KMTNet Supernova Project : The Introduction

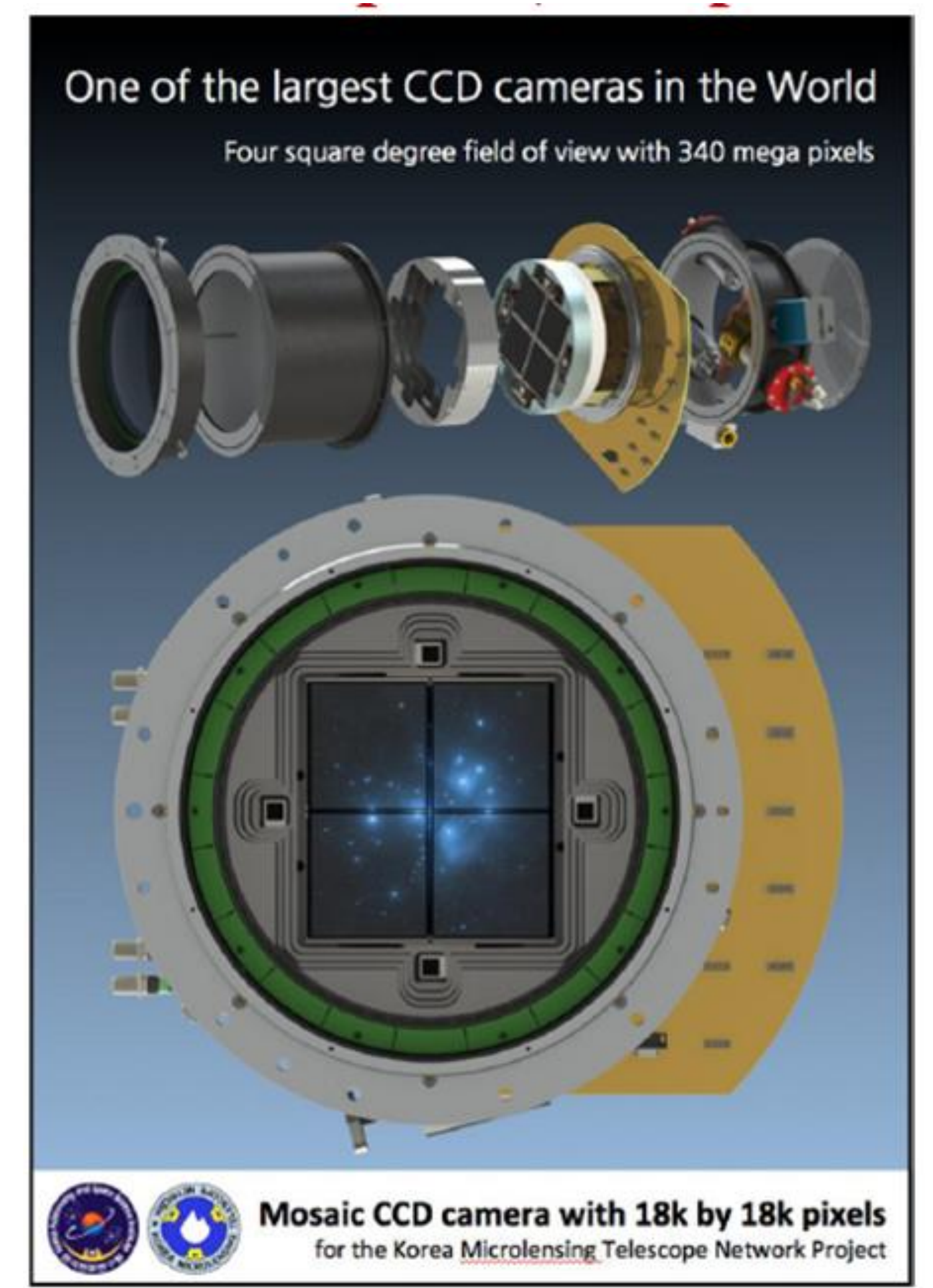