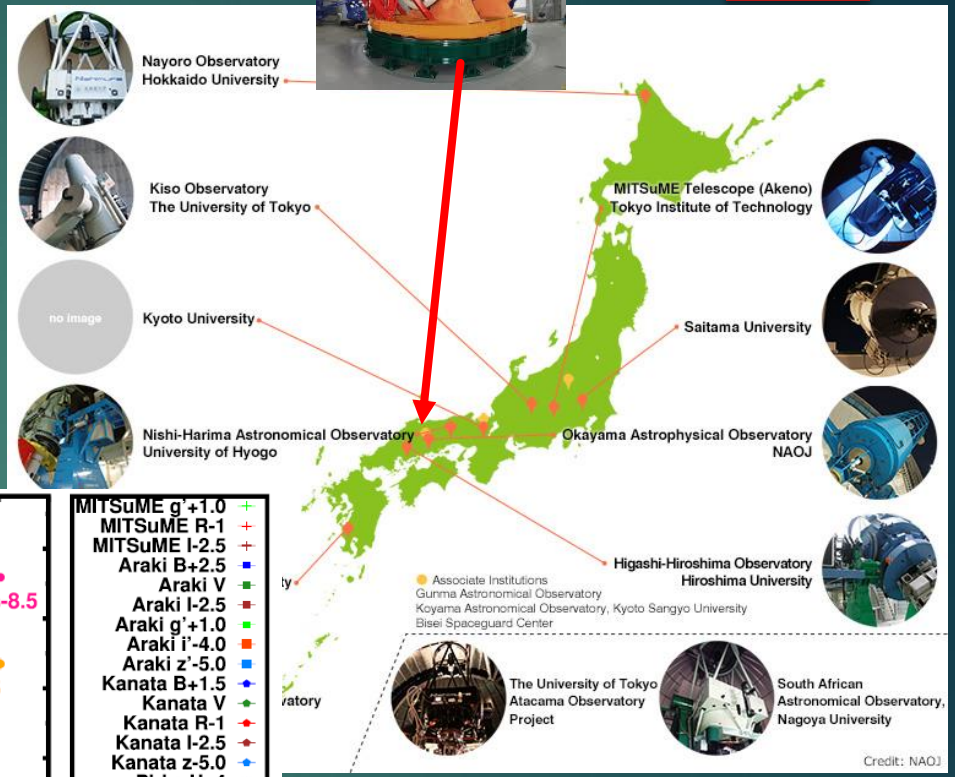
J-GEM and OISTER

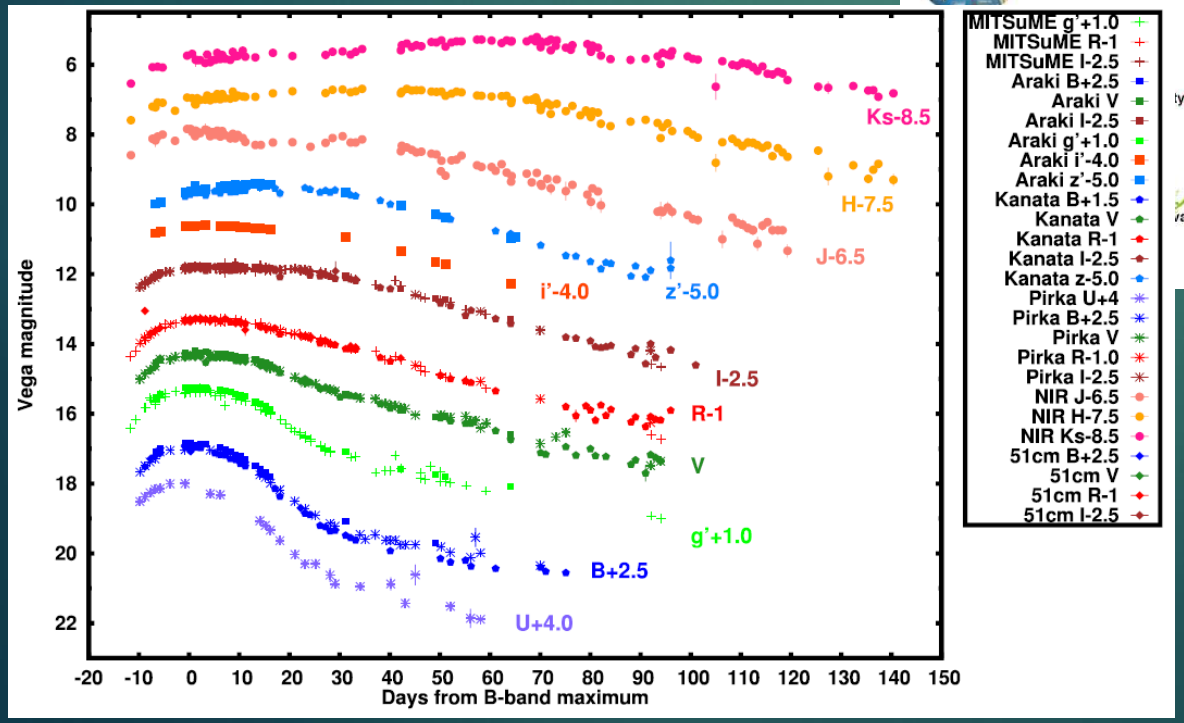
MASAYUKI YAMANAKA (KYOTO UNIV.)

