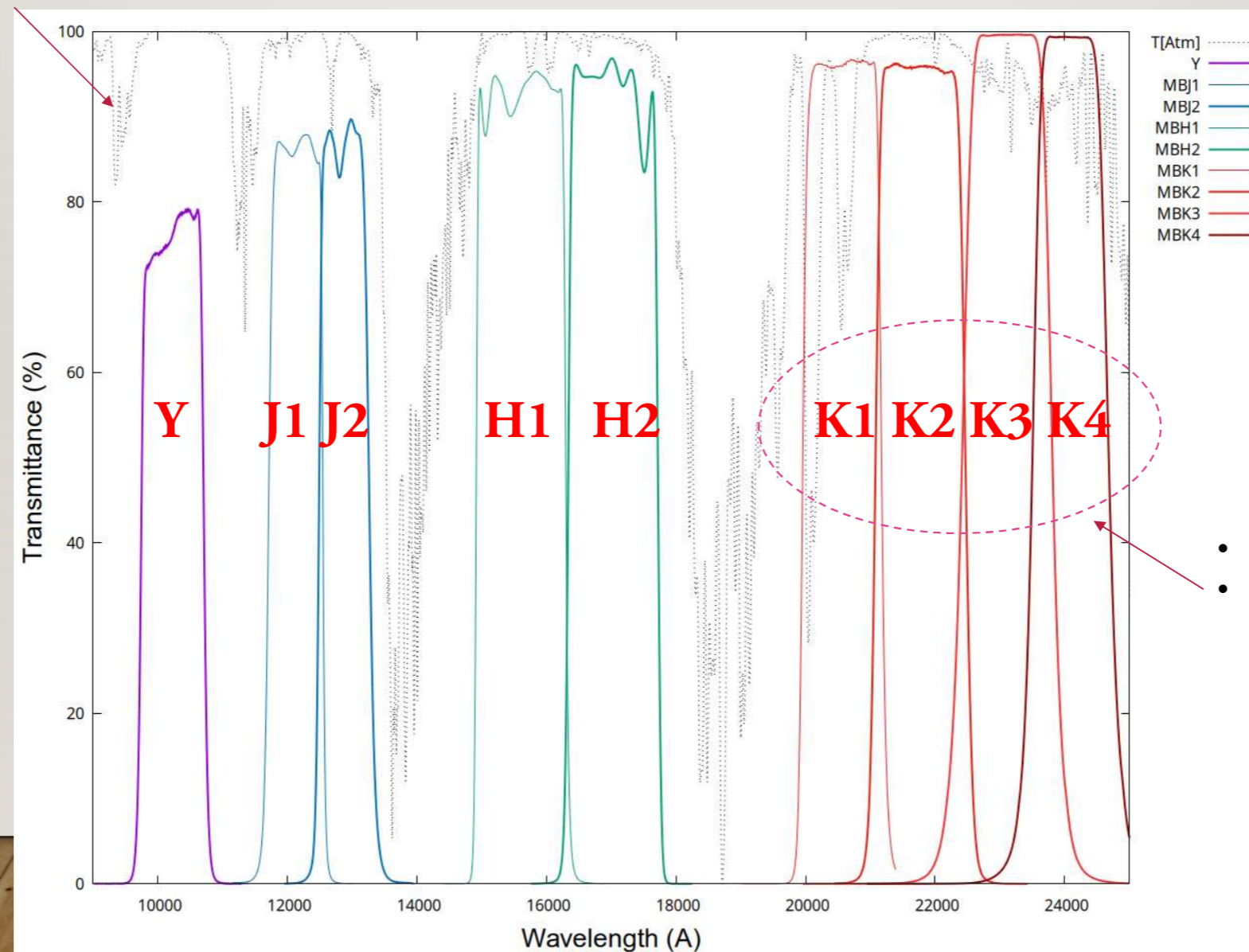


INTRODUCING THE SUITE OF NEAR- INFRARED MEDIUM-BAND FILTERS FOR MOIRCS

ICHI TANAKA, YUSEI KOYAMA, KENTARO MOTOHARA, & TADAYUKI KODAMA

INTRODUCING MOIRCS' MEDIUM-BAND FILTER SUITE

Maunakea's Atmospheric Transmission



- Four MB bands in K window is unique.
- K4 is the longest wavelength we can access from ground for faint galaxies.

