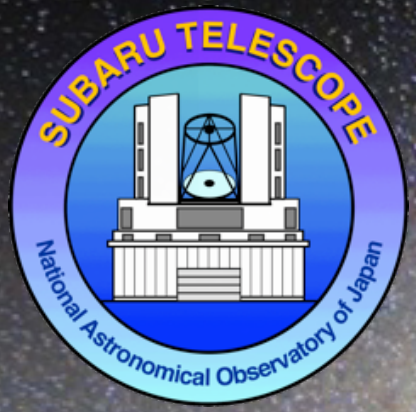
ULTIMATE-Subaru Collaboration Meeting 2018 (2018/1/16)

ULTIMATE-Subaru Galactic Science

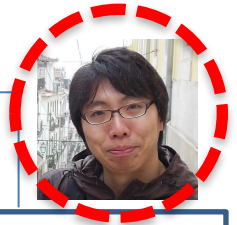
Yusei Koyama (Subaru Telescope)

ULTIMATE-Subaru Science Team



Looking for the chair of Galactic team…

Project scientist
(editor chair, Koyama)



High-z Imaging (Kodama)	High-z MOS (Tadaki)	IFU spectroscopy (Lidman)	Nearby galaxies (Motohara)	Galactic / Local Group (Koyama)
Hayashi	Akiyama	Bian	Iono	Chiba
Iwata	Hayashi	Bryant	Kaneko	Fukui
Kikuta	Matsuoka	Bloom	J, H, Kim	Guyon
Kohno	Nagao	Casey	Koda	Koshimoto
Koyama	Nakajima	Croom	*Koyama	C. H. Lee
Y.T. Lin	Onodera	Leslie	Saito	Matsunaga
Matsuda	Shibuya	Nataf	Sorai	Nishiyama
Minowa	Masayuki Tanaka	Kewley	Takeuchi	Oasa
*Onodera	Toba	I.T. Ho	Masaomi Tanaka	Pyo
*Shibuya	Yabe	Shaefer	I. Tanaka	Sumi
Shimakawa		Shimakawa	J. Ueda	D. Suzuki
T. Suzuki		Yuan	Yamashita	Terai
*I. Tanaka				Torii
				Yasui

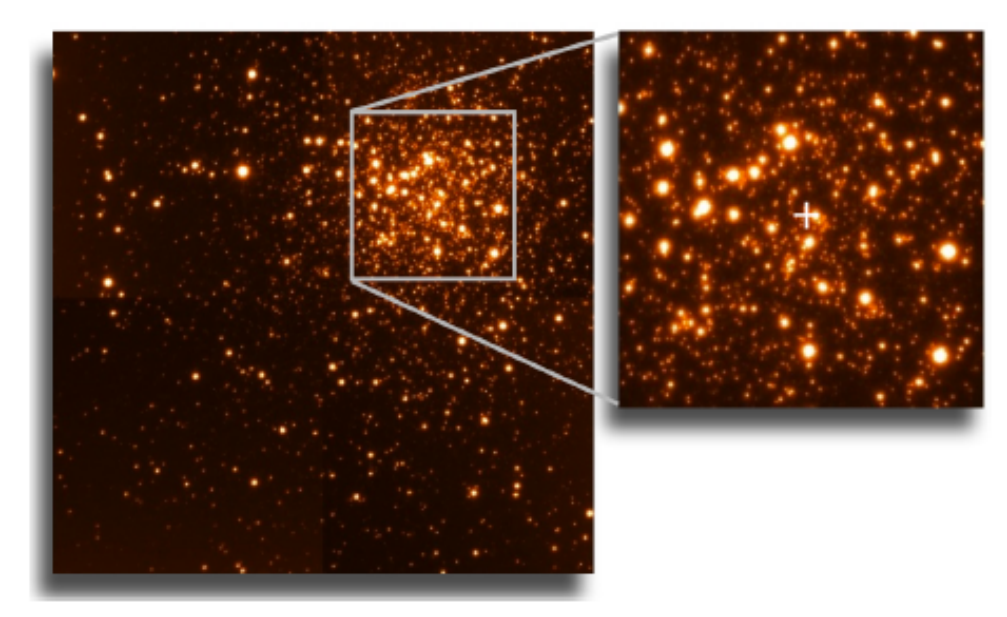
Summary

- Looking for the "chair" of Galactic team…
- The reviewers (in Feb 2016) commented that "Galactic/stellar science cases should be expanded, by involving a broader participation from the community".
- Current Galactic science cases are just a compilation of submitted proposals from each scientist.

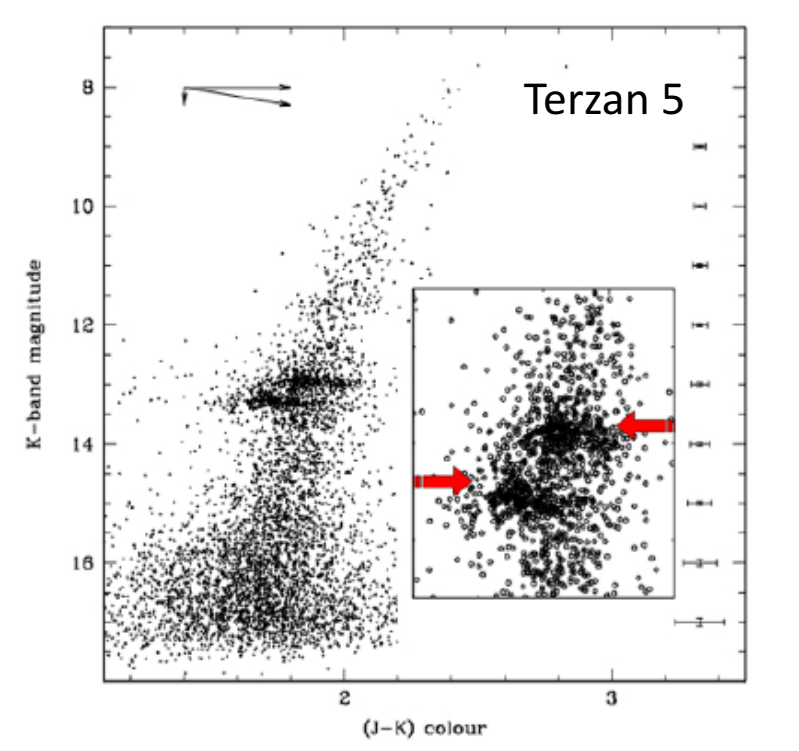
- ULTIMATE is powerful for studying dense/obscured regions.
  1. Galactic Center
  2. Star forming Regions