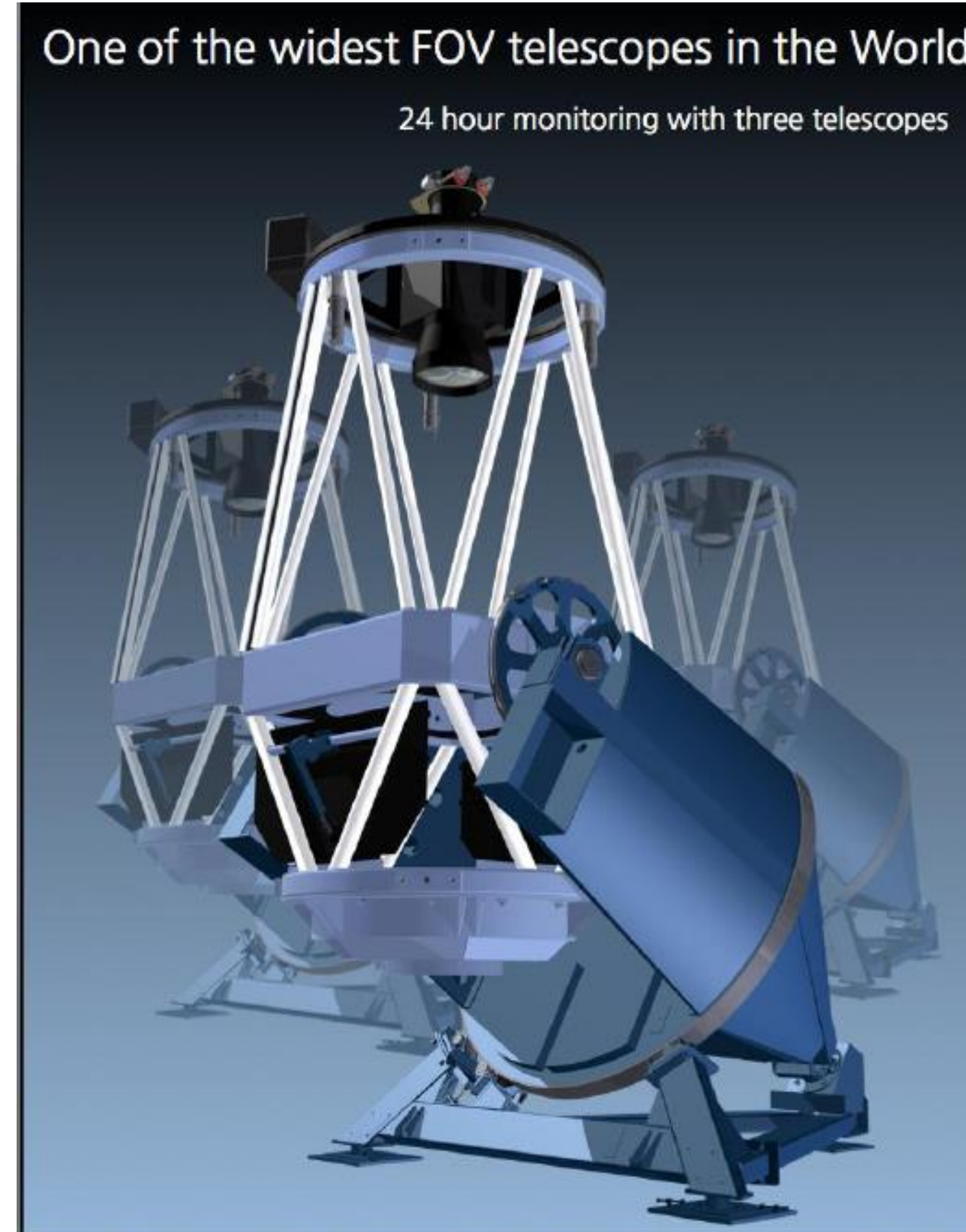