Past and Future Collaboration Activities with Subaru: A Korean View

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Subaru-related collaboration

- Many discussions/workshops (2003 ~)
- Individual collaboration

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REDDENING AND DISTANCE OF THE LOCAL GROUP STARBURST GALAXY IC 10*

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Since 2006 (12 years)

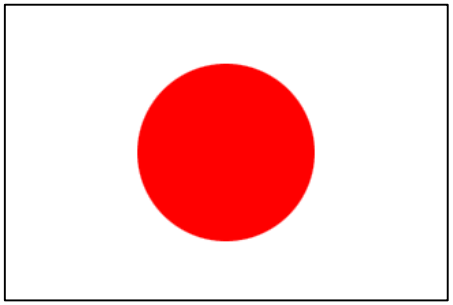
Papers by Korean or Japanese as the main author (with M. Im)
Red: AKARI, Blue: GRB, Green: HighzQSO, Bold: Subaru

- 2017: **Onoue, M.+**, Huang, KY.+
- 2016: Kim, SJ.+
- 2015: Goto, T.+, Yoon, Y.+, Jun, H.+, Kim, D.H.+ **Kashikawa, N.+**
- 2014: Urata, Y.+, Oi, N.+, Karouzos, M.+
- 2013: Yamada, R.+, Sakamoto, T.+
- 2012: Kim, JH.+, Kim, SJ.+, Hanami, H.+, Ko, J.+, Takagi, T.+
- 2011: Jang, M.+, Burrows, D.+, Koo, B.C.+, Shim, H.+
- 2010: Lee, I.+, Goto, T.+, Takagi, T.+
- 2009: Urata, Y.+, **Kim, M.+**, Ko, J.+, Lee, H.M.+
- 2008: Goto, T.+, Wada, T.+, Koyama, Y.+
- 2007: Takagi, T.+, Matsuhara, H.+, Lee, H. M.+, Hwang, N.+
- 2006: Matsuhara, H.+

Summary (since 2006)

37 papers

17 : 20



AKARI

26 : 3

Subaru

Subaru-related collaboration

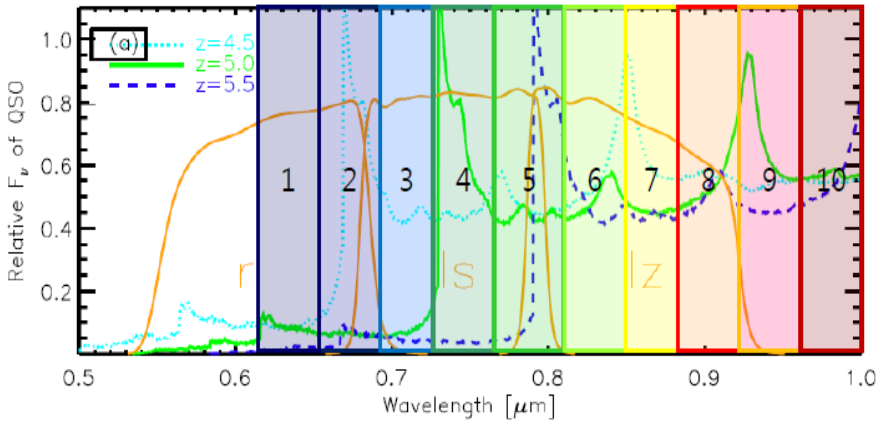
- Continued discussion/workshops (2003 ~)

Limited collaboration

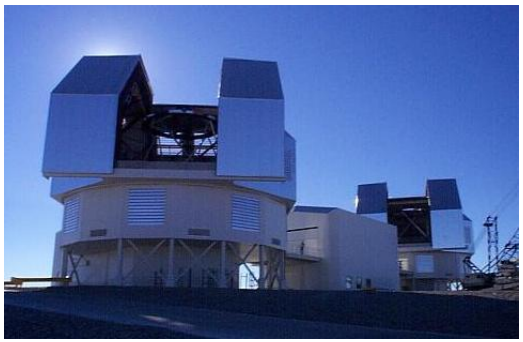
- Imbalance in facilities and expertise (1.8m vs 8.2m)
- Lack of project-based collaboration (SDSS, AKARI)

Getting better

- KASI – Gemini, MMT, KMTNet, …
- Special funding for groups in university (Research center, research institution)