Note: J1/H1/K1 filter will be available in S27A.

NEEDS FOR MORE FILTERS...

Challenges:

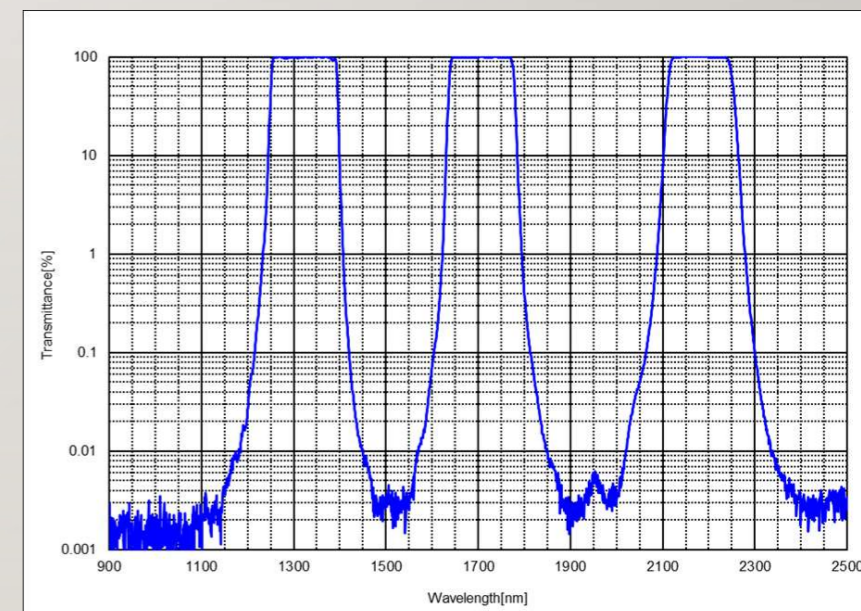
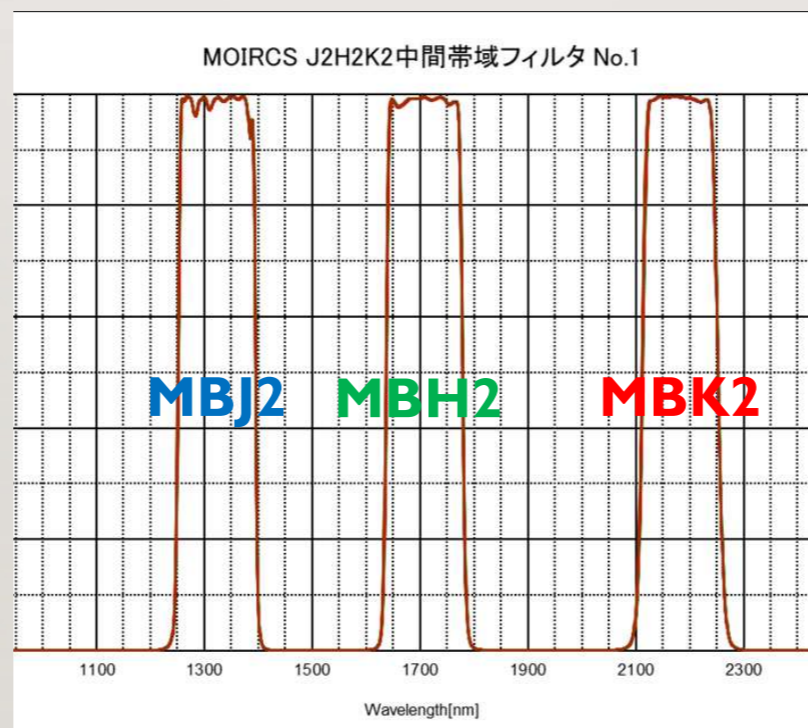
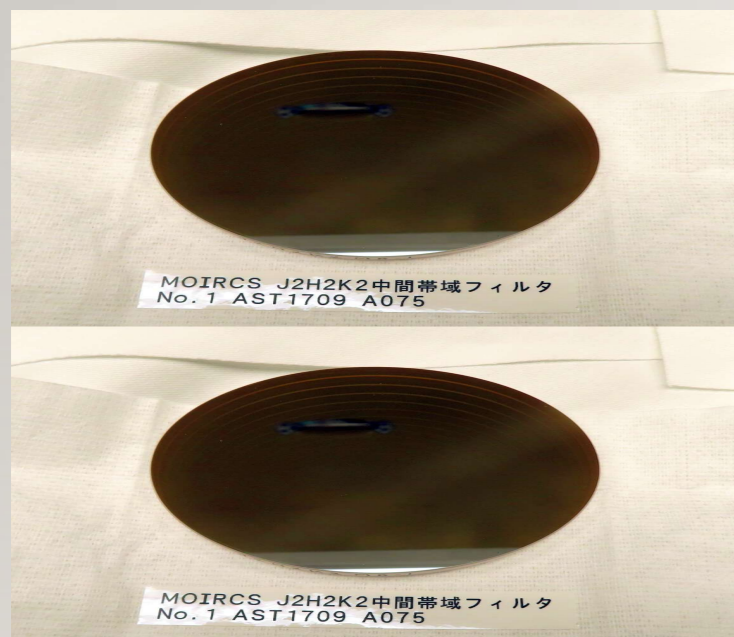
Near-infrared instruments house their filters in high-vacuum cooling dewars, meaning filters cannot be easily swapped, and the number of available filter ports is strictly limited.