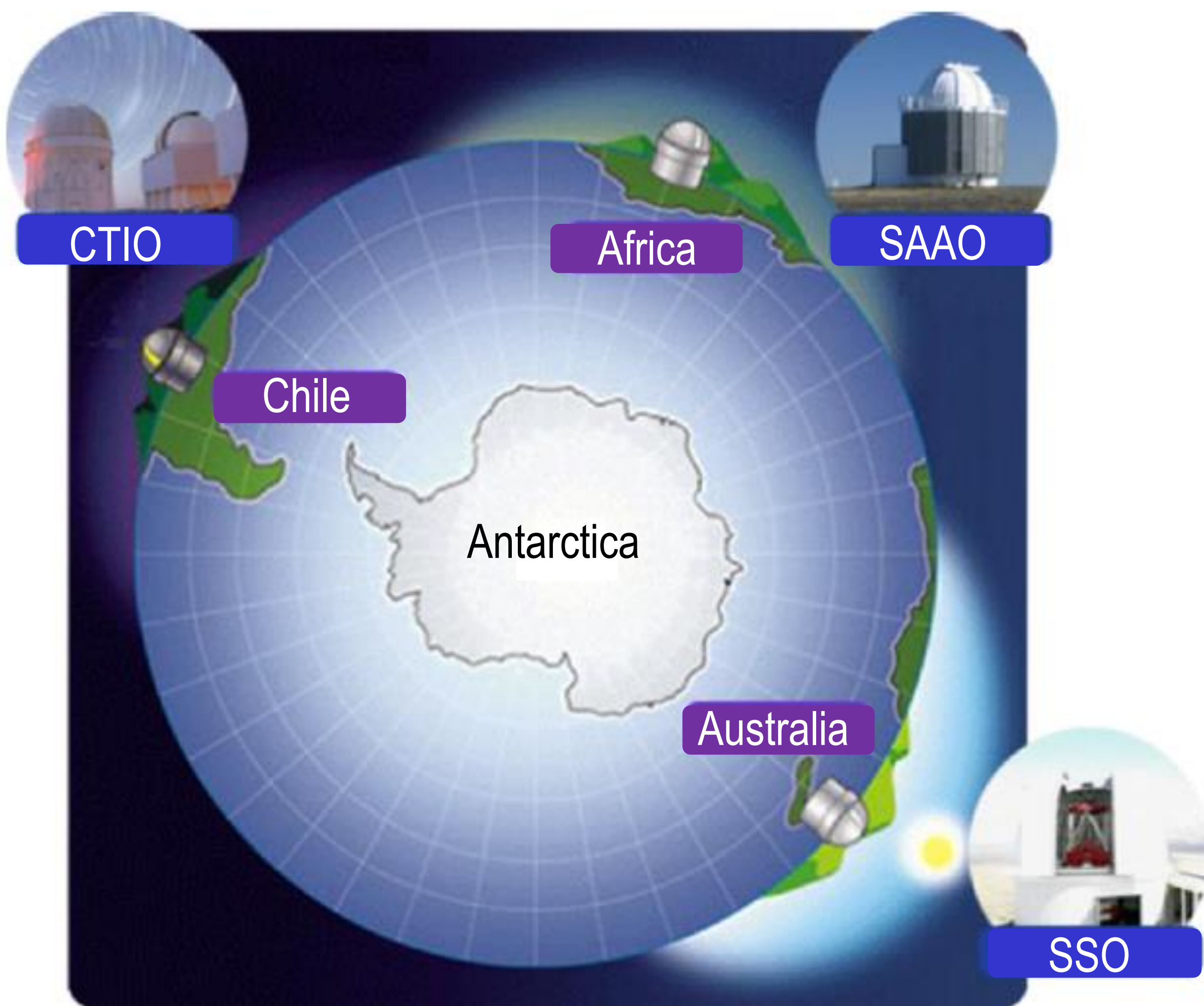※ KMTNet : Korea Microlensing Telescope Network

