-oriented MCAO

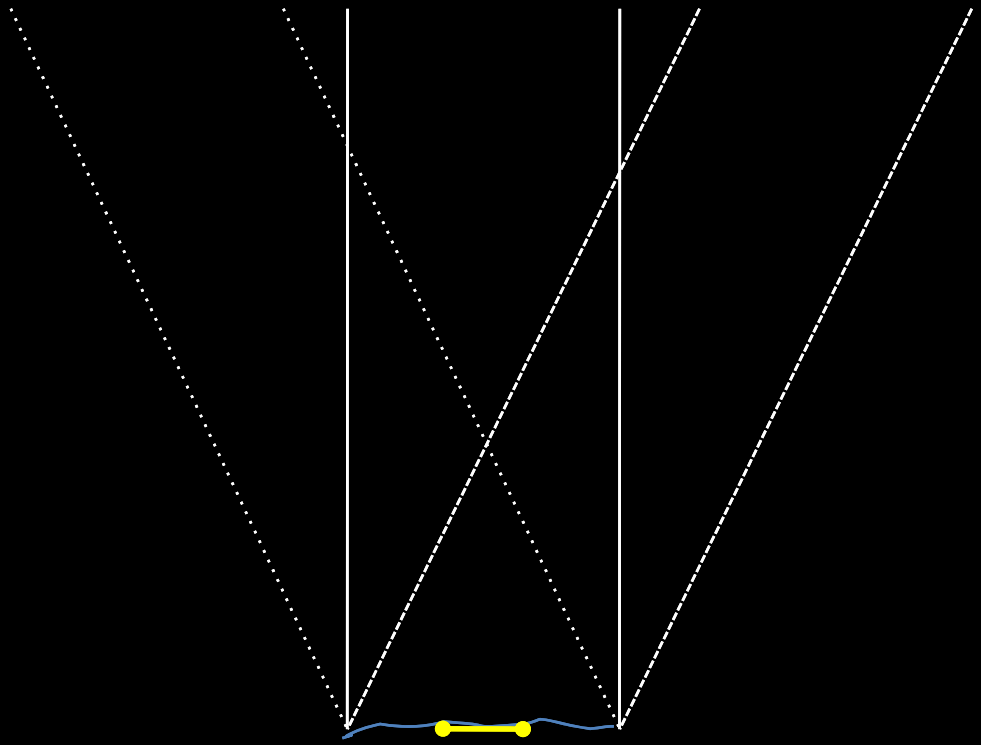


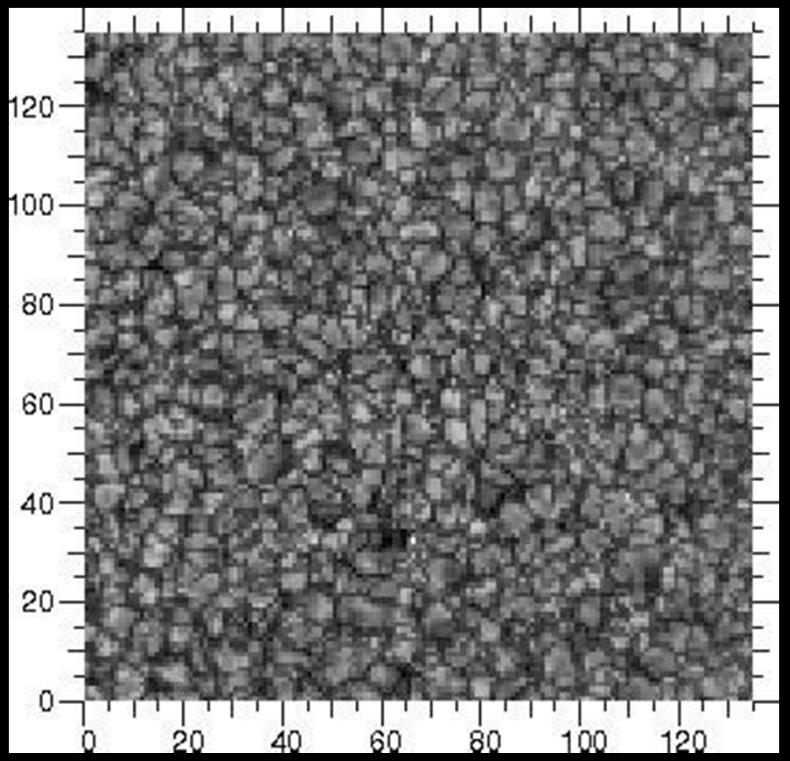
Layer-oriented MCAO



Layer-oriented approach: the wavefront distortions are sensed continuously over the entire field