Solution: Triple-band Filters

We introduced a revolutionary triple-band Medium-band (MB) filter, which integrates three distinct medium-band passbands (i.e., MBJ2, MBH2, and MBK2) into a single physical substrate. This is the world's first MB Triple-band filter.

The desired wavelength range is selected by combining this triple-band filter with standard J, H, and Ks broadband filters.

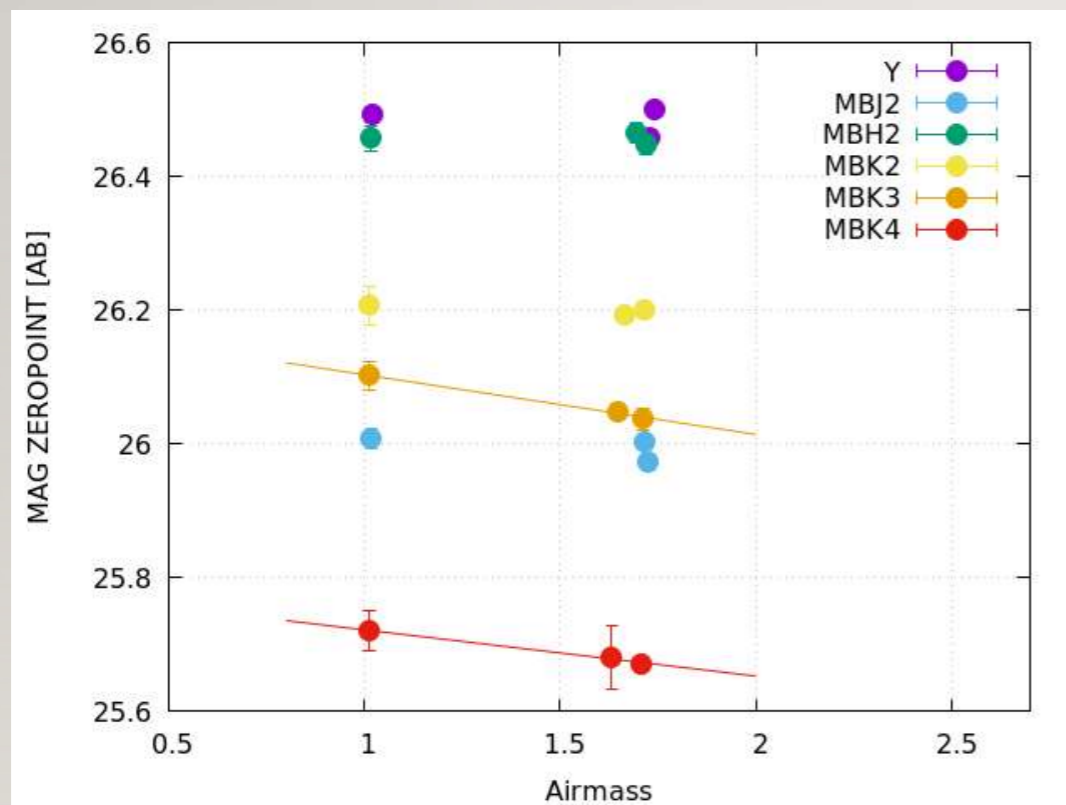
NOBLE J2H2K2 “TRIPLE MEDIUM-BAND FILTER” A FILTER WITH THREE BANDS!



