Design, testing and preliminary results of the Antarctic infrared binocular telescope (AIRBT)

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Design

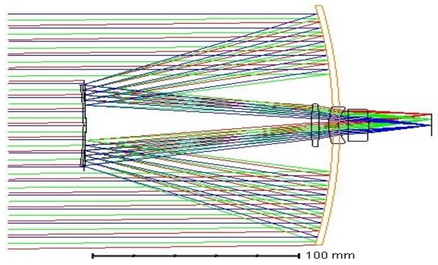

Figure 1: Optical path.

Telescope	
Diameter	15cm×2
f/	3
Band	J,H',(W)

Camera	
Size	640×512@15μm
Band	0.9∼1.7μm
QE	$\geq$ 70%
Dark	613e$^-$/s/p@-55°C
Full well	100ke$^-$
Rdnoise	134e$^-$(Nom.50e$^-$)
Nonlinear	$\leq$ 0.2%

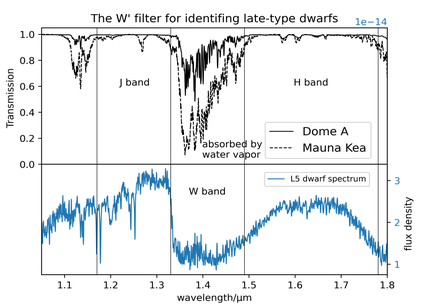

Figure 2: W band filter design (Sims et al. 2012; MaunaKea.com).

Testing

Laboratory testing

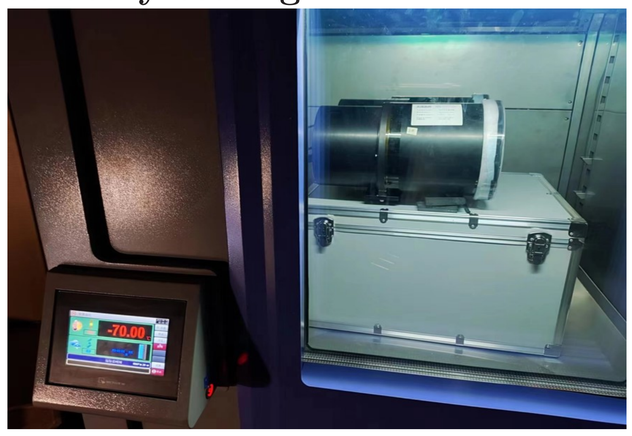

Figure 3: We tested the cold start and hot ru--nning of the equipment in a cryogenic chamber.

Observation testing

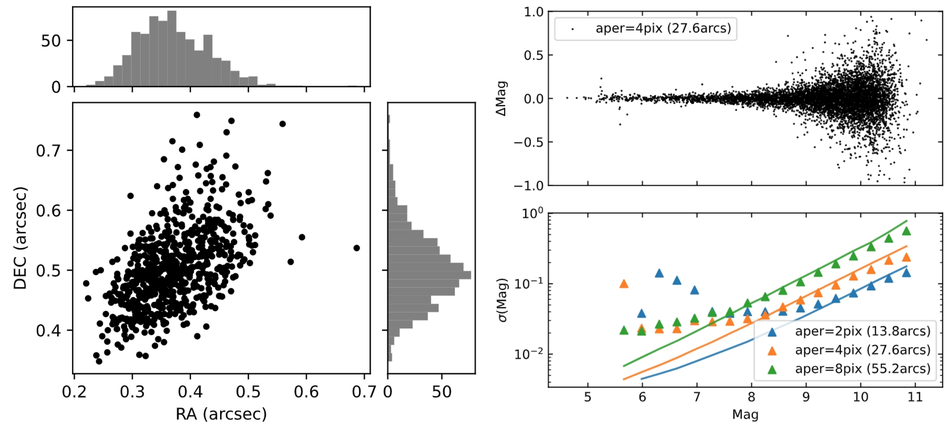

Figure 4: We observation in Zhuhai City using 3s middle mode. Astrom--etry by Scamp (left), and photometry by Sextractor (right). Photometry accuracy is 21mmag.

Preliminary results

The AIRBT aimed at monitoring the infrared site condition and conducting research in time-domain astronomy, such as transient like GRB and variable stars. The AIRBT project will provide references and accumulate technical experience for the deployment of larger-aperture near-infrared telescopes in Antarctica. More observations and data processing are underway. Welcome cooperation!

Figure 5: Installed in 8m tower in DomeA by China 39th, 40th Antarctic Expedition team.

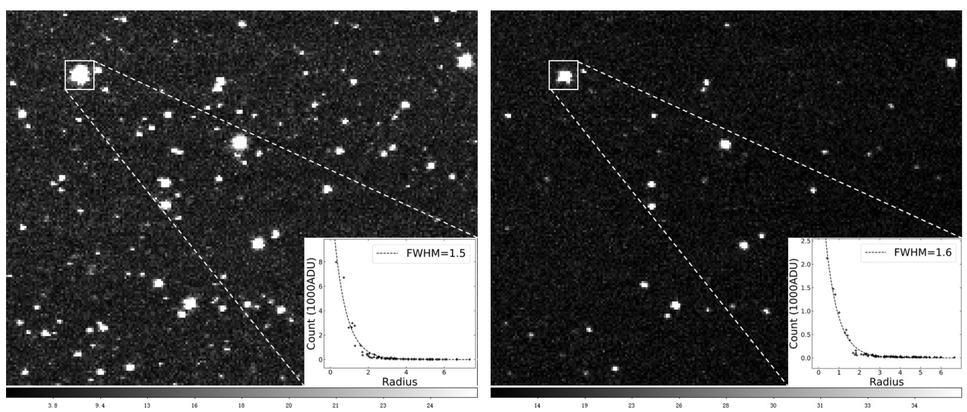

Figure 6: 1/16 of 1°×1°.2 FOV stack 2s×30 frames. Limiting magnitude 12.5 in J band (left) and 10 in H band (right).