Our framework 1: small telescopes

10 telescopes (1-4m)
- optical, near-infrared (NIR)
- image, spctroscopy, polarization
- high-speed obs.
- wide-field

New 3.8m telescope (Seimei)

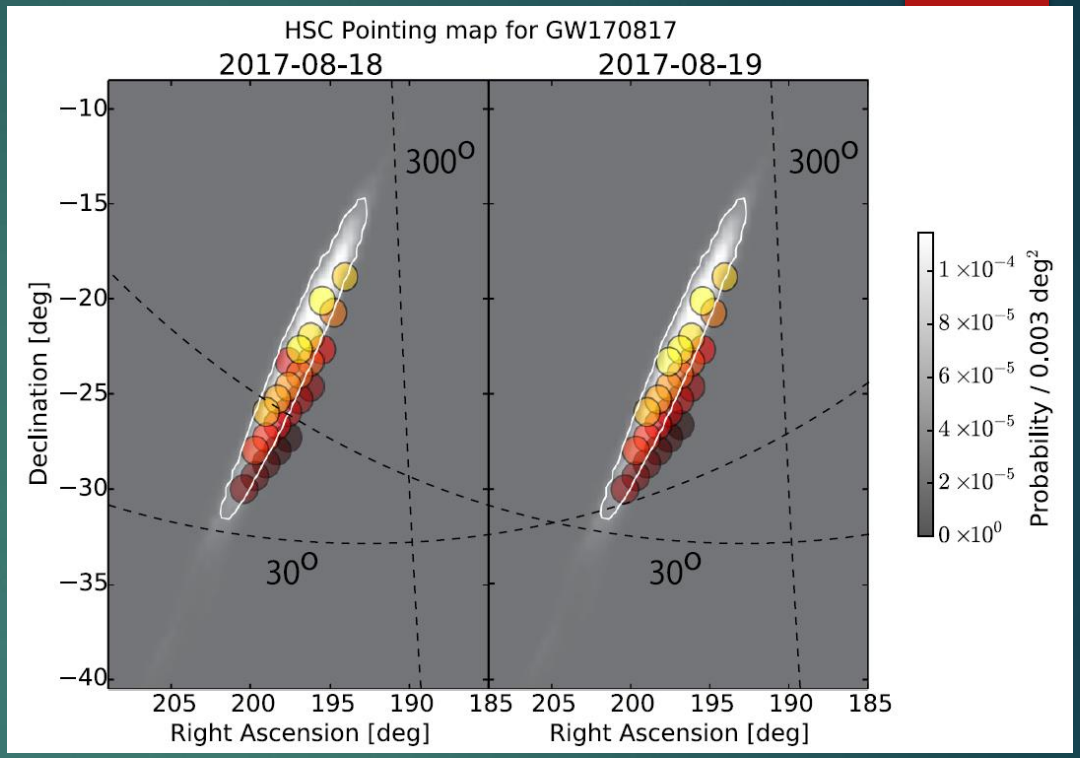




UV-optical-NIR observations was performed in OISTER. Strong circumstellar NIR emission of a Peculiar Type Ia SN

MY+, 2016, PASJ, 68, 68

Our framework 2-1: Deep, wide-field imaging (Subaru/Hyper Suprime-Cam)



