



SSC Report

January 27, 2006

Prepared by:

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on behalf of the Keck AOWG

*Antonin Bouchez, Rich Dekany, David Koo, Richard Ellis,
Bruce Macintosh, Franck Marchis, Keith Matthews*

Keck AOWG

Overview

- Science Update
- Projects Status & Milestones
- Next Generation (NG) AO
 - AOWG science case
 - Proposal

1. Science Update

1/27/06

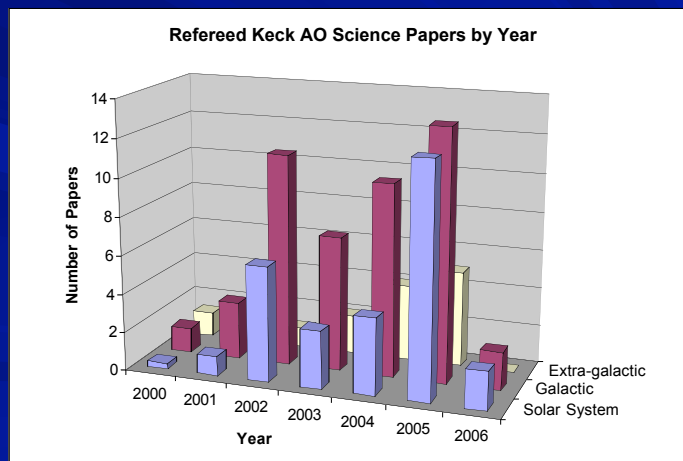
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Keck AOWG : Science Update

Refereed Papers

- 90 papers to date
- 30 in 2005, including 8 LGS & 5 KI
- 06A science:
 - 44 LGS nights
 - 14.5 NGS
 - 5 (x2) KI



1/27/06

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AAS LGS Session: Washington, DC

**“Seeing the Universe in a New (Sodium) Light:
Early Science Results from Laser Guide Star Adaptive Optics”**

■ Jan 10, 2006: 9 talks + 14 posters + press conference

■ **Planetary science (N=2)**

- Bouchez: Moons around KBOs
- Marchis: Binary asteroids

■ **Galactic (N=9)**

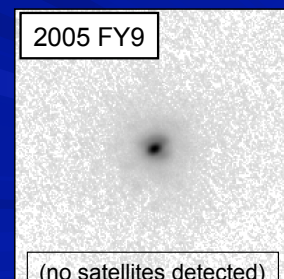
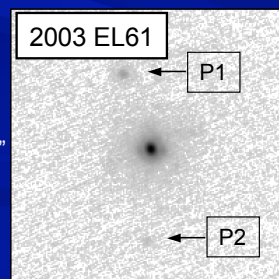
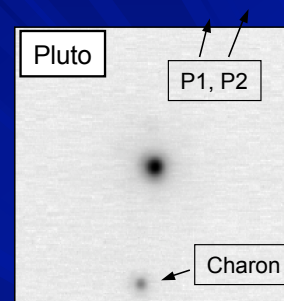
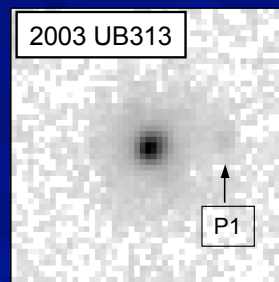
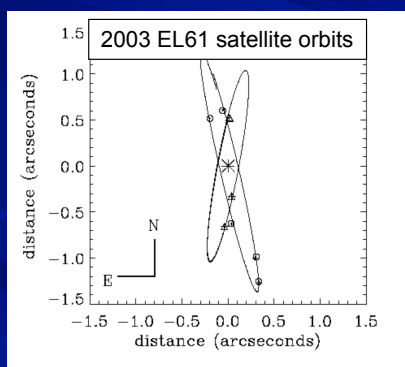
- Liu, Gelino: Binary brown dwarfs
- Lyke: Eruptive novae
- Lu, Hornstein: Galactic Center
- Sahai: Proto-Pne
- Perrin: Pre-MS stars (Lick LGS)
- Graham, Cameron: Compact objects