(1) Origin of the Galactic Globular Cluster

(by Masashi Chiba)



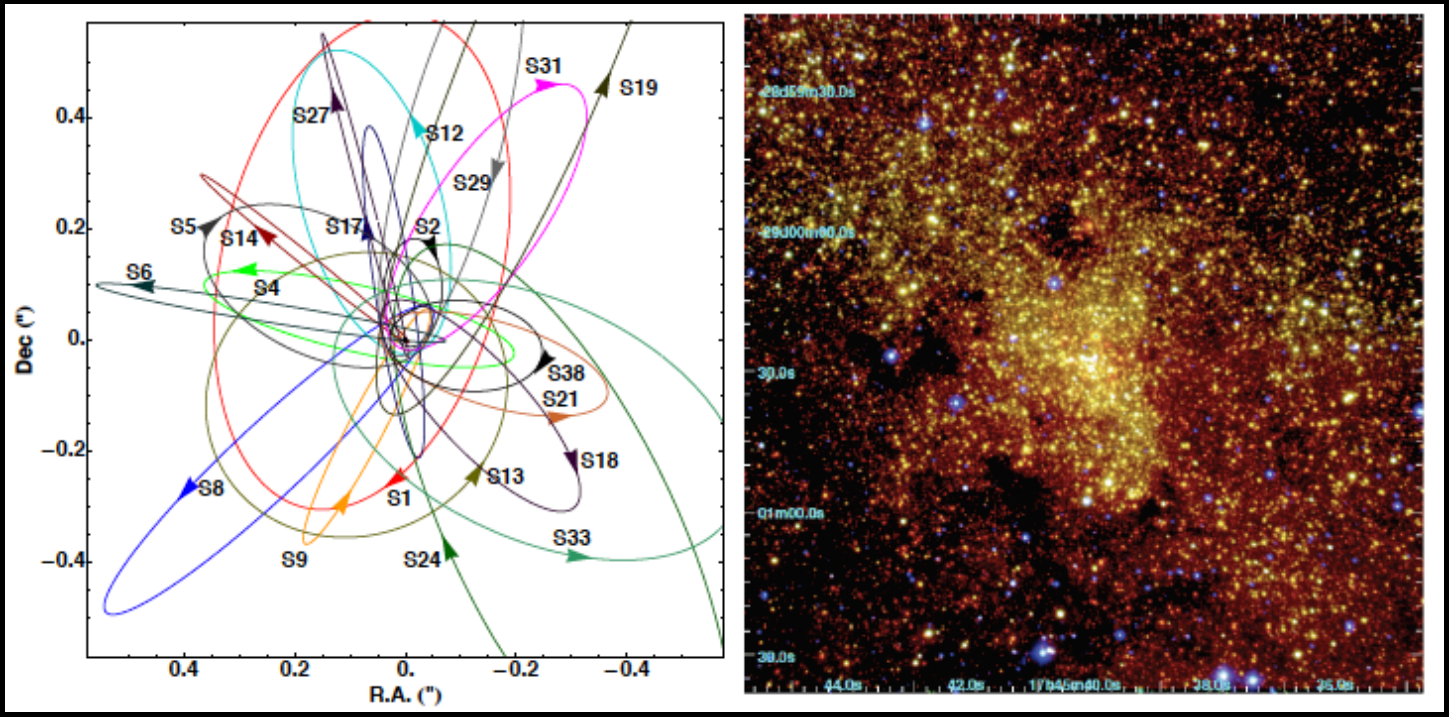
VLT/MAD K-band image of Terzan 5
(Ferraro et al. 2009)



ULTIMATE imaging & spectroscopy to spatially resolve GCs near the Galactic bulge into stars – and characterize their nature.

(2) Origin of "S-stars" in the Galactic center

(by Shogo Nishiyama)



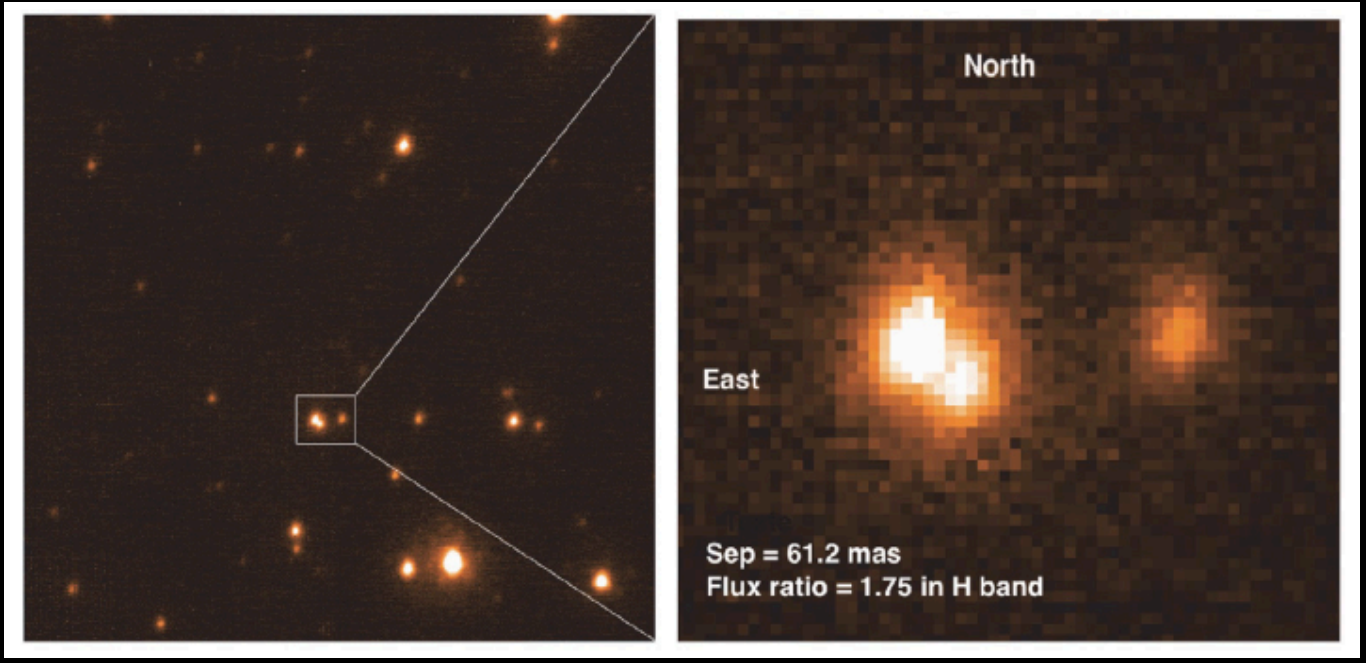
Stellar orbits of S-stars in the central region of our Galaxy (Gillessen+2009)