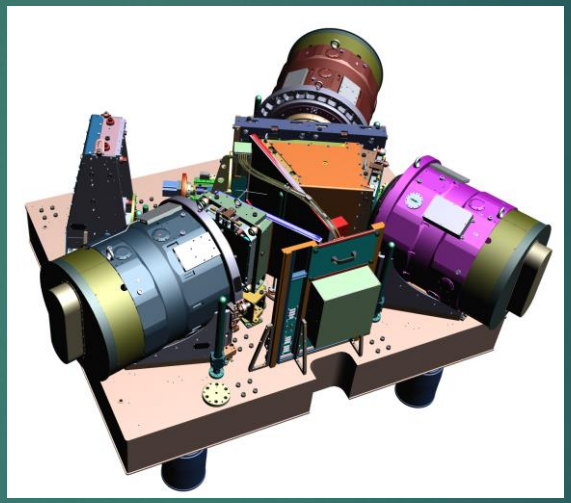
Tominaga et al. 2018

HSC did not find the kilonova-like transient in the field of GW 170817, supporting that SSS17a is a counterpart of the GW event.

FOV ~ 1.8 deg^2
Limiting mag ~26 mag

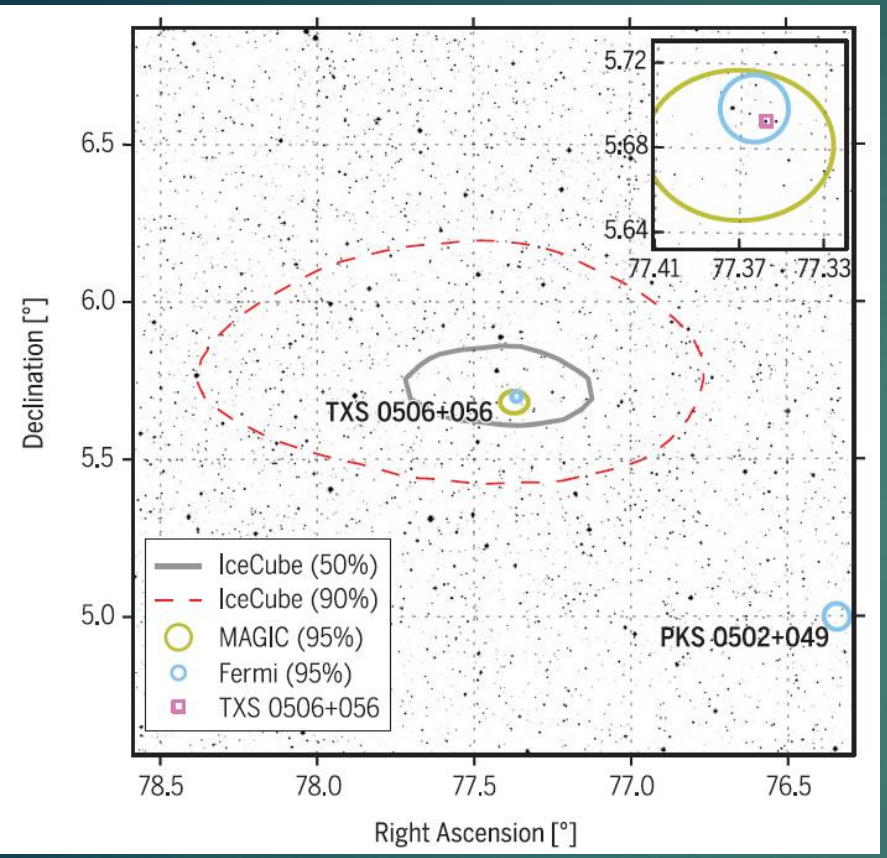
Our framework 2-2: Deep, wide-field multi-object spectroscopy (Subaru/PFS)

Prime Focus Spectrograph (PFS) : Fiber spectrograph
Main goal : constraints on the dark energy
Scientific observations will start on 2022

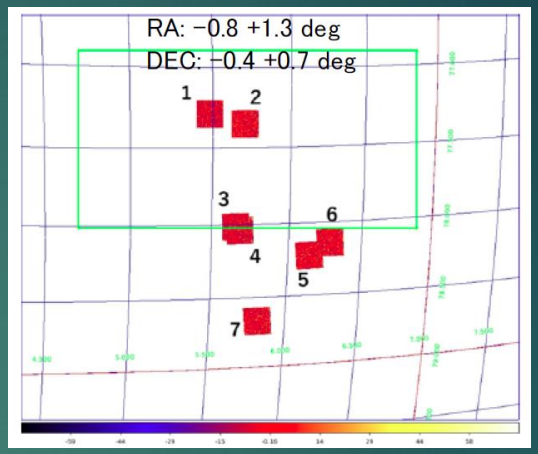


FOV ~1.25 deg^2 (hexagon)
~2400 Fibers
R~2300(blue)-3000(red)
Limiting mag ~23 mag