■ **Extragalactic (N=10)**

- Gal-Yam: SN progenitors
- Cohen, Gregg: M31 globulars
- Melbourne: High-z field galaxies
- Stockton: ERO morphology
- Wright: High-z radio galaxies
- Gates: Quasar hosts (Lick LGS)
- Erb: Lyman-break galaxies
- Menendez: SCUBA galaxies
- Sheedy: Super star clusters

AAS LGS Session: Washington, DC

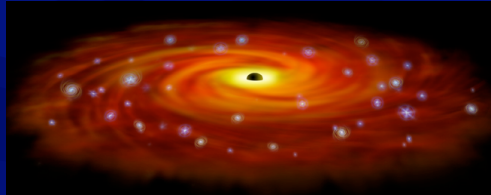
■ **Satellites of the
largest KBOs
(Bouchez, Brown et al
+ Team Keck)**



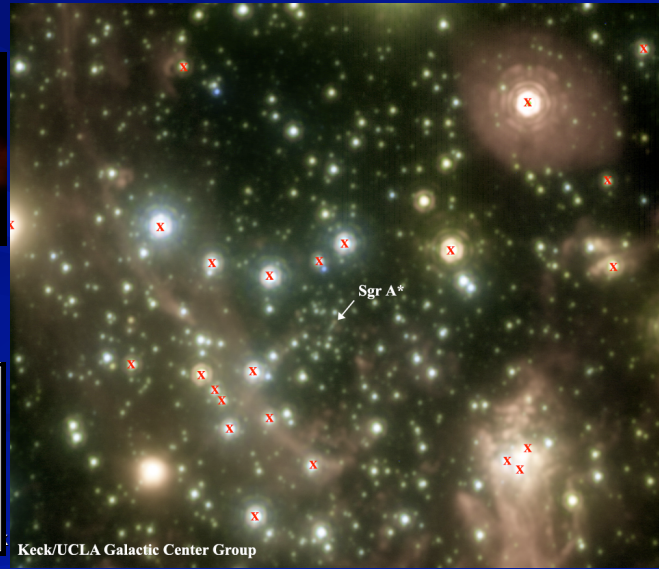
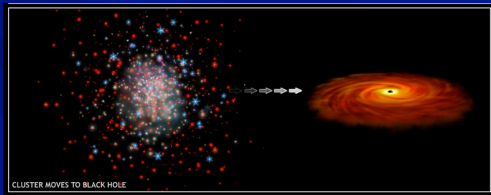
AAS LGS Session: Washington, DC

■ Stellar orbits around Galactic Center (*Lu, Ghez et al*)

"The Paradox of Youth"

