Robo-AO KP
A New Era in Robotic Adaptive Optics

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AAS 227th Meeting, Kissimmee, FL
January 8th, 2016
Robo-AO Operations at Palomar

- First and only robotic AO system
- Three years of robotic scientific operations on Palomar 60”
- Most efficient AO system in the world
  - About 21 observations per hour
    - Record of 247 observations in one night
  - 18,000+ total robotic observations in ~150 nights
  - ~80 second average overhead time between science observations
    - ~20 seconds to set up AO system, plus automated LGS acquisition
  - Automatic data reduction pipeline

- 19 total science publications (+4 in submission)
  - 12 publications in 2015
  - More on the way...
• NSF directed NOAO to find other operators for KPNO 2.1m
• Caltech submitted proposal to move Robo-AO to 2.1m
• Proposal accepted!
  • Installation complete, commissioning almost complete, some early science underway
• **Robo-AO KP Team**
  - Collaboration between Caltech, U. Hawaii, UNC Chapel Hill, IUCAA
  - PI: Prof. Shri Kulkarni
  - Project Scientist: Dr. Reed Riddle
  - **Robo-AO** PI: Prof. Christoph Baranec
  - UNC Chapel Hill: Prof. Nick Law
  - Data Scientist: Dr. Dmitry Duev
  - IUCAA Lead: A. N. Ramaprakash
  - Graduate students: Rebecca Jensen-Clem, Maïssa Salama
  - Telescope operators: Amy Ray, Mark Trueblood (hiring a third)

• **1/6th of observing time granted to US community**
Robo-AO on the KPNO 2.1m

Laser guide star

Electronics & Robotic Software

Adaptive Optics System + Vis/NIR Science Instruments
Robo-AO on the KPNO 2.1m

Electronics & Robotic Software

Laser
Robo-AO on the KPNO 2.1m
Robo-AO on the KPNO 2.1m Laser guide star Adaptive Optics System + Vis/NIR Science Instruments
Robo-AO on the KPNO 2.1m

Laser guide star

Adaptive Optics System + Vis/NIR Science Instruments
Initial Kitt Peak Operations

- Installed Robo-AO in November
  - ~5 month development time
  - ~1 week to integrate hardware on telescope
  - ~2 weeks for on-sky alignment, calibration, testing, etc.
  - Operational checkout of observing system
  - 3 year science program (with possible extension)

- Not initially robotic
  - Telescope control system old, requires holding button to close dome
  - Will operate in manual-ish mode

- Telescope automation being investigated
  - Summer 2016 implementation

Complete!
Initial Kitt Peak Operations
Initial Kitt Peak Operations
Initial Kitt Peak Operations
Thank you!

http://robo-ao.org
See videos on Youtube
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