IceCube-170922A

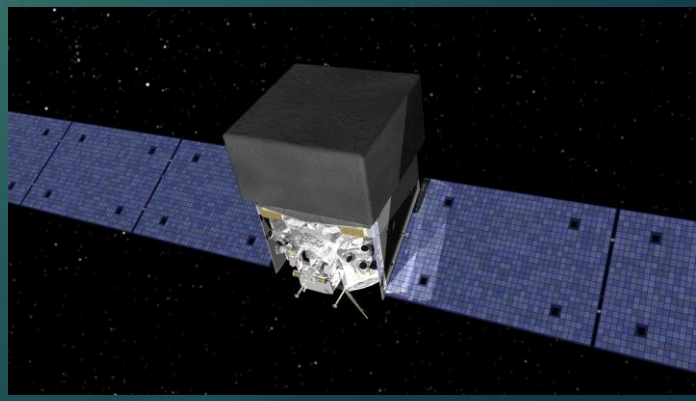


IceCube collaboration et al. 2018

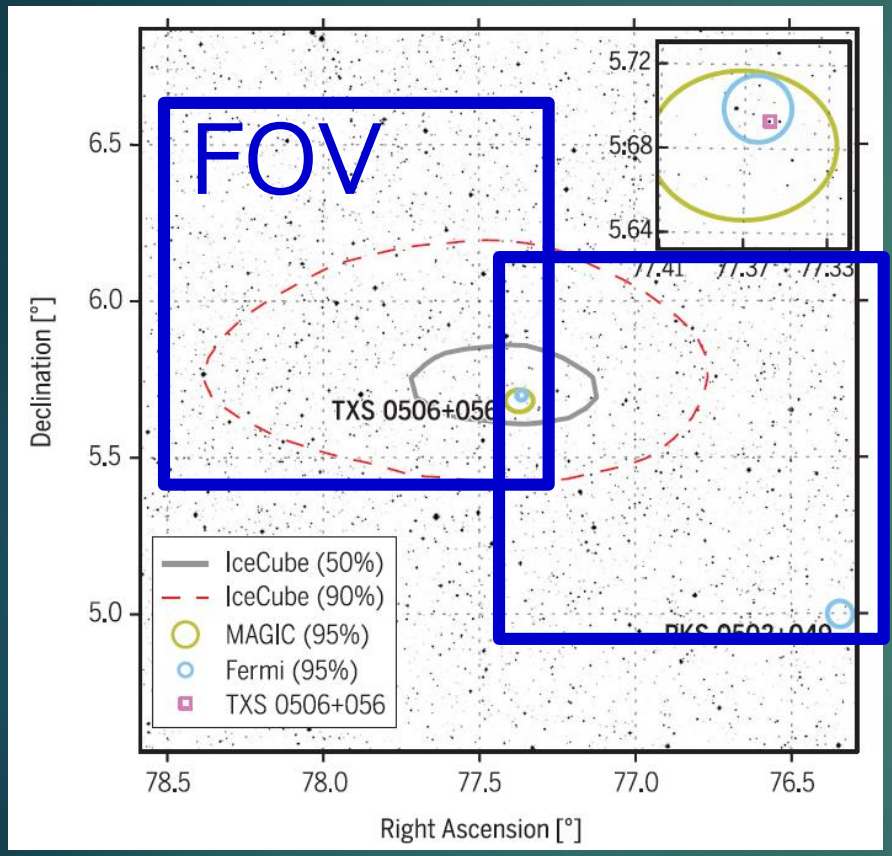


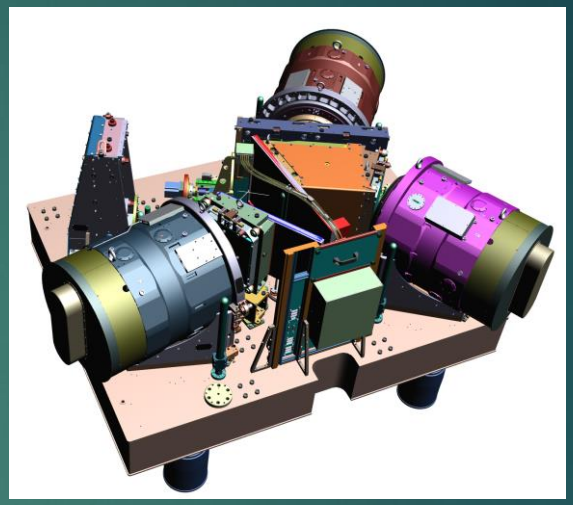
Mori, master thesis (2019), Hiroshima Univ.
1.5-m **Kanata** discovered the activity of TXS 0506+056 (MY+, ATEL)