Excellent Peak Transmittance!
We can select a band using a standard
JHKs broadband filter with it.

Out-of-band blocking is excellent.

PERFORMANCE EVALUATION & DETECTION LIMITS



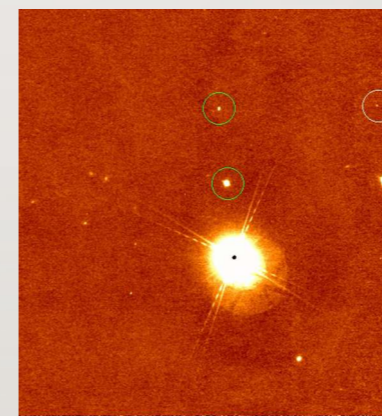
PERFORMANCE EVALUATION & DETECTION LIMITS

Filter	Limiting Mag (AB)	System Efficiency
Y	24.5	0.31
MBJ2	23.8	0.33
MBH2	23.6	0.36
MBK2	23.4	0.35
MBK3	23.5	0.35
MBK4	22.8	0.32

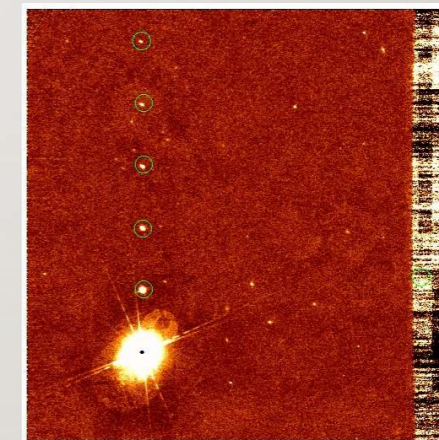
1 hr, 5 sigma limit within 1.5 arcsec aperture under 0.5" seeing.

CAUTIONS: GHOSTING AND ATMOSPHERIC TRANSMISSION

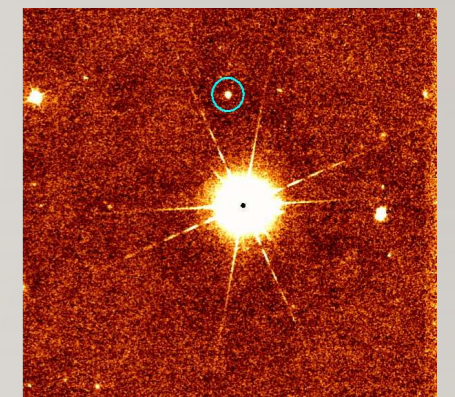
- **Ghosting:** Because the J2H2K2 triple-band filter is stacked with a broadband filter (J, H, or Ks) for band selection, reflections between the two filters cause visible ghosts.
- Please be cautious when bright stars are in the field of view.
- Intensity: roughly 10^{-3} to 10^{-4} , fixed to stars.