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Facility

One of the widest FOV telescopes in the World
24 hour monitoring with three telescopes

One of the largest CCD cameras in the World
Four square degree field of view with 340 mega pixels
Mosaic CCD camera with 18k by 18k pixels for the Korea Microlensing Telescope Network Project

- KMTNet : Korea Microlensing Telescope Network
- 24-hour coverage, continuous monitoring facility equipped with wide-field (FOV = 2°×2°) imaging facility (pixel scale = 0.40")
- Three new big enough (1.6m diameter) telescopes for survey purpose
- Three southern hemisphere sites : CTIO (Chile), SAAO (South Africa), SSO (Australia) → similar latitudes of -30 deg
- Mosaic e2v CCD camera of 18K×18K pixels, Readout time ~71 sec (32 channels)
- Filters : BVRI (3 sites), griz Hα (CTIO)
- Founded and operated by Korea Astronomy and Space Science Institute (KASI)
- Images are being transferred to the KMTNet data center in KASI
- Three telescopes and two CCDS are completed, and final CCD will be completed soon
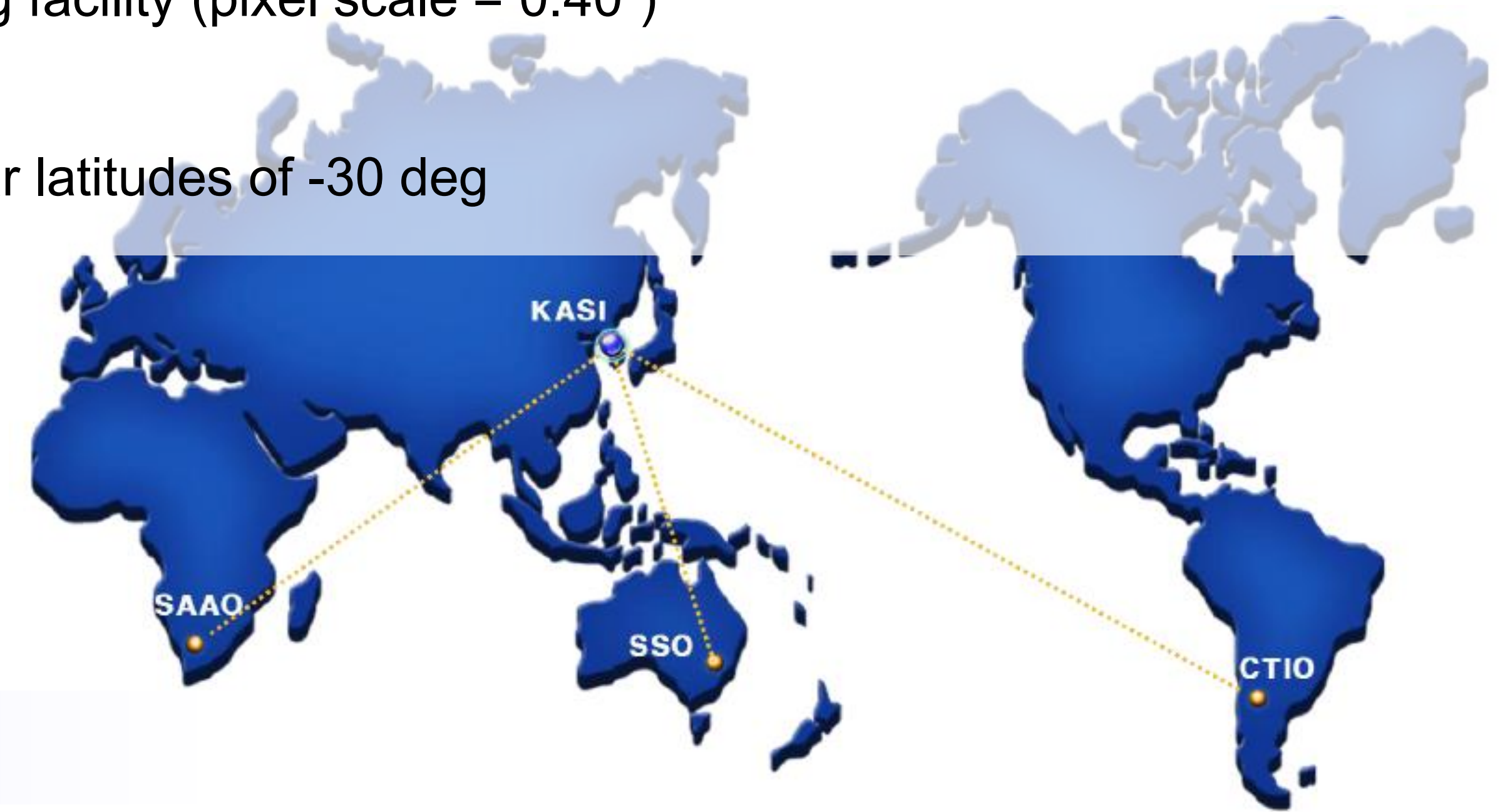
Telescope Time

- 17% time of all three KMTNet telescopes are secured till 2018
- Mainly anti-bulge season
- KMTNet primary science (50% time) is for bulge observation using gravitational microlensing technique

Observational Modes

(1) Discovery mode
- 60 sec for B, (V), I-bands → ~7 min / field
- At 1.2" seeing, S/N=10 for B~20.6 mag
- 3-5 day interval → will focus on infant and young SNe
- if 1 hour/telescope → ~8 fields (30 deg^2) → 3 tel : ~100 deg^2
- if 3-day cadence → ~300 deg^2 / 5-day cadence → ~500 deg^2