Quick analysis of the gamma-ray data with **Fermi/LAT**
(Tanaka et al. ATEL)



Suggestion 1: Complete spectroscopy for the IceCube error region





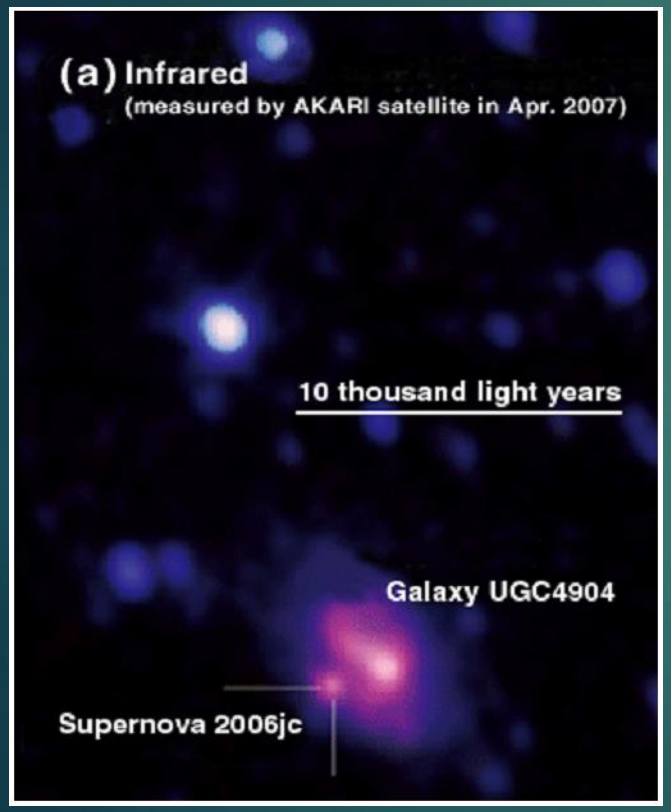
Candidates (<23mag) discovered by 4m-class telescopes could be completely observed.

Entire localization area is covered by only two exposures !

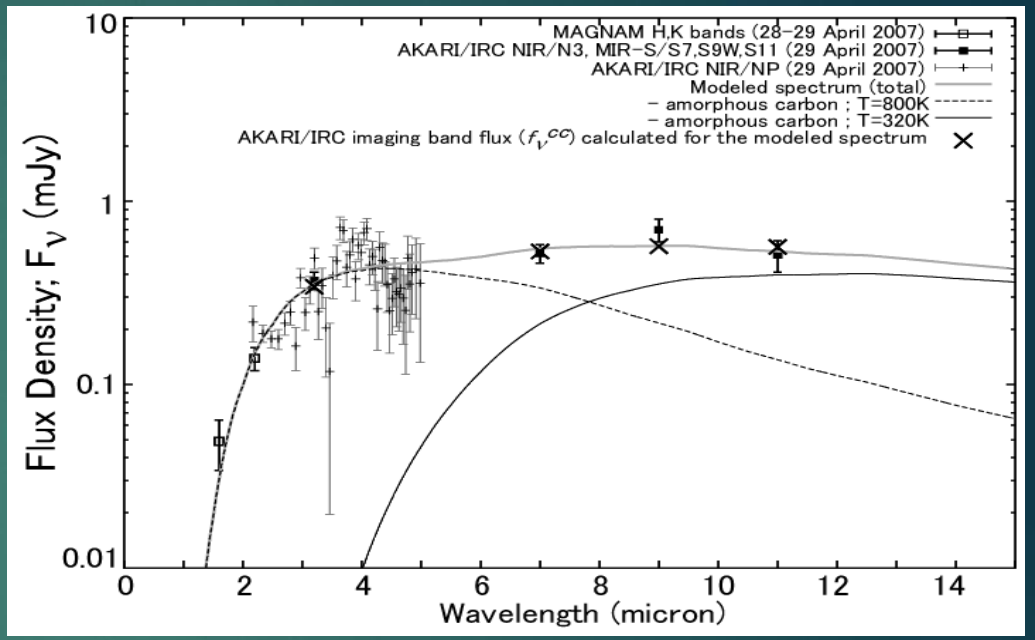
Example from MIR + NIR observations

Dusty Supernovae (e.g., SN2006jc; Sakon et al. 2009)
"Properties of Newly Formed Dust by SN2006jc based on NIR & MIR Observation with AKARI"

