Progress report on a J/H/(Ks) band aperture photometer

Light Bucket Astronomy 2010

Project goals - NIR photometer

- Scientifically useful NIR-AP on sub 1m semi-portable telescopes.
- Minimal facilities support (no LN2)
- H and J band minimum Ks/K' preferred (K'/s only OK)
- 2 mag improvement over commercially available system(s)

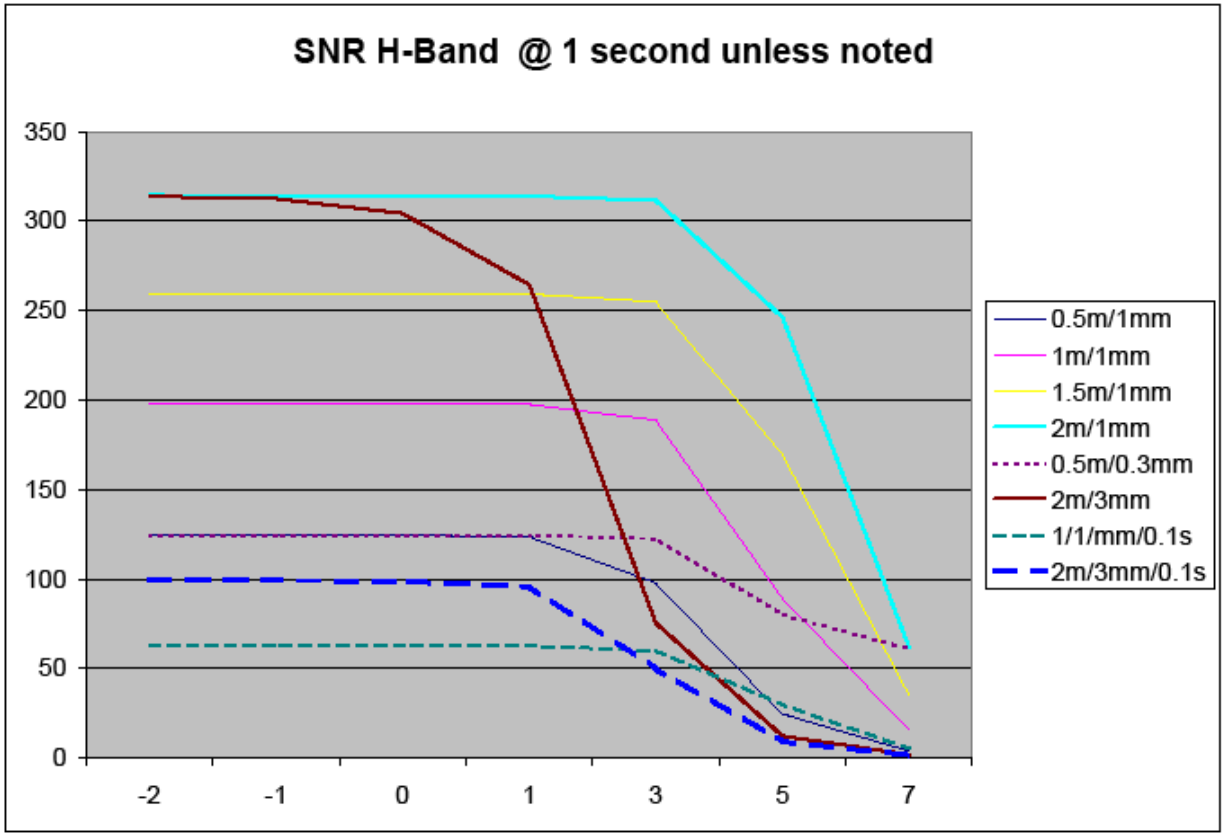
Note: most applications to date are highly constrained by budget… ie. CHEAP

Project Plan- sort form

- Lit search √
- Analysis of commercial system √
- Model proposed design (Dave Rowe's model) √
- Design H/J prototype √
- Test TIA options √
- Build H/J prototype ◄ 2/1/2011
- Test H/J prototype
- Update design for Ks (redesign)
- Build and test Ks

TIA test fixture

Diode & telescope size/ integration



Mistakes likely

Performance Expectations

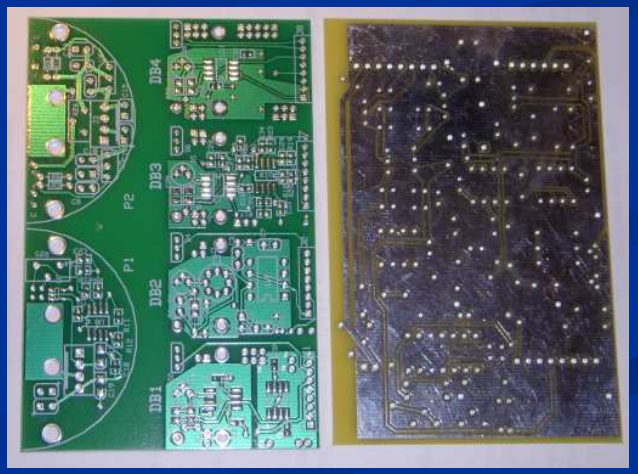
	1m telescope w/ 1mm diode	0.5m telescope w/ 0.3 mm diode
J band, detector at 210k	Mag 11.5	Mag 10.9
H band, detector at 210k	Mag 10.45	Mag 9.85
K band, detector at 185k *	Mag 9.85	Mag 8.8

From Dave Rowe's Model…

1 sec integrations, AD-549, 5 Gohm R(f), SNR = 2, Hamamatsu detectors
* Using existing TIA

H/J Prototype

- VCO based
- Sensor 0.5mm InGaAs
- Cooled Detector & TIA
- Cooling -65c or better
- Off the shelf μComputer w/ USB interface
- Working up a software spec like INDI or ASCOM for instruments plus SSP comp.



Board set

H/J prototype

- Initial testing on the bench w/ black body
- Hope to try in Portland (w/ Dan Gray's help)
- Should be close to done for AAS in Seattle

K'/s Photometer

- Complete re-design; current thinking:
  - Cooled filter(s)
  - ADC vs. VCO to support occultation work
  - Extend TEC cooling to 4 stage (~185k)
  - Ethernet a possibility/probability
- Needed
  - FILTERS (MKO?) – 6mm dia are OK . Gating issue!
  - Applications needed
  - Guidance or questions welcome