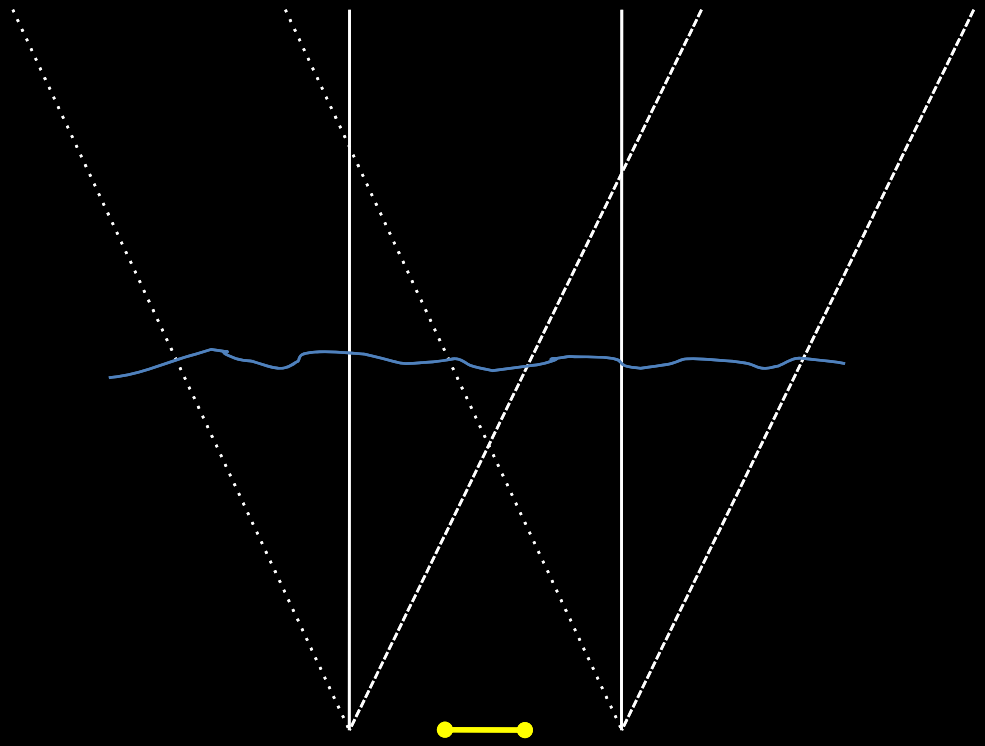
Wide-field sensors

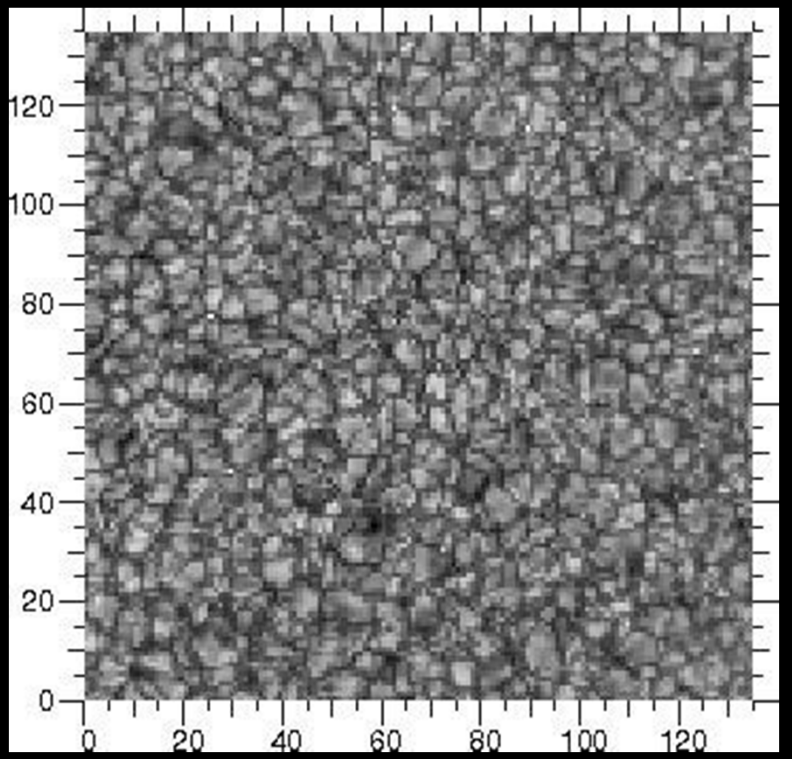




Turbulence at the pupil globally shifts the image

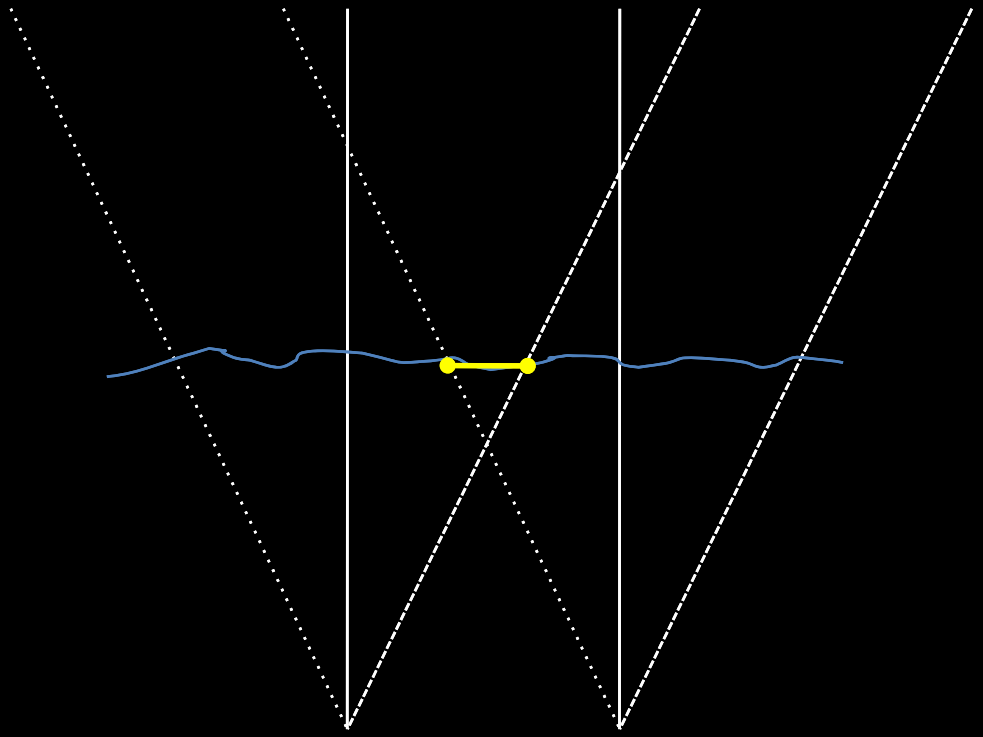
Wide-field sensors

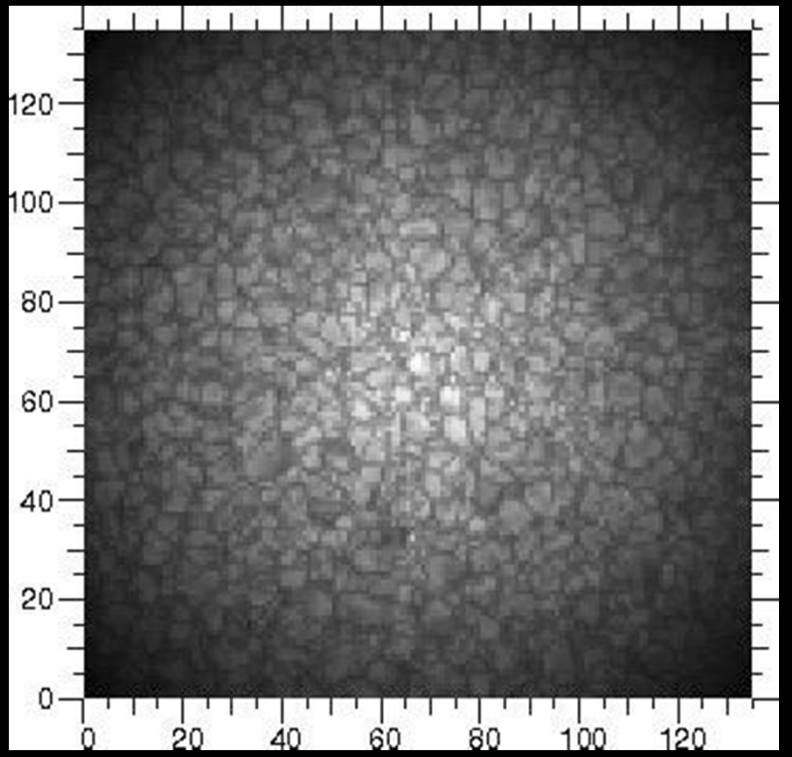