AKARI/IRC; 3μm, 7μm, 9μm, 11μm
MAGNAM; H, K-bands



3mm(blue), 7mm(green), 11mm(red)



800K component; Newly formed dust in the ejecta of SN2006jc

$T_{hot.car.} = 800 \pm 10$ (K)
$M_{hot.car.} = 6.9 \pm 0.5 \times 10^{-5}\ M_{solar}$

300K component; pre-existing circumstellar dust

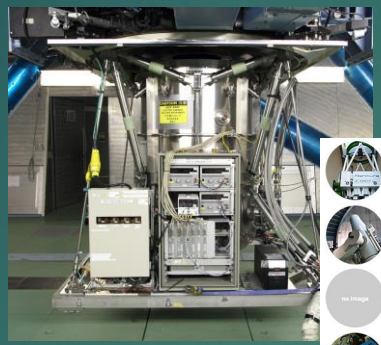
$T_{warm.car.} = 320 \pm 10$ (K)
$M_{warm.car.} = 2.7\ ^{+0.7}_{-0.5} \times 10^{-3}\ M_{solar}$

→ Presence of massive pre-existing circumstellar dust

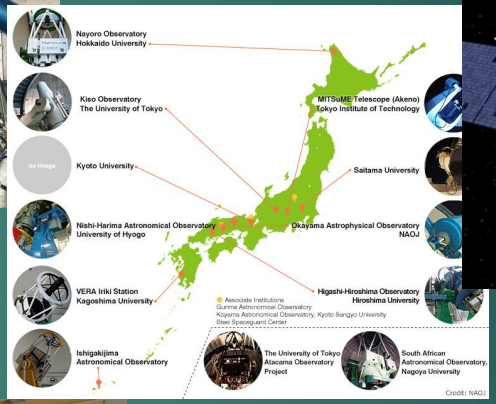
Multi-wavelength observation collaboration in Japan will start

Radio *MIR* *NIR-Optical* *X-ray* *Gamma-ray*

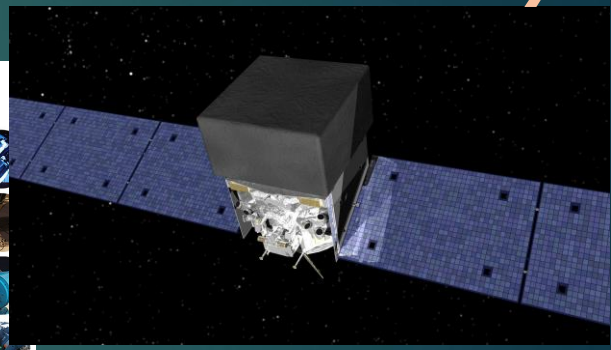
Yamaguchi 32m



Subaru/ COMICS

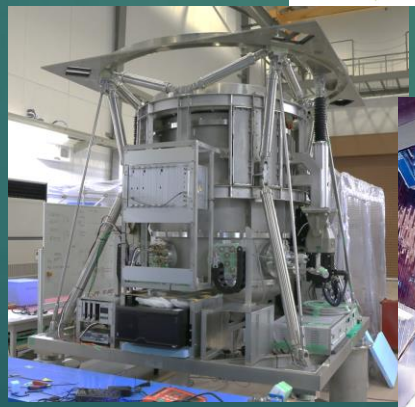


OISTER (1-4m)

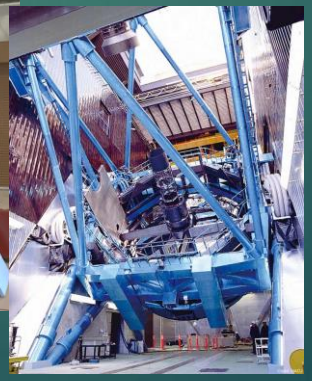


Fermi/LAT

Ibaraki 32m



TAO6.5m/ MIMIZUKU



HSC+PFS

MAXI

Summary

- Multi-band and mode co-observations of transients have been well developed in Japan.
- Deep and wide-field observations with HSC/PFS can make us discover and identify the many transients.
- Simultaneous multi-wavelength observation collaboration will start in Japan.