JHK imaging of Galactic center (Nishiyama & Schodel 2013)

Astrometric approach to find high-velocity stars (HVS) at the Galactic center to solve mystery of S-stars (young B-stars). Request: ~15-mas/yr proper motion.

(3) Microlensing exoplanet survey in Galactic bulge

(by C.H. Lee, A. Fukui, T. Sumi, D. Suzuki)

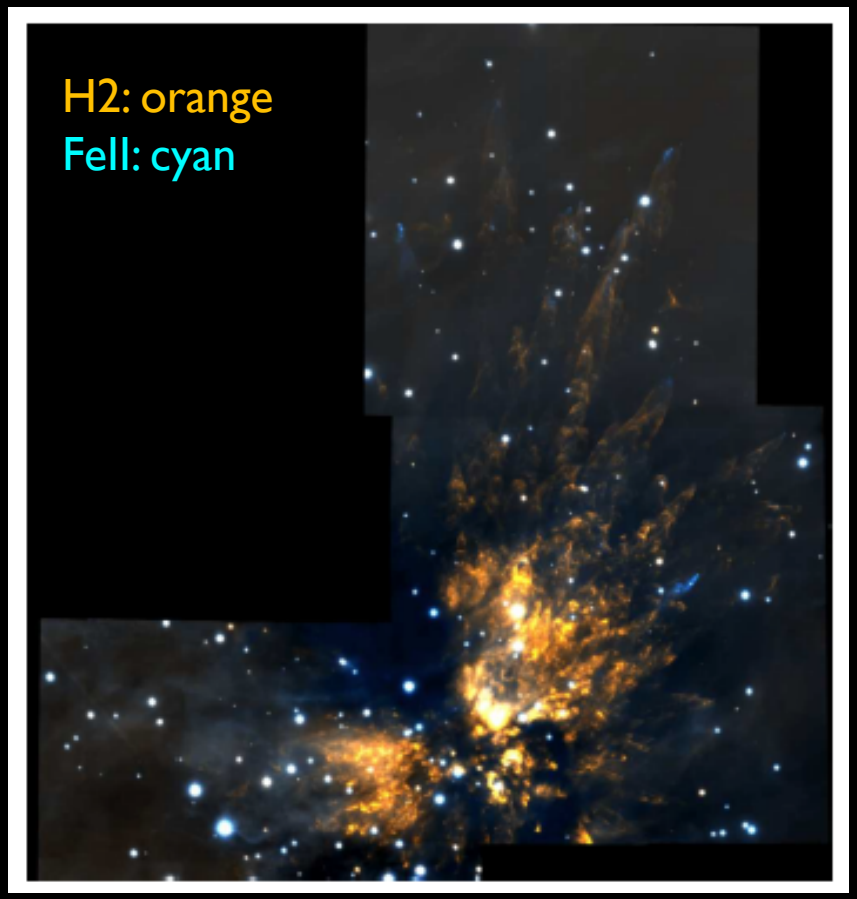


Keck AO image of microlensing event OGLE-2005-BLG-169 (Batista+2015)

Multi-epoch, multi-color microlensing exoplanet survey in Galactic bulge: synergy with WFIRST particularly in K-band to measure colors of lens.

(4) Jet/shock survey with ULTIMATE NB imaging of Galactic SF regions (by Tae-Soo Pyo)