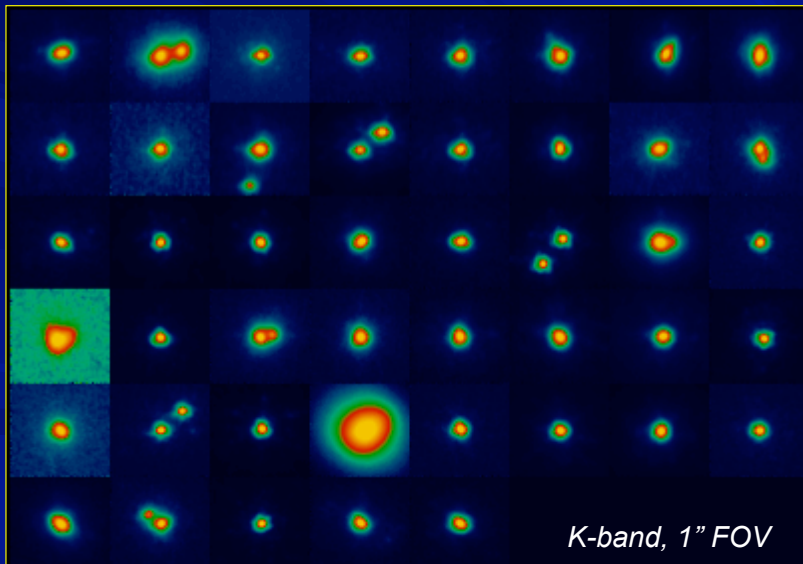


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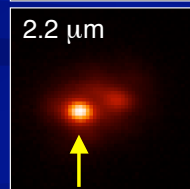
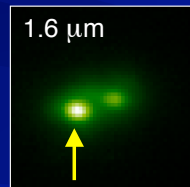
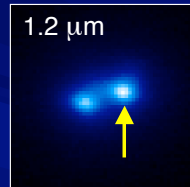
AAS LGS Session: Washington, DC

■ Survey for Nearby Binary Brown (L+T) Dwarfs (*Liu, SDSS, 2MASS et al*)

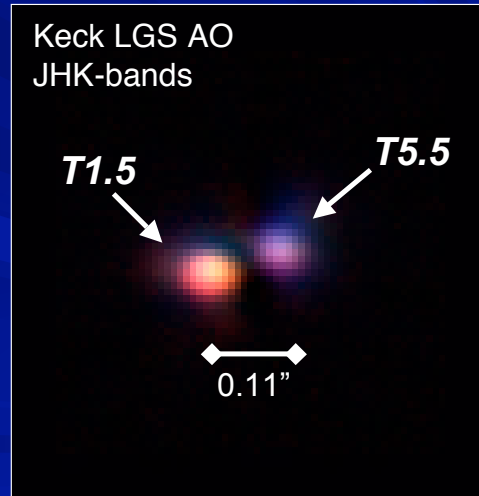


AAS LGS session: Washington, DC

■ A New Kind of Binary Brown Dwarf (*Liu et al*)



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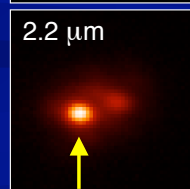
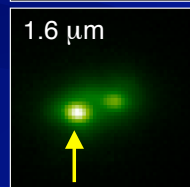
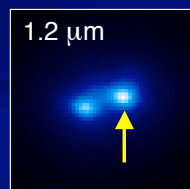


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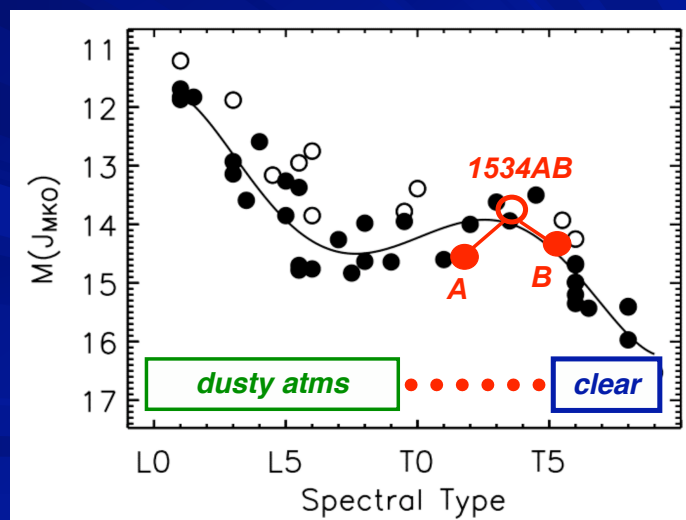
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AAS LGS session: Washington, DC