High-altitude turbulence distorts the image

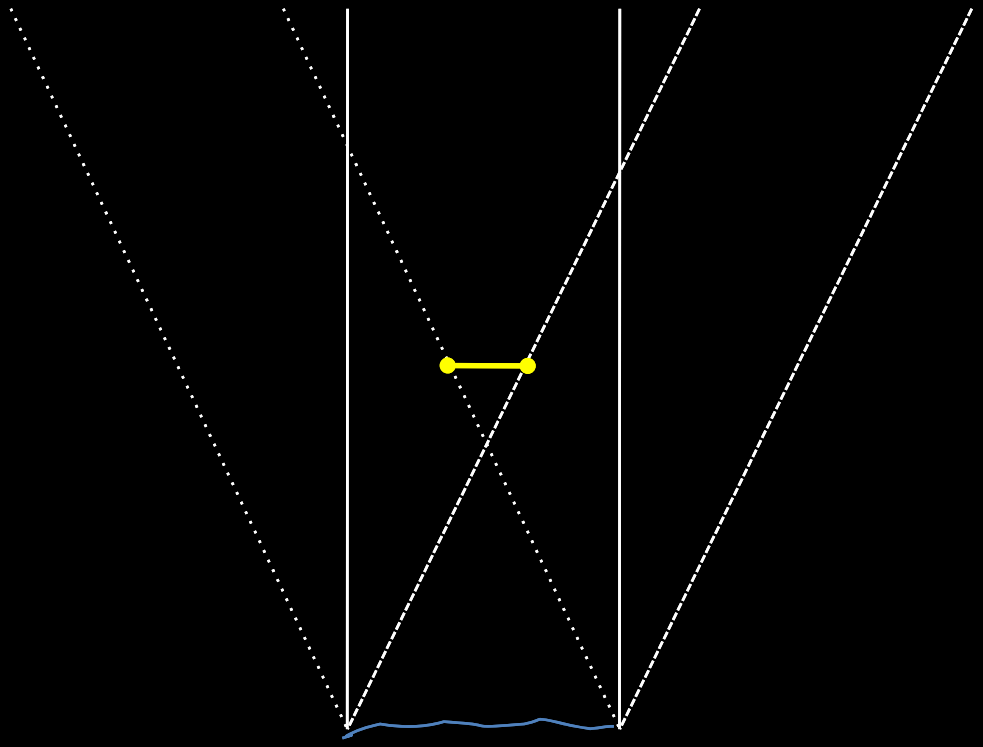
Layer-oriented MCAO

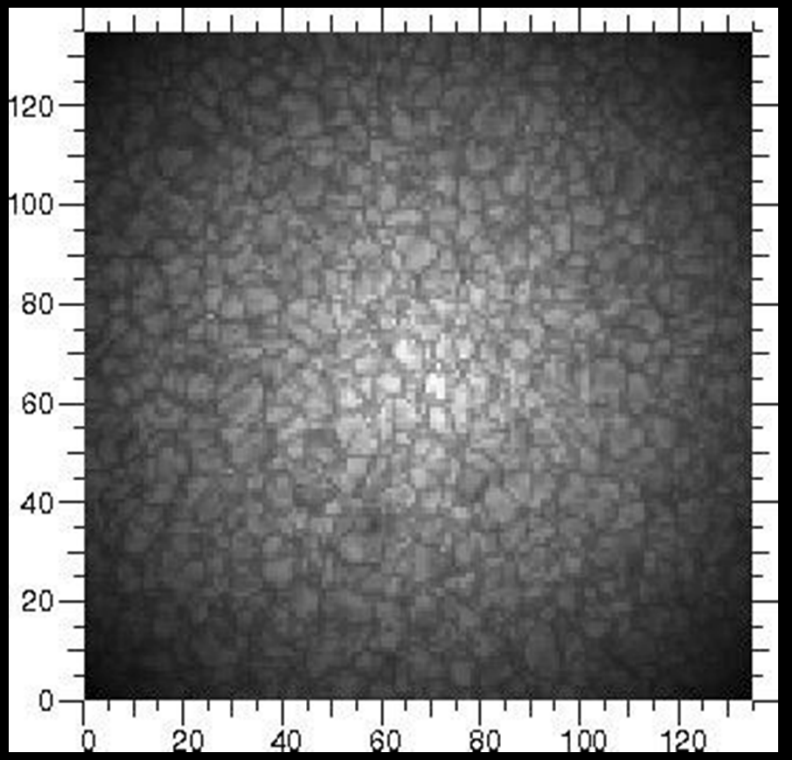




Turbulence at the conjugate layer shifts the image

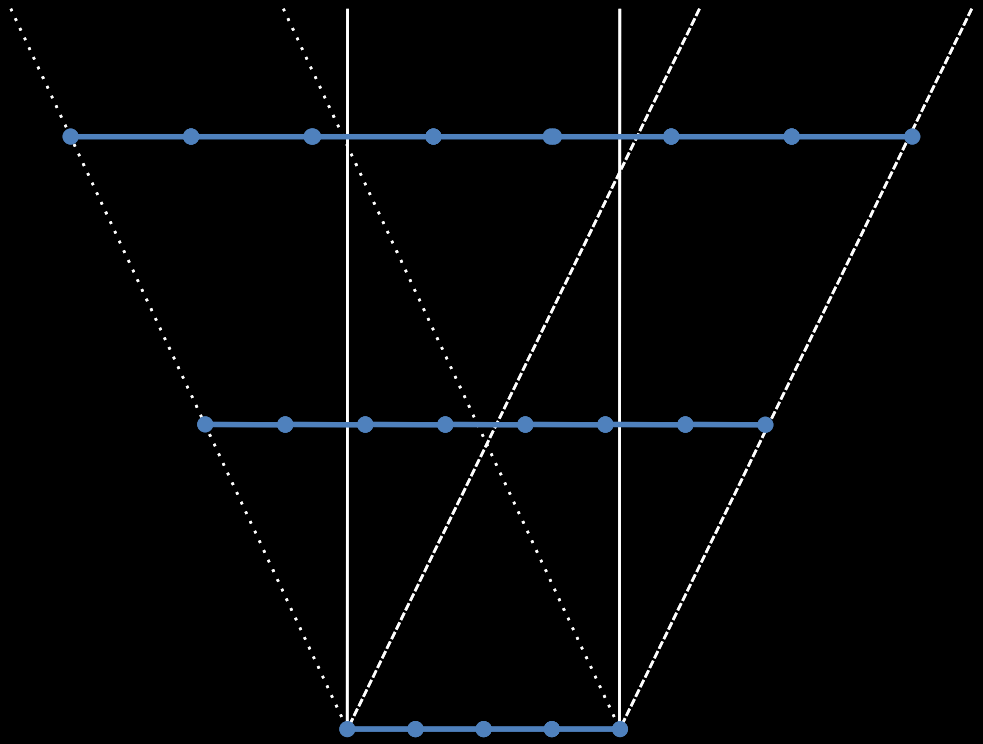
Layer-oriented MCAO