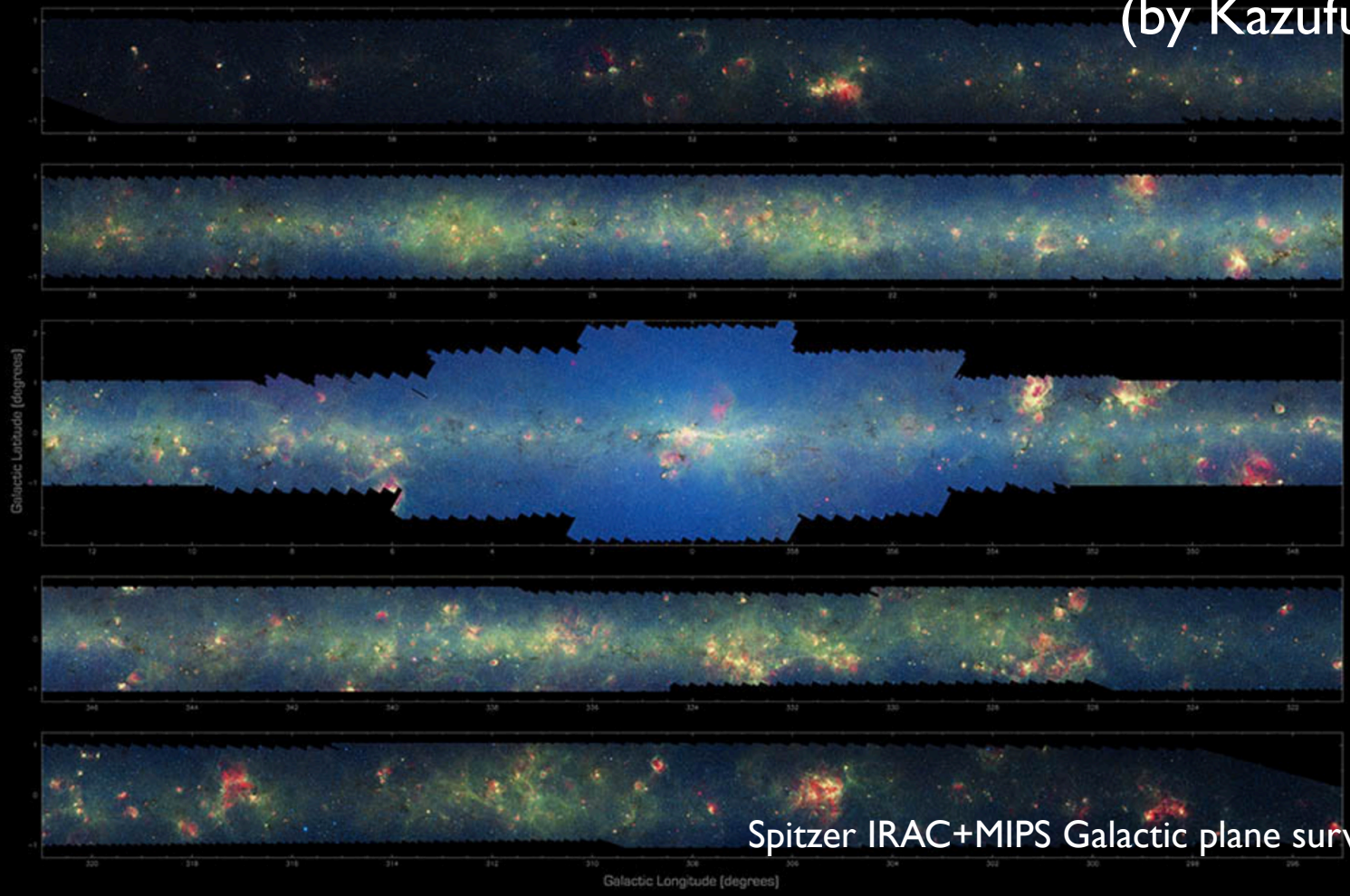
- AO-assisted NB imaging of star-forming regions to pinpoint shock-excited atomic (FeII) and molecular (H2) gas induced by outflow / jet.



GeMS/Gemini AO imaging of Orion region (Bally+2015)

(5) “Spitzer bubble” in Galactic plane: the site of high-mass star formation

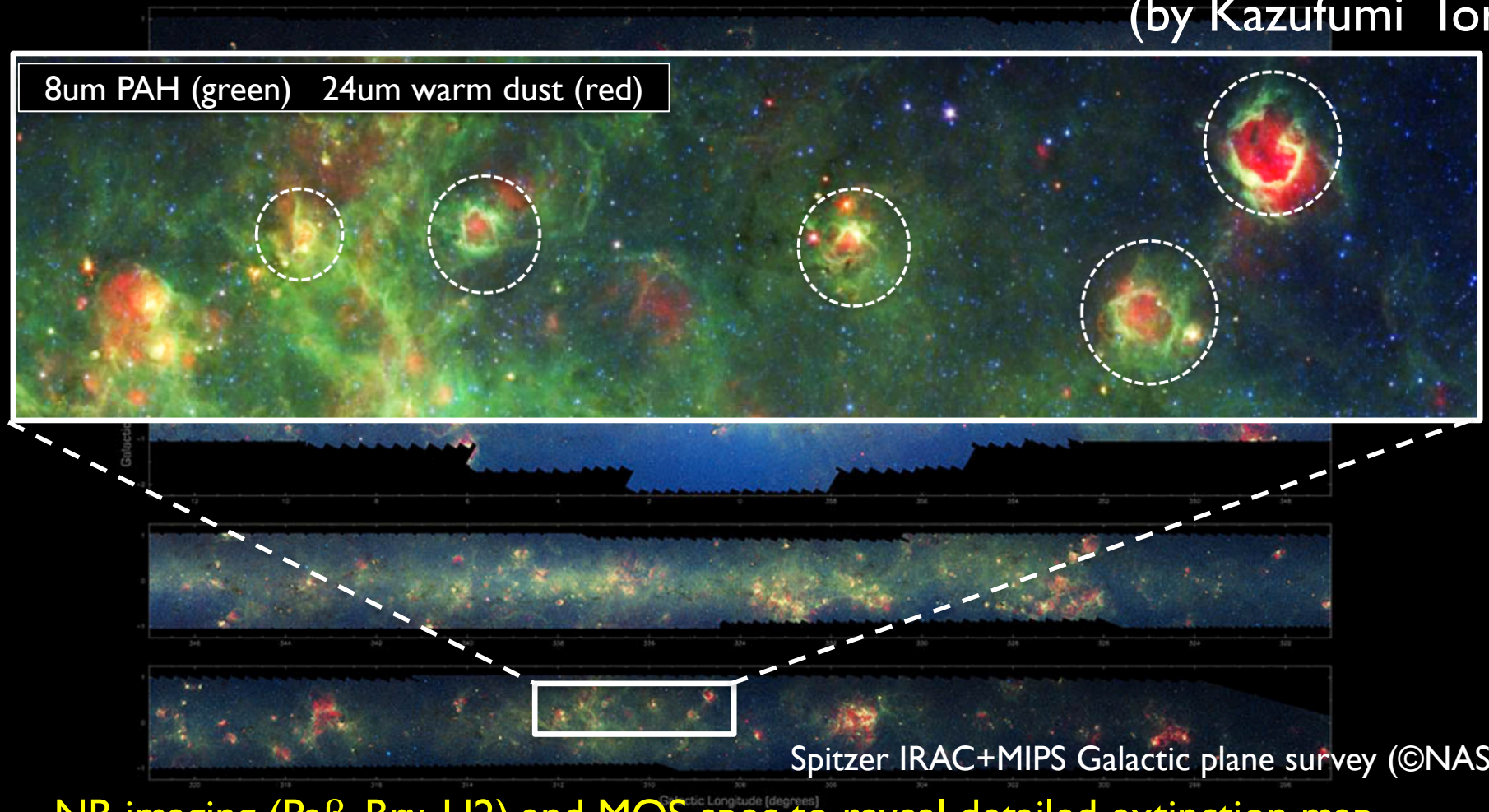
(by Kazufumi Torii)