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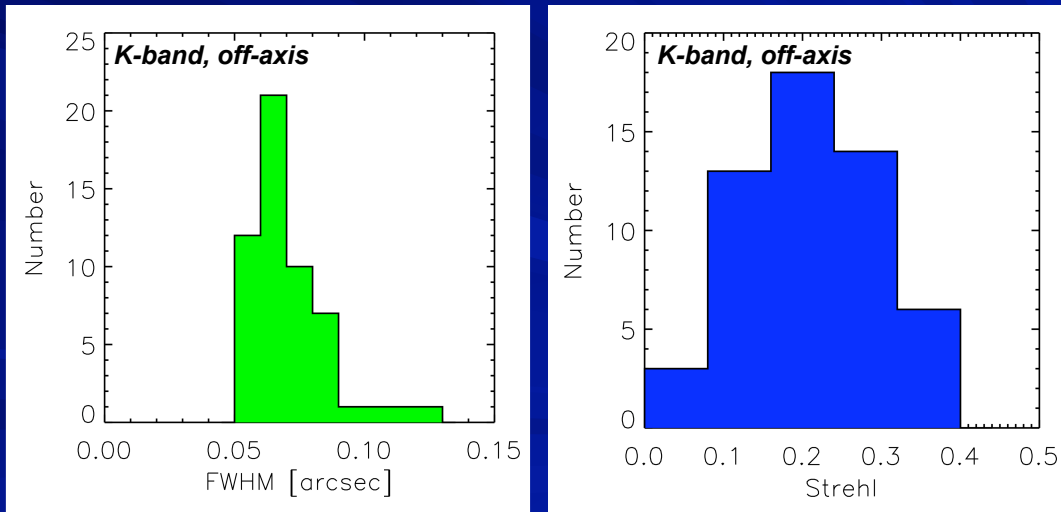


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AAS LGS Session: Washington, DC

■ Survey for Nearby Binary Brown (L+T) Dwarfs (Liu, SDSS, 2MASS et al)



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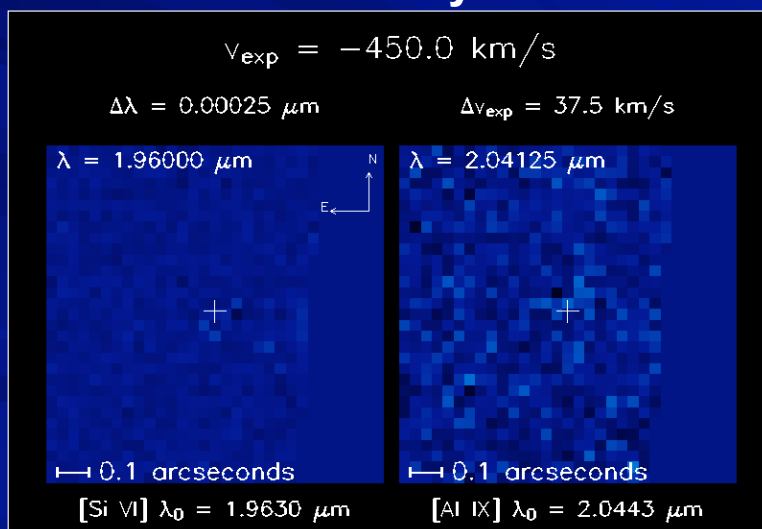
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AAS LGS session: Washington, DC

■ OSIRIS imaging of a nova shell (Lyke, Campbell et al)

Radial velocity slices



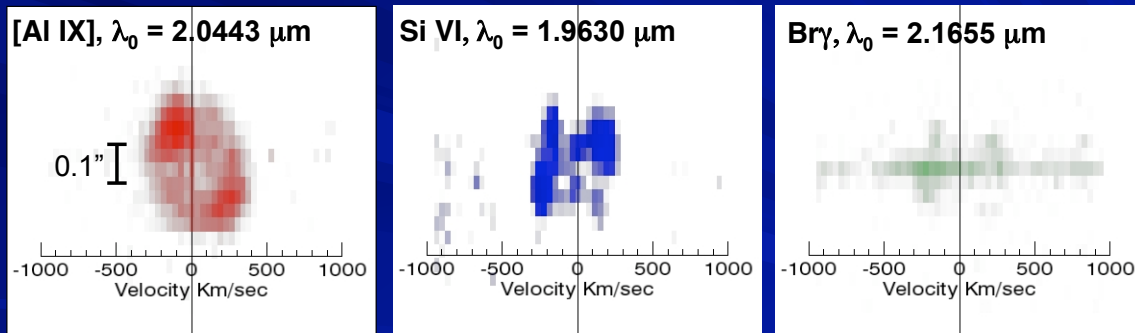
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AAS LGS session: Washington, DC