(2) Follow-up mode
- High-cadence, multi-color monitoring → systematic investigations into SN evolution (esp. at early times, rare type, peculiar progenitors…)
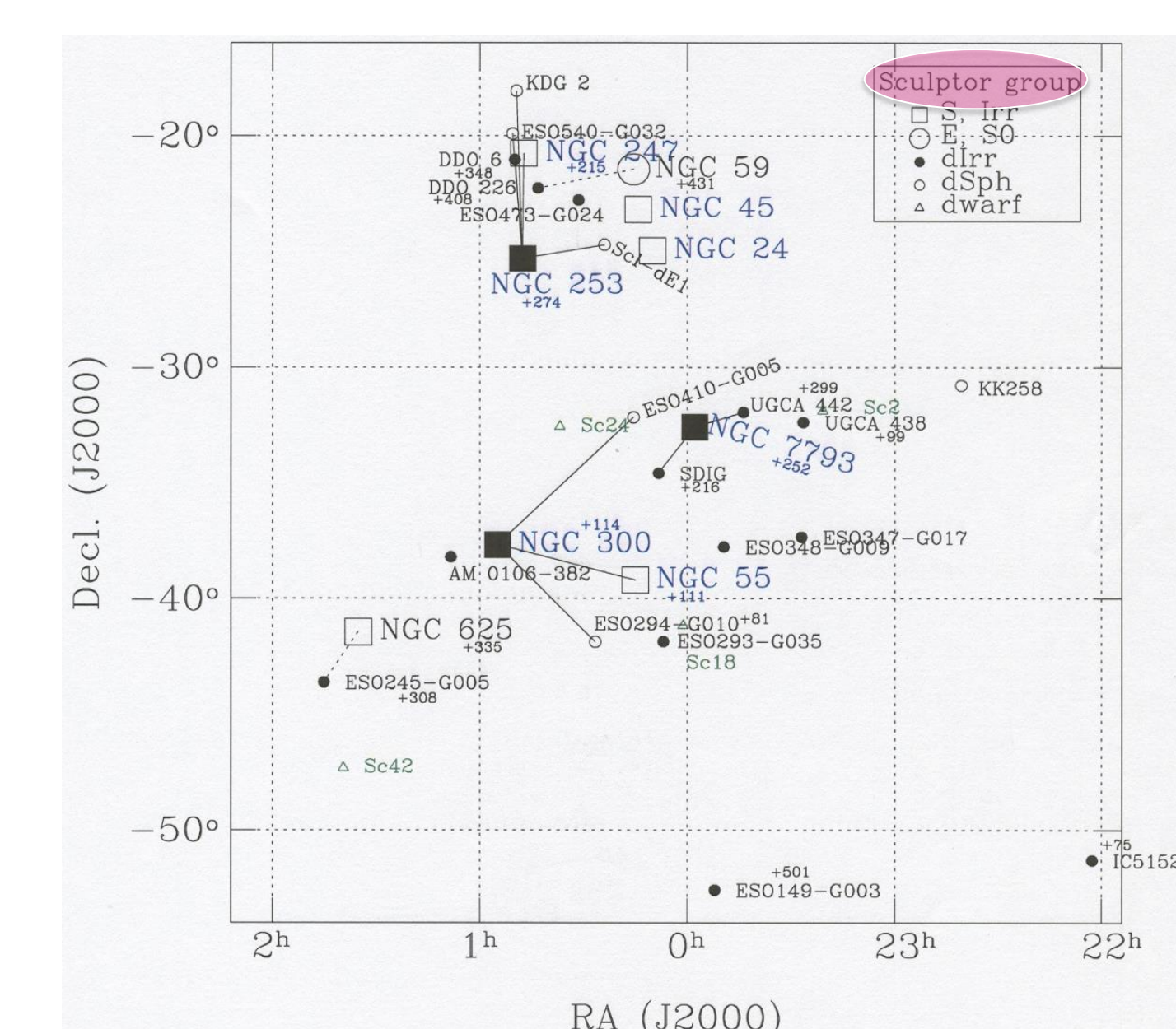
Potential Initial Targets
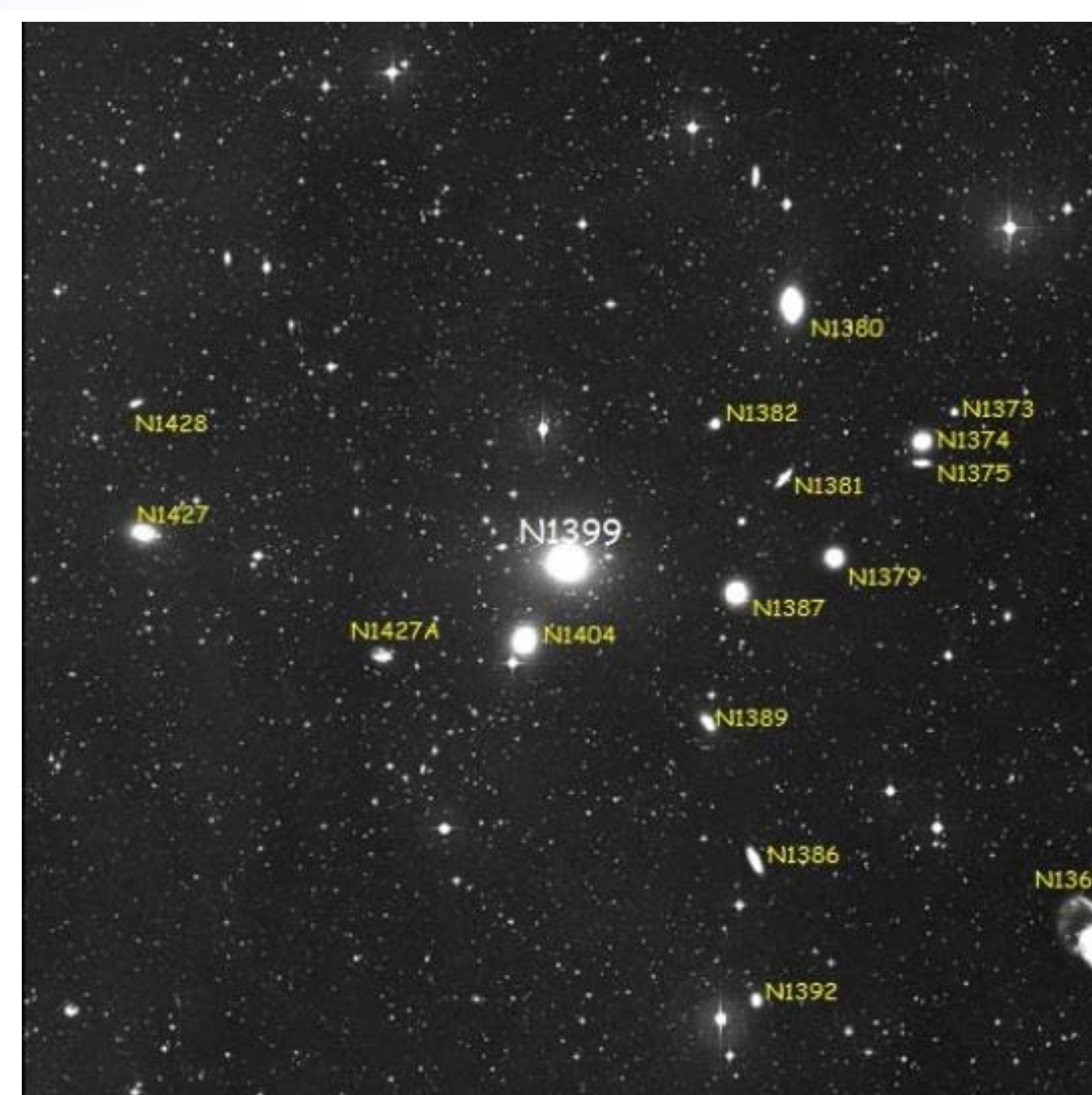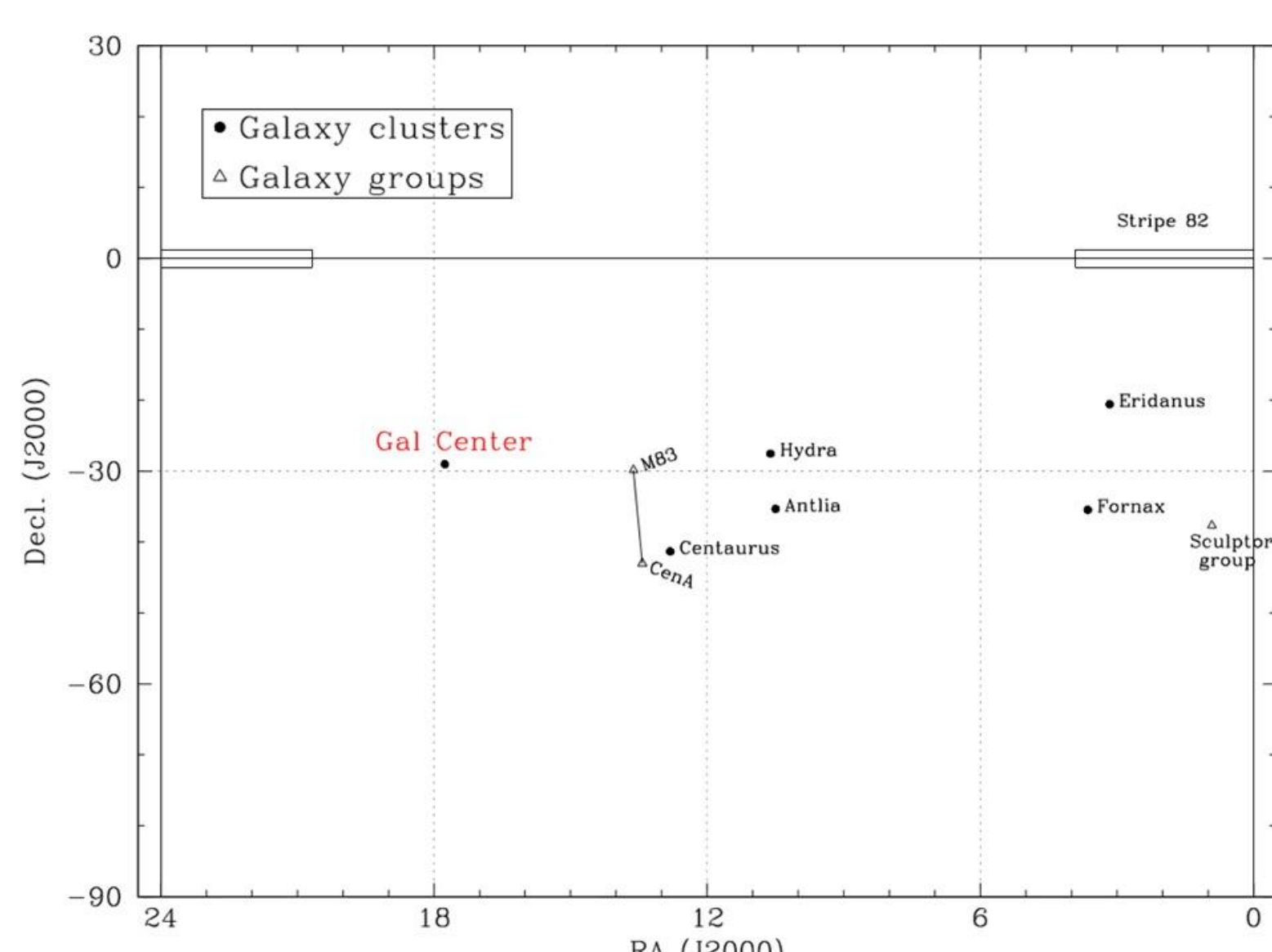
Digital Sky Survey B-band image of the Fornax cluster center. The image size is 2°×2° as the KMTNet.

- Nearby groups (e.g. Sculptor group, CenA/M83 group)
- Nearby clusters of galaxies (e.g. Eridanus, Fornax)
- Random fields

Potential Sciences

- Early and young (infant, < a few hours) SNe
- Rare and peculiar SNe (e.g. fast decay, subluminous)
- Progenitors
- Explosion mechanisms
- Precise estimation of SN parameters (e.g. ^{56}Ni mass)
- High-cadence multi-color light curves
  → Demographic studies
- Auxiliary/serendipitous sciences (e.g. other types of optical transients, properties of SN host galaxies)
- Unexpected discoveries

CTIO
2014 Apr 10

- Follow-up spectroscopy using Gemini-South and other telescopes (e.g. LCOGT) is expected