Spitzer IRAC+MIPS Galactic plane survey (©NASA+)

(5) "Spitzer bubble" in Galactic plane: the site of high-mass star formation

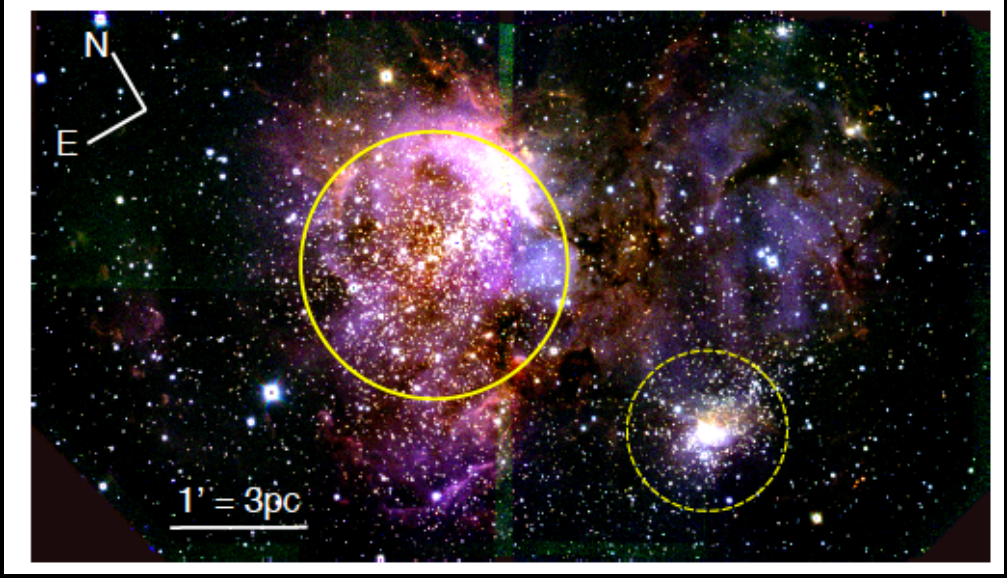
(by Kazufumi Torii)



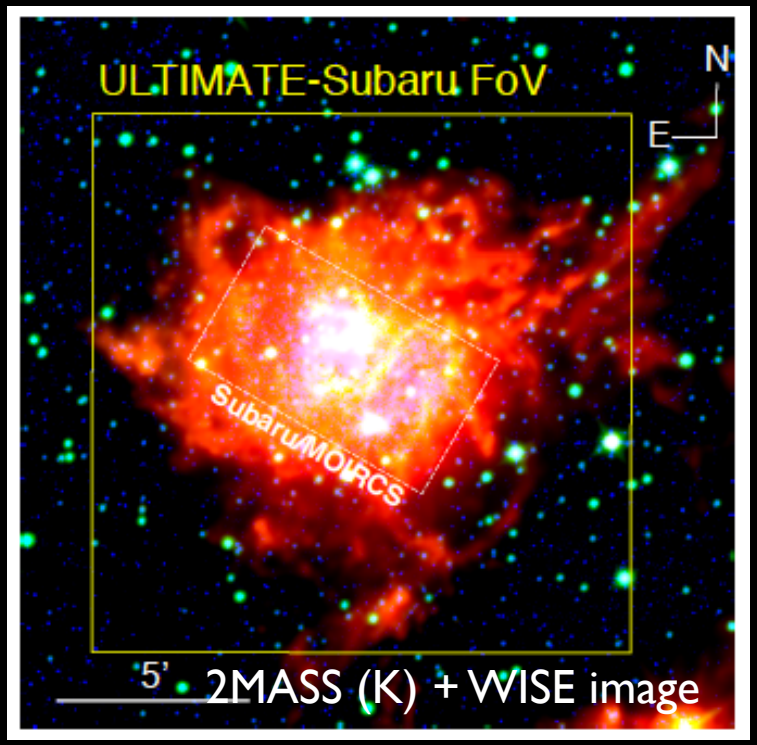
NB imaging (Paβ, Brγ, H2) and MOS spec to reveal detailed extinction map and shock/kinematics within the high-mass, young, HII regions.

(6) Spatially resolved IMF in the extreme outer Galaxy

(by Chikako Yasui)



