Global Adaptive Optics Systems

Observatory Locations

Are you an Andor customer using one of our products for your Adaptive Optics project? If so, please get in touch* - we would love to hear more about your research.

CHARA Array

The Center for High Angular Resolution Astronomy (CHARA) Array,[1,2] based at the Mt Wilson Observatory, is comprised of six 1 m telescopes, arranged in a Y shape. It is an optical interferometer reaching sub-milliarcsecond angular resolution in the visible.

Adaptive Optics[3] systems were installed on all telescopes to improve the instruments performance and data quality.

iXon Ultra 897 EMCCD (as WFS)

RAVEN MOAO

The RAVEN[4,5] instrument, developed by the University of Victoria AO Lab, was the first Multi-Object Adaptive Optics (MOAO) technical and science demonstrator on an 8 m class telescope, feeding the Infrared Camera and Spectrograph (IRCS). It was tested successfully from 2014-2016 on the Subaru telescope and allowed for the following AO modes: MOAO, closed-loop Single-Conjugated AO (SCAO) and open-loop Ground-Layer AO (GLAO).

iXon 860 EMCCD (as open-loop and closed-loop WFS)

LBTO

The Large Binocular Telescope Observatory (LBTO) is based at the Mt Graham International Observatory in Arizona. It hosts, amongst other instruments, the "System for coronagraphy with High-order Adaptive optics from R to K bands (SHARK)", consisting of two complementary instruments in the VIS[5] and NIR. It will allow for AO-assisted high resolution and high contrast observations.

Zyla 4.2+ sCMOS (as guide camera)

VAMPIRES

The Subaru Coronagraphic Extreme AO System (SCExAO)[6] is comprised of different modules, such as the Visible Aperture Masking Polarimetric Imager for Resolved Protoplanetary Structures (VAMPIRES)[7] and lucky imaging, which are both utilizing Andor cameras.

iXon3 897 (lucky imaging), iXon Ultra 897 (science camera)

Robo AO

ROBO-AO[8,9] is an autonomous laser adaptive optics (AO) system, which observed with the 60-inch telescope at Palomar Observatory (Caltech) and the 2.1 m telescope at Kitt Peak National Observatory in Arizona.

The fully robotic system performed, amongst others, large scale surveys and long term monitoring of astrophysical dynamics. At the moment, ROBO-AO is undergoing commissioning at the 2.2 m telescope of the University of Hawaii and will be upgraded to ROBO-AO-2, launching in 2020.

iXon 888 EMCCD (Robo-AO optical imager)

CANARY / WHT

The CANARY[10] project, a multi-object adaptive optics (MOAO) science demonstrator like RAVEN, received its first light in 2010 at the 4.2 m William Herschel Telescope (WHT) on the Canary Islands in Spain. The results and analysis of CANARY will be used to directly explore ideal next generation ELT scale AO instrumentation.

iXon 860 EMCCDs (as WFS)

AO at AAT

The Anglo-Australian Telescope (AAT) was testing the use of an adaptive optics system[11] for its 3.9 m telescope at Siding Spring Observatory. The aim of using AO at the AAT was to improve the image quality (i.e., resolution), to detect faint objects and to enhance AAT productivity.

Zyla sCMOS

NAOMI / VLTI

New Adaptive Optics Modules for Interferometry (NAOMI)[12, 13] are implemented on each of ESO's 1.8 m Auxiliary Telescopes (ATs), forming part of the Very Large Telescope Interferometer (VLTI) based at Paranal Observatory. NAOMI provides a basic adaptive optics system, enabling the ATs to be less sensitive to atmospheric conditions.

iXon Ultra 897 EMCCDs (AO cameras)

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References and Further Reading:

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2. ten Brummelaar T. A. et al. "An update on the CHARA array," Society of PhotoOptical Instrumentation Engineers (SPIE) Conference Series 7013 (2008)
3. Xiao Che, et al. "The CHARA array adaptive optics I: common-path optical and mechanical design, and preliminary on-sky results" (2014).
4. Lardière Olivier, et al. "Multi-Object Adaptive Optics On-Sky Results with RAVEN" (2014)
5. Mattiolo, M, et al., "SHARK-VIS the LBT high contrast imager at visible wavelengths", (2018).
6. Jovanovic, N. et al., "The Subaru Coronagraphic Extreme Adaptive Optics System: Enabling High-Contrast Imaging on Solar-System Scales", (2015).
7. Norris, B.R.M. et al., "VAMPIRES: probing the innermost regions of protoplanetary systems with polarimetric aperture-masking", (2014).
8 http://www.ifa.hawaii.edu/Robo-AO/
9 Jensen-Clem, R., et al., "The Performance of the Robo-AO Laser Guide Star Adaptive Optics System at the Kitt Peak 2.1 m Telescope.", (2017).
10. Gendron, E. et al., "MOAO first on-sky demonstration with CANARY", (2011).
11. Goodwin, M., et al., "Adaptive optics on-sky demonstrator for the Anglo-Australian Telescope" (2016).
12. https://www.hq.eso.org/public/teles-instr/paranal-observatory/vlt/vlt-instr/naomi/
13 Gonté, F., et al., "NAOMI: the adaptive optics for the auxiliary telescopes of VLTI", (2018).

This graphic provides an non exhaustive overview of different adaptive optics projects utilizing Andor products.
For more information check out our Article: Introduction to Adaptive Optics, in the Andor Learning Center.

*Please contact Ines Juvan-Beaulieu at i.juvan-beaulieu@andor.com