■ OSIRIS imaging of a nova shell (*Lyke, Campbell et al*)

Position-Velocity diagrams

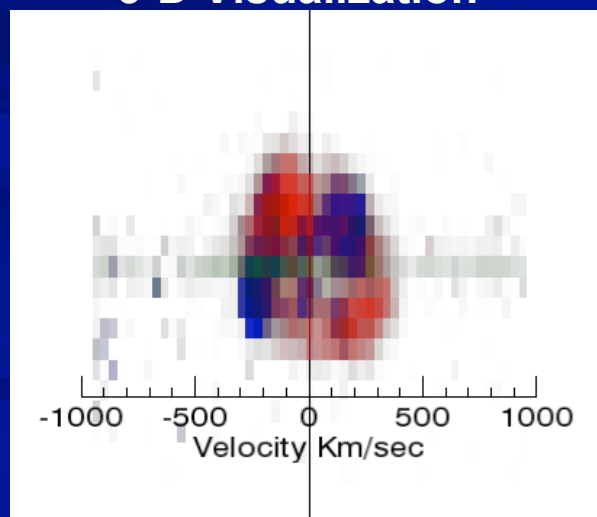


AAS LGS session: Washington, DC

■ OSIRIS imaging of a nova shell (*Lyke, Campbell et al*)

3-D Visualization

Red: [Al IX]
Blue: [Si VI]
Green: Br γ



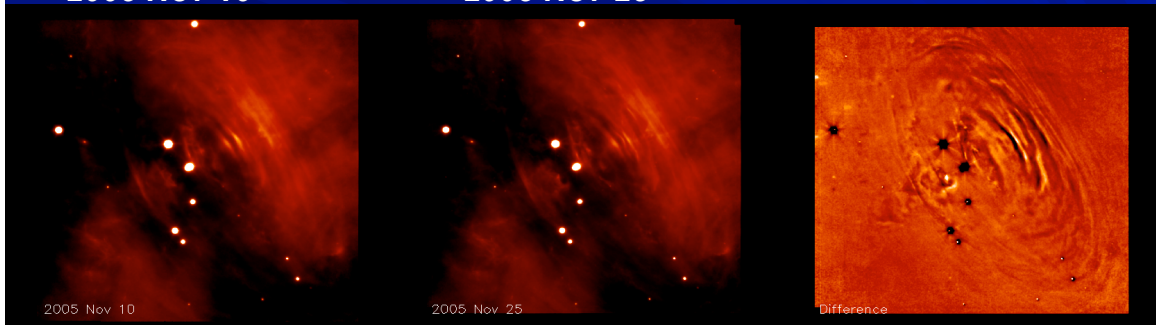
AAS LGS Session: Washington, DC

■ Time variability of the Crab Nebula (Graham, Max et al)

2005 Nov 10

2005 Nov 25

Difference



2. Project Status

Project Status

■ **K2 LGS Development**

- Emphasis on laser maintenance, training & reliability
- Performance characterization effort complete
- AOWG input on priorities

■ **K2 LGS Operations Transition**

- Emphasis on simplifying operations & training.
- Operational model by 07A: 1 OA at HQ to operate LGS & 1 at summit to monitor laser & safety systems in addition to telescope

Year	05A	05B	06A	06B	07A	07B
#nights	14	30	44	50	~70?	~70?