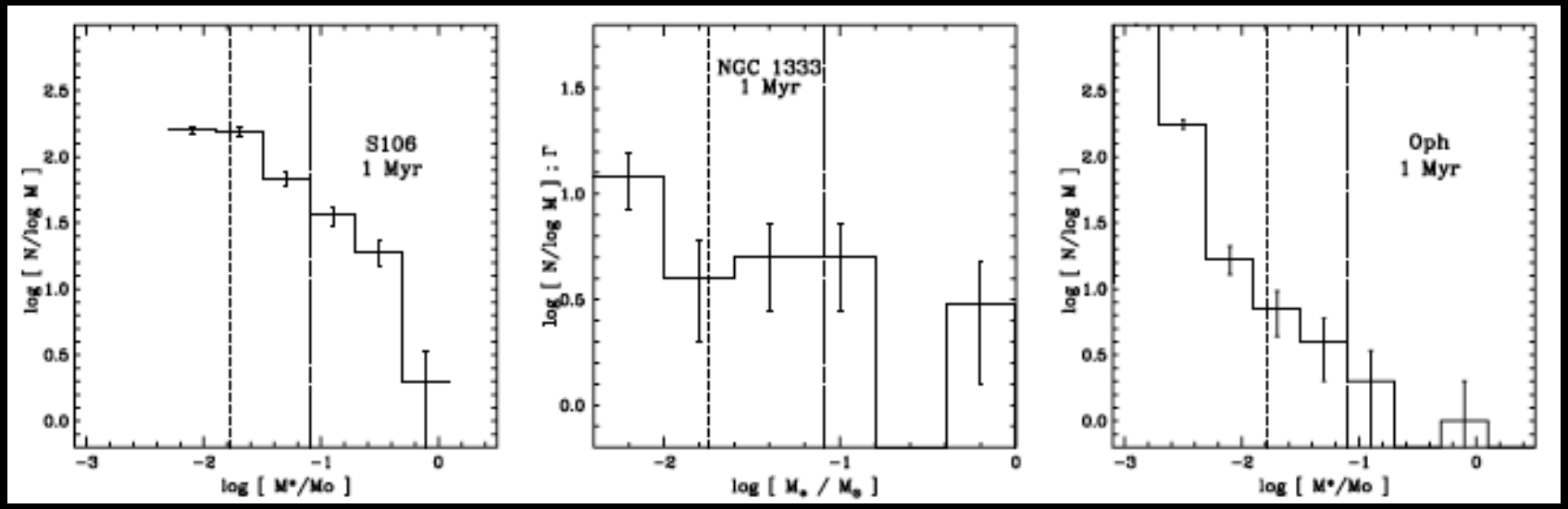
JHK image of a SF region in the extreme outer Galaxy, Sh 2-209 (Yasui+)



Sharp JHK imaging to detect low-mass end of IMF in the extreme outer Galaxy (low gas density, low metallicity environment)

(7) Universality of "sub-stellar" IMF

(by Yumiko Oasa)

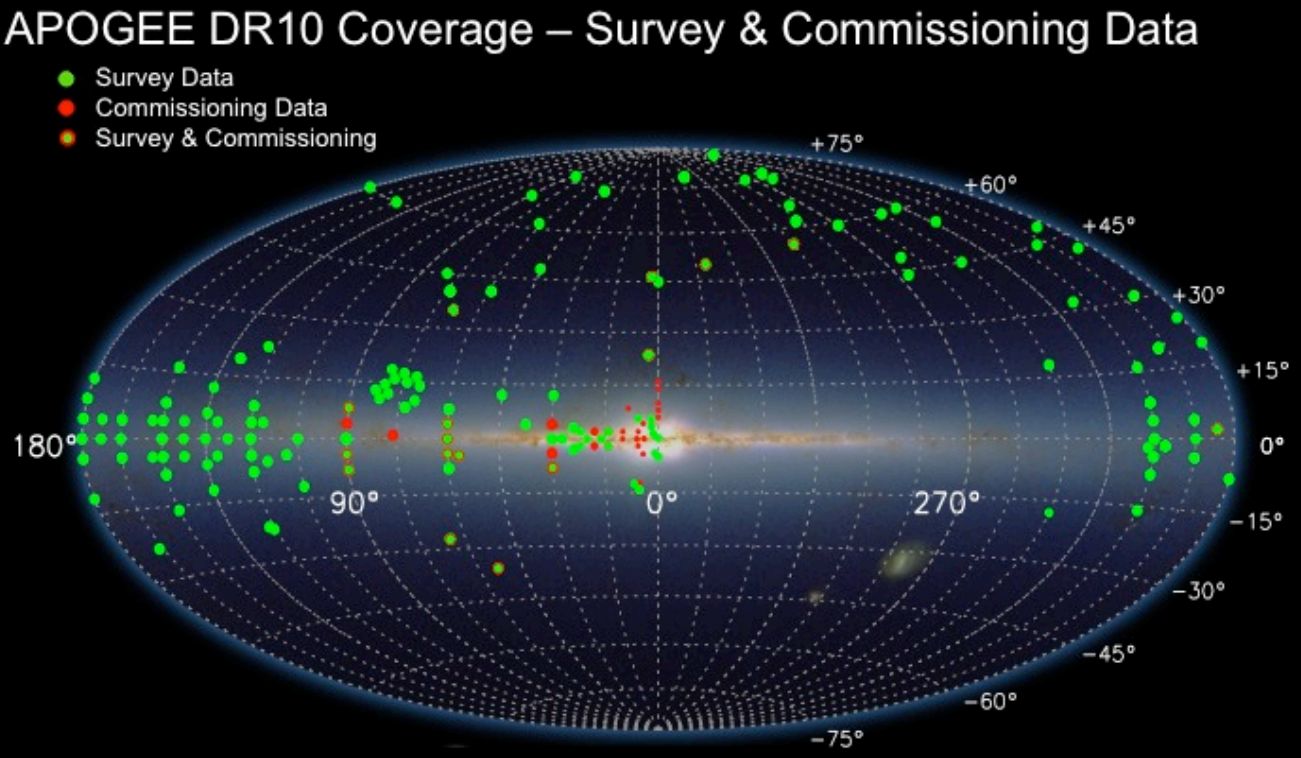


(Oasa+2006; 2008)

- JHK photometry: detect sub-stellar objects - young brown dwarfs (YBDs) & planetary mass objects (PMOs) – in SF regions at > 1-kpc. Test the environmental dependence of stellar IMF.
- Deep spectroscopy: to detect water band and determine Teff.