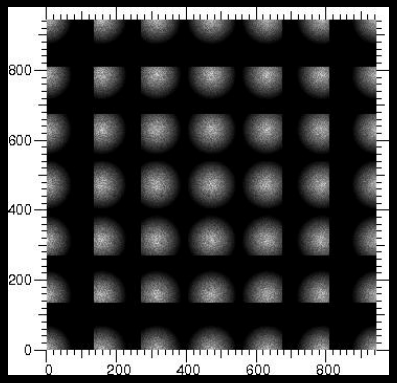


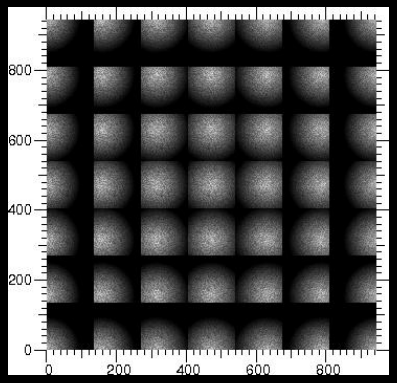
Turbulence in an un-conjugated layer distorts the image

Layer-oriented MCAO

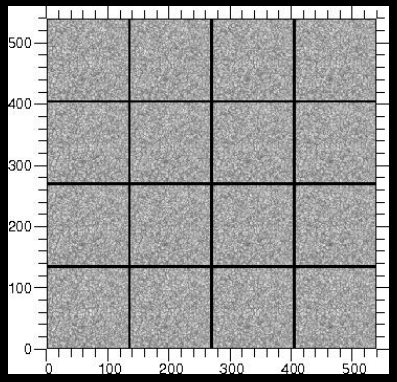


Both the mirror and the sensor are optically conjugated to the turbulent layer