MBJ2



MBH2



MBK2



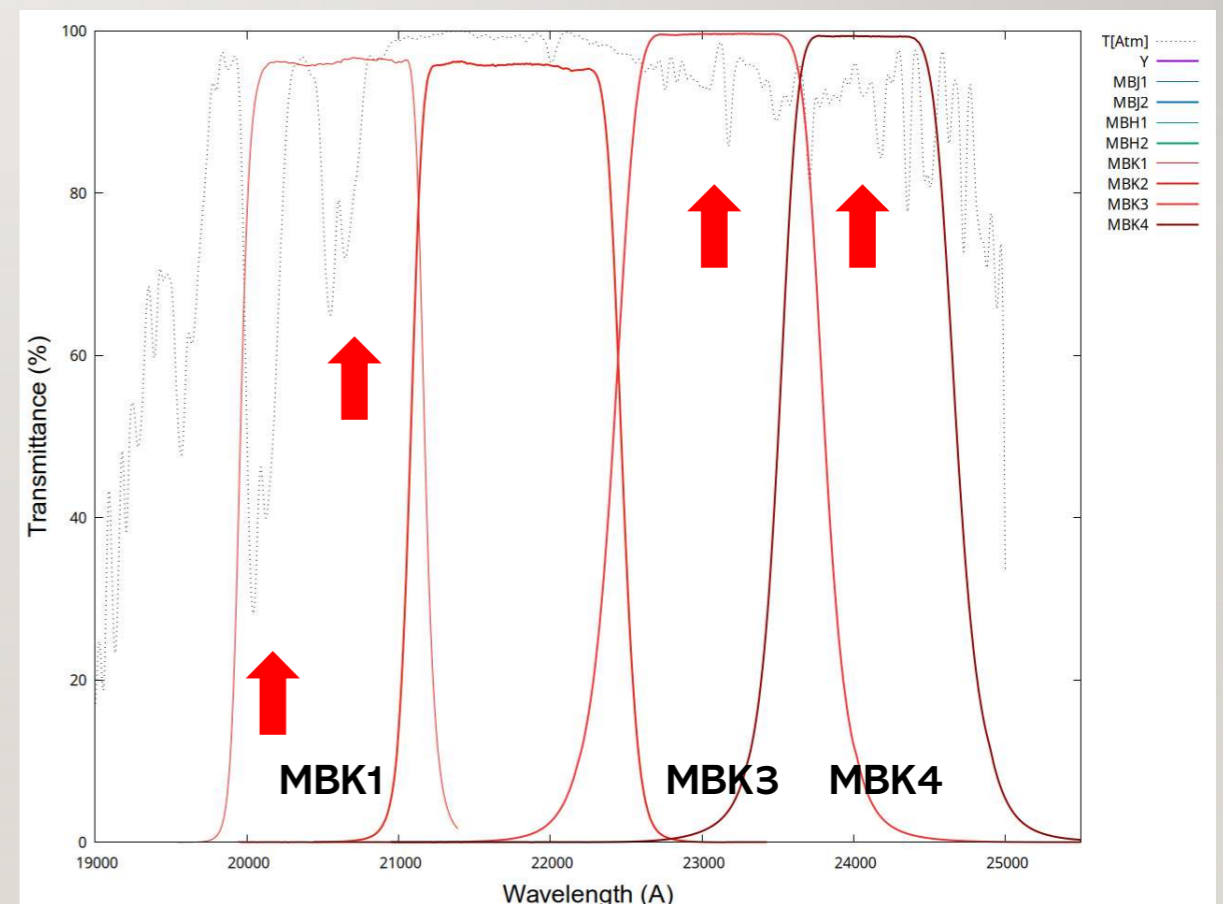
CAUTIONS: GHOSTING AND ATMOSPHERIC TRANSMISSION

- **Atmospheric Absorption:**

The MBK1 filter contains a region with high atmospheric absorption within its band.

MBK3 and MBK4 are also subject to some absorption, causing the airmass-dependence of the zero-points.

Performance on these filters will be influenced by atmospheric transmission.



SUMMARY & ACCESS

- The MOIRCS MB Filter Suite covers the 1-2.5 μ m range with 9 medium-band filters.
- The triple-band filter technology is unique and highly expandable for future instruments.
- The suite is scheduled to be available from the next semester (some will be treated as user filters).

Note: If using the triple-band filters for shared use, permission from the Filter PI is required. For details, please check the MOIRCS Website or contact Ichi Tanaka (MOIRCS Primary SA).

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