(8) Hidden structures and chemical abundances in the Milky Way disk

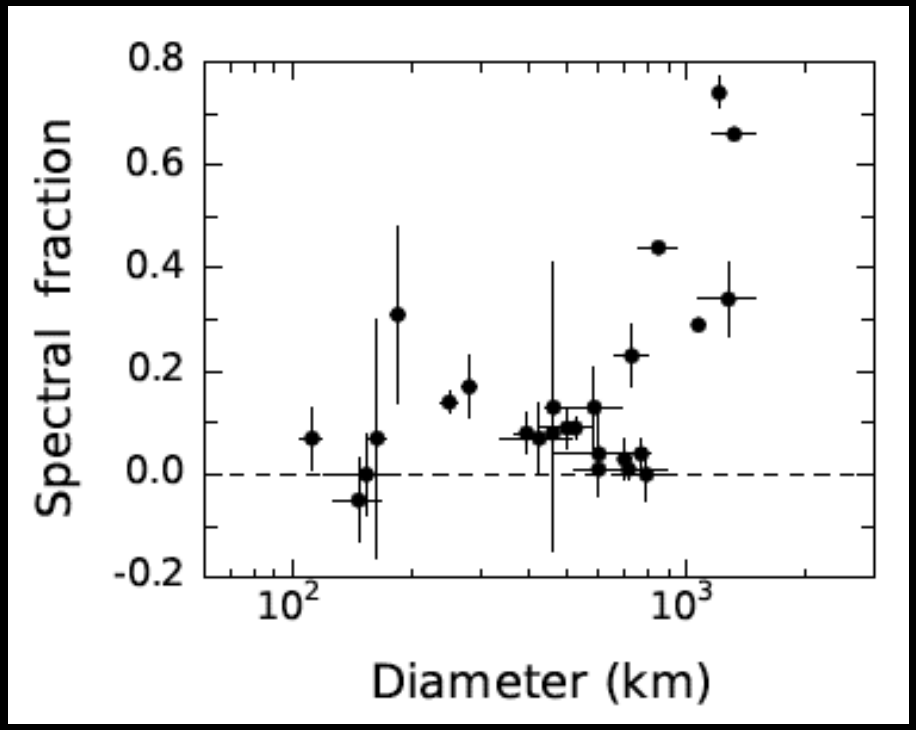
(by Noriyuki Matsunaga)

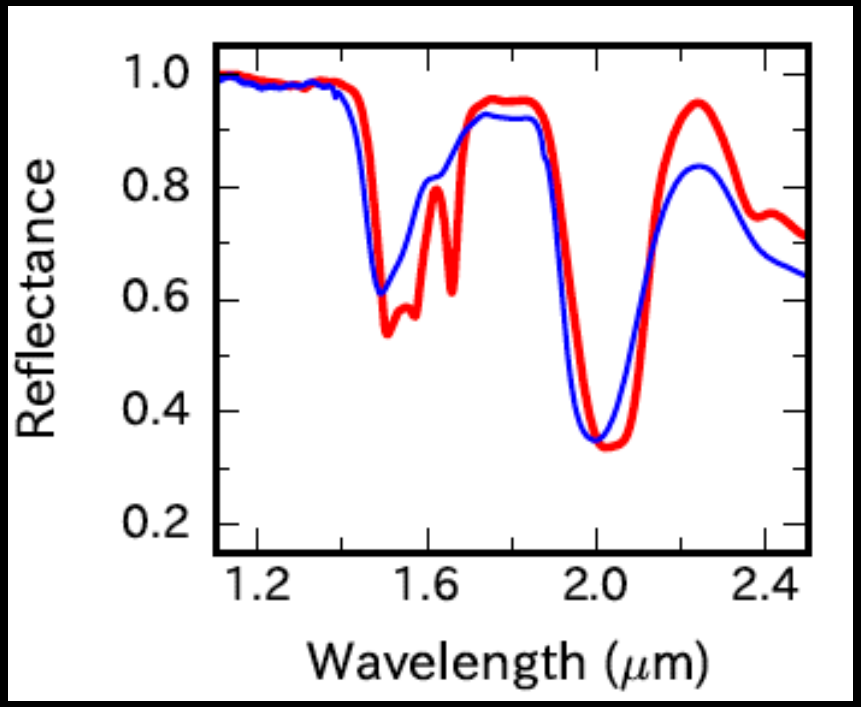


Unveiling the metallicity gradient and structure of the Milky Way disk with chemical measurement Cepheids and star clusters using deep, multi-object, high-resolution, NIR (J-band) spectroscopy.

(9) Trans-Neptunian Objects

(by Tsuyoshi Terai)



