

ALPAO Shack-Hartmann (SH) wavefront sensors (WFS) are the only range of WFS specifically designed for Adaptive Optics. They feature excellent performances to fit with every adaptive optics system. Sensitivity, speed and spectral range can be chosen depending on your needs. All **ALPAO SHs** perfectly fit with **ALPAO DMs** and **ALPAO software and real time computers**.



Key features

OPTIMIZED FOR AO

Specificly designed for adaptive optics

SPEED

Frequency up to 5kHz,
latency as low as 7.4 μ s

HIGH SENSITIVITY

Photon flux for SNR=1
down to 3 photons/frame/
sub-aperture (EMCCD)

OPTIMIZED FOR AO

ALPAO SHs are specifically designed for adaptive optics.

When needed, the number of subpupils correspond to the fried configuration of the recommended DM. It allows an optimal configuration for AO.

The design is optimized for extremely high performances around a flat wavefront.

The latency has also been minimized for best AO performances. Such parameters improve the results even with slow aberrations.

FAST WAVEFRONT SENSING

For atmospheric perturbation correction, kHz frequency wavefront sensors are needed. ALPAO WFS can be run up to 5kHz.

Beyond frequency, latency is a key parameter for real time compensation of the perturbations. ALPAO WFS interfaces are designed for extremely low latency.

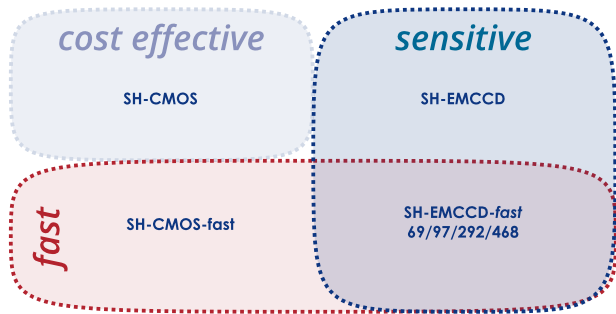
Thanks to their speed and low latency, those wavefront sensors can be associated to ACE Fast, ACE RTC, to control ALPAO DM and reach AO bandwidth greater than 100Hz.

HIGH SENSITIVITY

For some applications like in microscopy or astronomy, a high-sensitivity wavefront sensor is required.

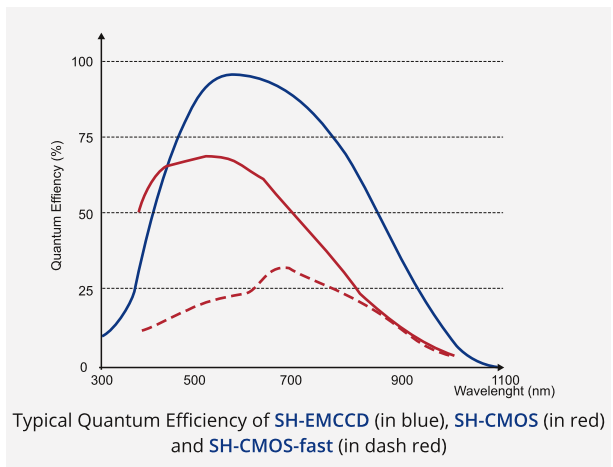
EMCCD technology allows great performance in terms of sensitivity thanks to their very low read out noise. SH-EMCCD and SH-EMCCD-fast are featuring such performances.

CHOOSE YOUR VIS-WFS



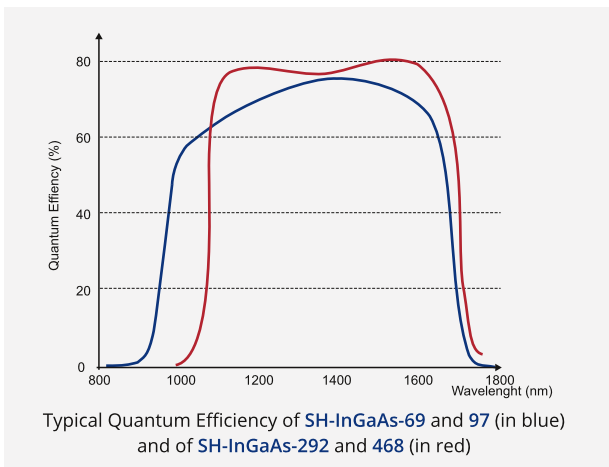
VIS WFS

ALPAO SH-CMOS and SH-EMCCD are perfect for large spectral range from 350 to 1000nm.



NIR WFS

ALPAO SH-InGaAs are working in the near infra-red from 950 to 1700nm. They features a high sensitivity at 1.5µm and a very high frequency.



ALPAO PERFORMANCES

	SIZING				SPEED			SENSITIVITY			OPTICS				
	Number of microlenses	Useful aperture (mm)	Acquisition frequency (Hz)	Readout latency (µs)	Sensor maximum quantum efficiency	Photons for SNR=1 (ph./fr./sub-pupils)	Read-out noise (e- RMS)	Tip-tilt / defocus range (µm PV)	Repeatability (nm RMS)	Spectral range	Rejection bandwidth with ACE/fast (Hz)	Max. # of DM actuators	Interface	Cable length (m)	
SH-CMOS	50x50	4.8x4.8	99	5000	67%	100	2.1	80/20	2	VIS	5	820	USB	3	
SH-EMCCD	16x16	3.1x3.1	502	141	95%	3	0.1	26/7	2	VIS	25	192	CL	2	
SH-CMOS-fast	23x23	3.2x3.2	5670	5	35%	1000	38	50/12	2	VIS	230	468	CL	2	
SH-EMCCD-fast	-69	8x8	1.5x1.5	1838	64	95%	3	0.1	13/4	2	VIS	90	69	CL	2
	-97	10x10	1.9x1.9	1004	64		16/4	50	97						
	-292	19x19	3.6x3.6	2067	60		32/9	100	292						
	-468	23x23	4.4x4.4	2067	60		39/11	100	468						
SH-InGaAs	-69	8x8	1.9x1.9	3000	7.4	75%	1500	150	29/7	2	NIR	140	69	CL	2
	-97	10x10	2.4x2.4	2000	7.4		40/10	100	97						
	-292	1	2.4x2.4	3150	8		16/4	150	292						
	-468	23x23	3.5x3.5	2000	8		23/6	100	468						

SOFTWARE & DRIVERS

ALPAO WFS includes software drivers (SDK). It allows to recover spot diagrams for integration into your software or Real Time Computer (RTC).

ALPAO WFS are designed to work with ALPAO Core Engine (ACE) or ALPAO RTC (ACE fast). ACE or ACE fast are not included and need to be purchased separately. ACE fast include hardware and ACE minimum configuration is 4Gb RAM, 100MB disk space, MATLAB® R2014b or higher.

CUSTOMIZE YOUR WFS

For some applications, specific needs can arise. If you have a particular requirement get in touch with our specialists at contact@alpao.fr. We will surely be able to bring our expertise in that field to fit with the needed performances. We could for example use almost any camera to build a wavefront sensor that fits your requirements. .

WFS HOUSING



SH-CMOS



SH-CMOS-fast



SH-EMCCD-fast-69/97



SH-InGaAs-69/97

ORDER TODAY



Need more information?

Contact us for one-to-one guidance and technical support.

- ▶ www.alpao.com
- ▶ contact@alpao.fr
- ▶ +33 476 890 965