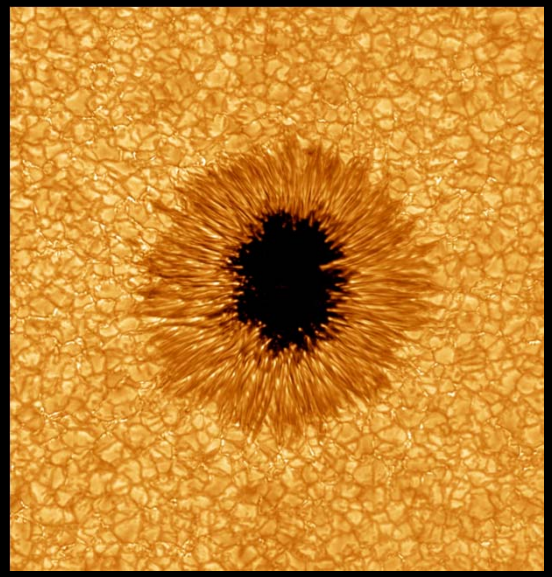




Sensors conjugated to high-altitude layers



Sensor conjugated to the ground



- Ribak “*Separation of atmospheric layers*” SPIE 2004
- Kellerer “*Layer-oriented AO for solar astronomy*” Applied Optics 2012
- Marino & Woger “*Feasibility study of a layer-oriented wavefront sensor for solar telescopes*” Applied Optics 2014
- Kellerer “*Further considerations on layer-oriented adaptive optics for solar telescopes*” Applied Optics 2014