- AOWG seeking input from users

■ **Wavefront controller upgrade (NGWFC)**

- Priorities reviewed by AOWG
- DDR successfully completed in Dec.

■ **K1 LGS**

- System design begun
- LMCT laser PDR in Feb.

LGS AO: Gemini, Subaru & VLT



■ **Gemini-N (2006A):** 12W laser & Altair

- Demo science to start in late 06A
- Center projection & QUEUE scheduled

■ **VLT (2006):** 10W dye laser + NACO

- Laser integration started in Nov/05
- Shared risk science in 2006

■ **Gemini-S (2007):** 50W laser & MCAO

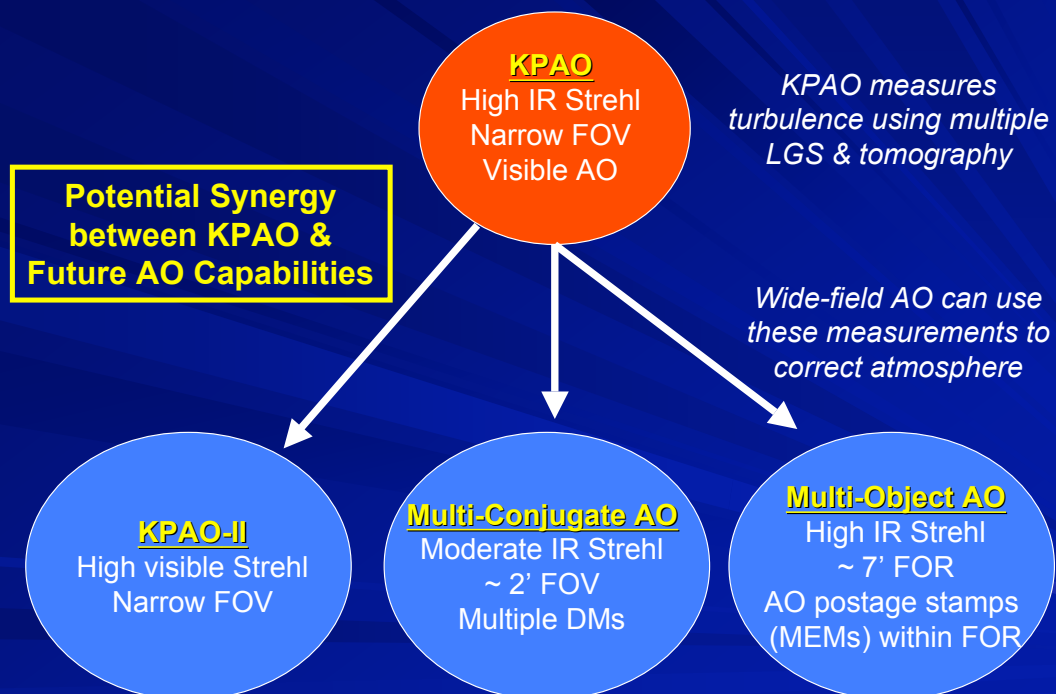
- MCAO I&T through 06.
- Laser delivery in Jan/07
- LGS 1st light in 07A, commissioning by end of 07B