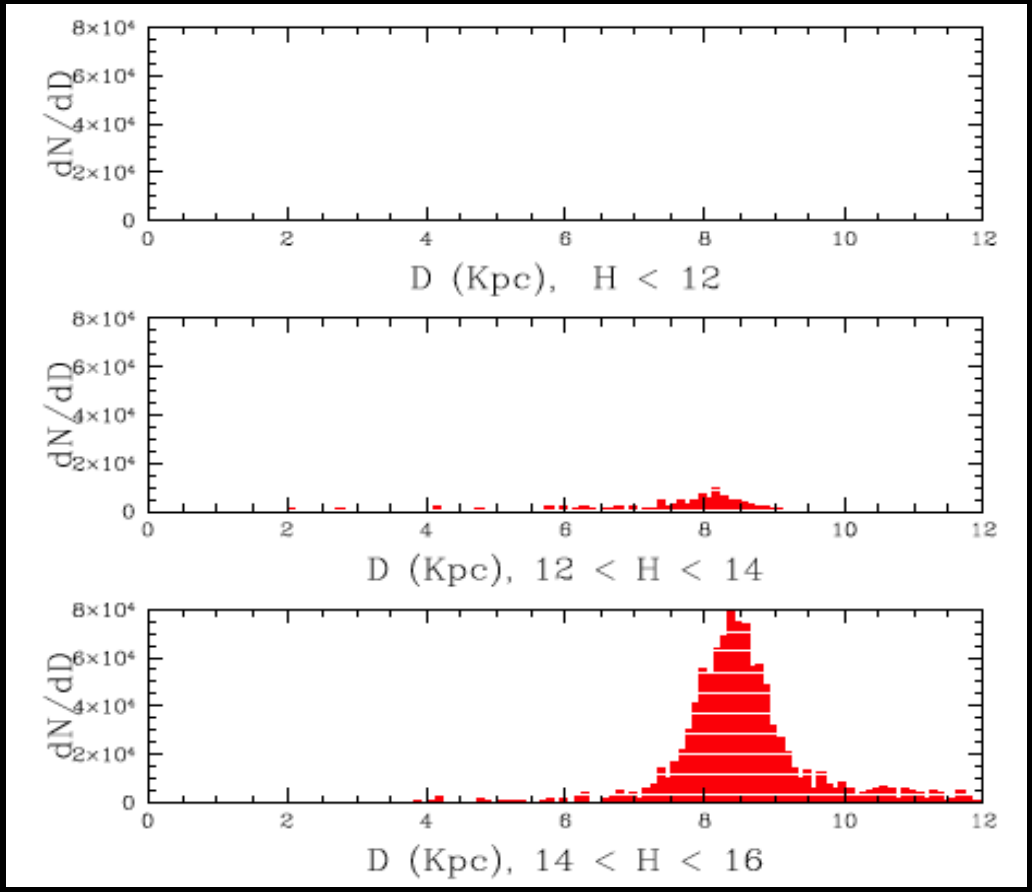


NIR spectroscopy (and/or NB/MB imaging) to detect H2O ice abundance at the surface of TNOs – insights on threshold for creating "ocean" and H2O delivery to the Earth…

(10) Milky Way dark matter mapping

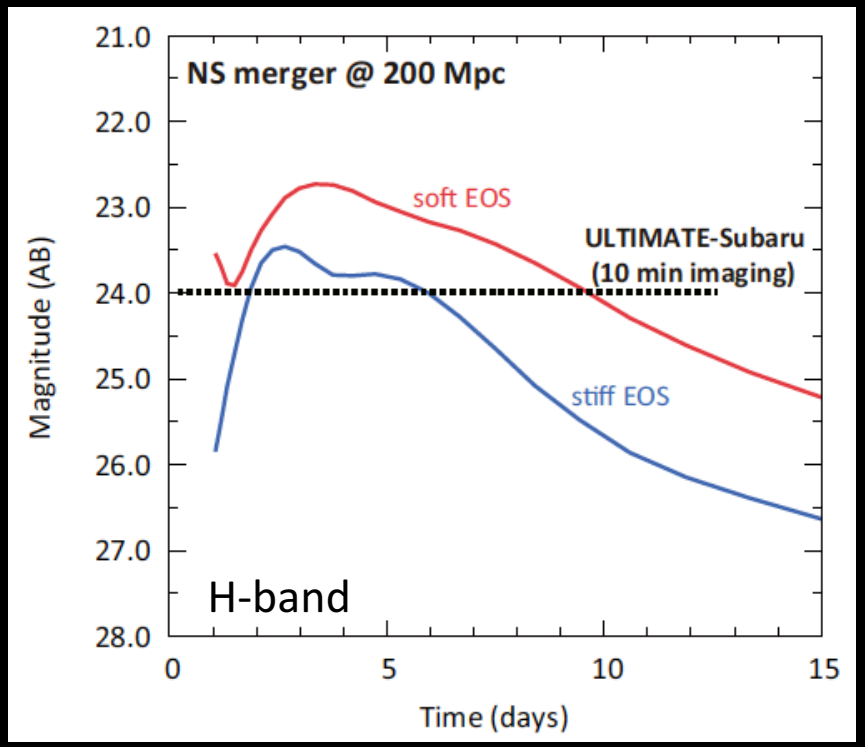
(by David Nataf, Andy Casey)

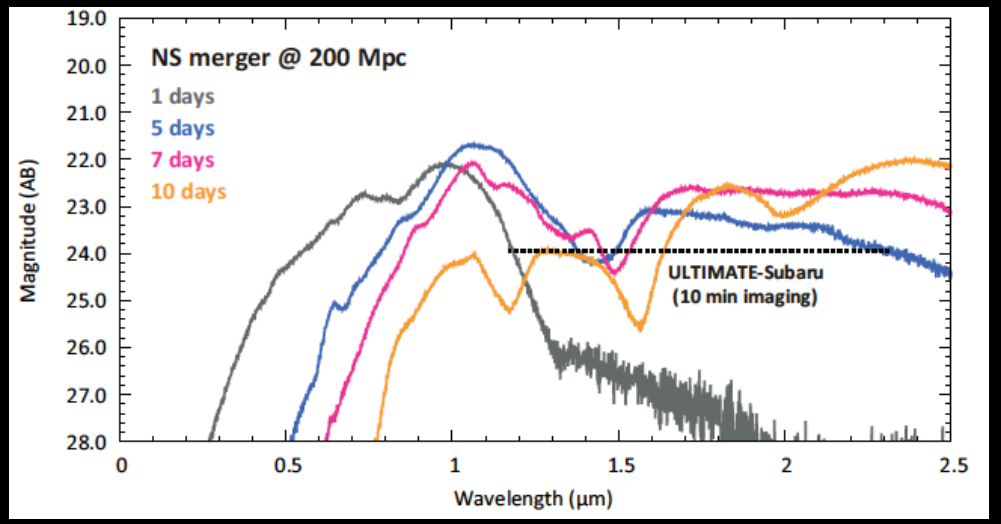
- MOS spectroscopy of ~10,000 stars identified with WFIRST Galactic plane survey.
- Measure their radial velocity to complete dark matter mapping inner ~2-kpc region of the Milky Way.



Predicted distance modulus toward WFIRST field as a function of apparent magnitude cut.

(11) Electro-magnetic identification of gravitational wave source (by Masaomi Tanaka)





(Tanaka & Hotokezaka 2013)

A few 10-deg^2 imaging survey to identify electro-magnetic counterparts of GW sources + spectroscopy with ToO (timescale of "kilonova" = ~1-week)

Summary (& discussion)

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- How to merge Galactic programs into high-z (and low-z) SSP program? Or, just consider separate open-use programs?
- Interests from partners countries/institutes?