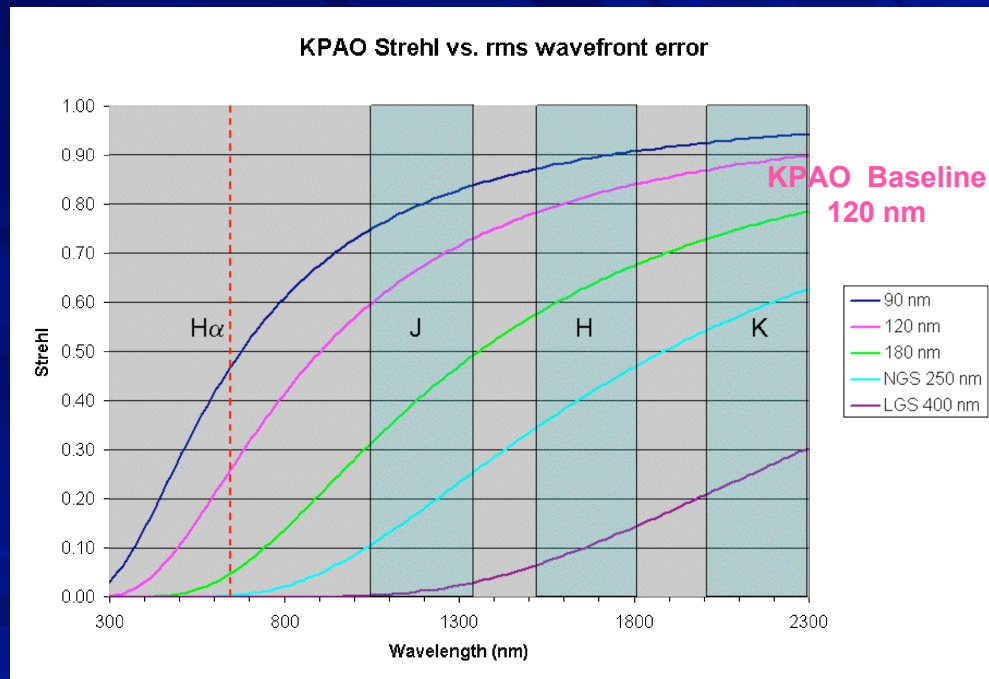
■ **Subaru (2007):** AO upgrade + LGS

- 188-element curvature system
- NGS: 1st light in Aug/06
- 4W sum frequency LGS: 1st light in Mar/07

3. Next-Generation AO

Keck AOWG : Next -Generation AO





Next Gen AO: Science Case

- Tasks, timeline & subcommittees defined.
 - <http://www2.keck.hawaii.edu/optics/ScienceCase/index.htm>
- **Timeline:**
 - **Dec:** Establish subcommittees. Done
 - **Jan-Feb:** Identify science cases to pursue & technical questions that need to be answered.
 - **Mar-Apr:** Understand & document science cases, including interactions with Technical team.
 - **May:** Unite science cases into single document.
 - **June:** Presentation & approval by SSC.
 - **July:** Prepare glossy science case for proposal.

Solar System Science Sub-Group

■ ***Marchis (chair), Adamkovics, Bouchez, Emery, Noll***

■ **Science topics** (notional)

- Binaries among asteroids & KBOs
- Variable atmospheric phenomenon (e.g. Io, Titan, Triton)

Galactic Science Sub-Group

■ ***Liu (chair), Ghez, Greene, Hillenbrand, Macintosh, Weinberg***

■ **Science topics** (notional):

- Imaging planets around VLM stars and BDs
- Resolved debris disks
- Galactic Center

Extragalactic Science Sub-Group

■ ***Max (chair), Dekany, Ellis, Koo, Larkin, Steidel, Treu***

■ **Science topics (notional):**

- Morphological evolution of high-z galaxies
- Internal dynamics and stellar pops of high-z galaxies
- Resolved stellar pops in the local universe
- Gravitational lensing

Technical & Science Instrument Sub-Group

■ ***Wizinowich (chair), Bouchez, Dekany, Flicker, Gavel, Le Mignant, Matthews, Neyman***

■ **Potential products in support of science teams**

- Simulated PSFs versus wavelength, sensitivity, contrast, astrometric precision, photometric precision, time variability, etc.
- Initial science instrument thoughts

NGAO – Proposal

- WMKO plans to produce a proposal to present at the June SSC meeting.
- Will incorporate AOWG science case, plus technical, management and budget sections.
- Proposal will emphasize a detailed plan to complete the SDR, as well as plans through project completion.
- Technical products maintained at <http://www2.keck.hawaii.edu/optics/kpao/kpao.php>

The End