SQUEAN: Medium-band imager at McDonald 2.1m telescope



Magellan 6.5m

CEOU/SNU Facilities

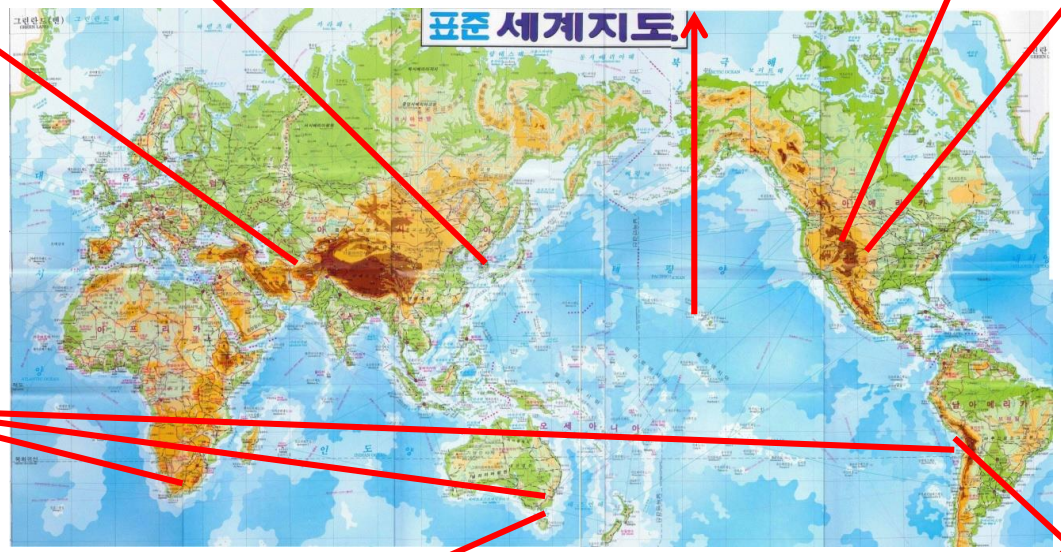
Korea: Many small ones

Hawaii: UKIRT, (Gemini-N)

US: LOAO 1-m

US: McDonald
2.1-m, 0.8m,
0.25m

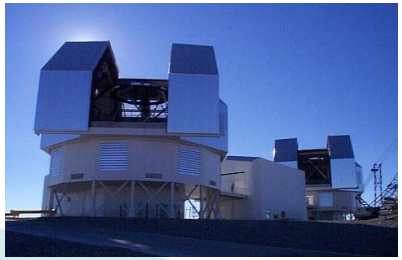
Maidanak:
1.5m Telescope



(KMTNet 1.6m)

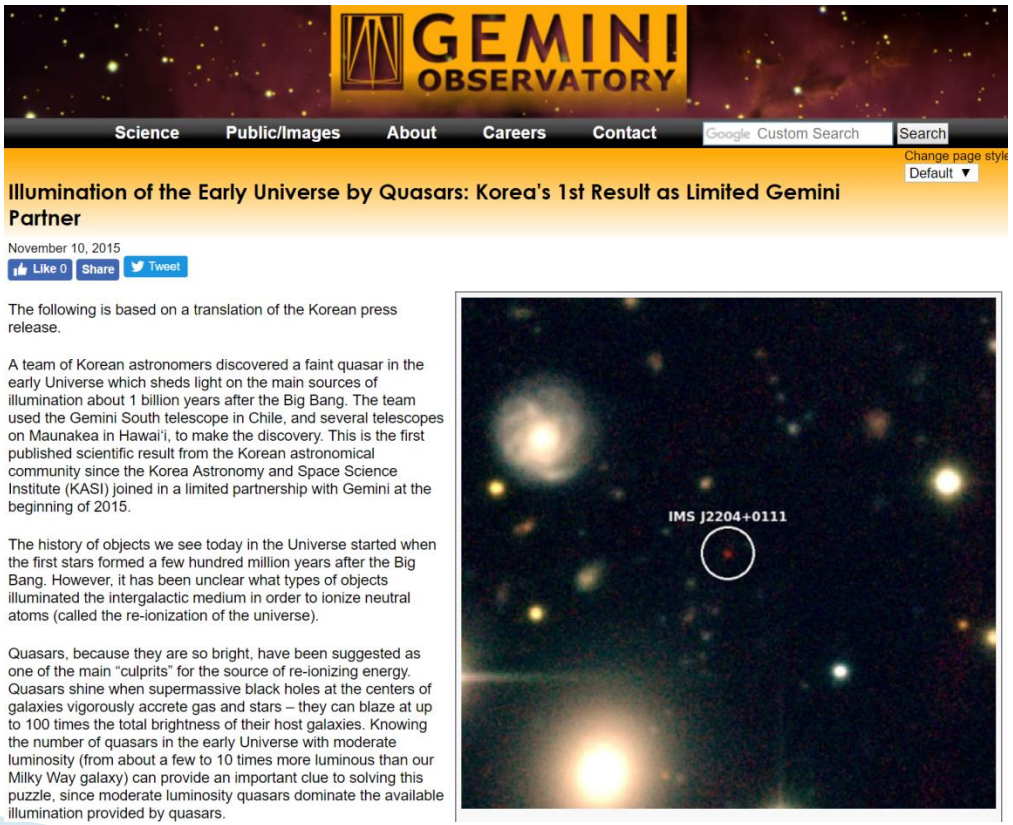
Australia: LSCT 0.43m (SSO)

Chile: Magellan, (Gemini-S, GMT)



High redshift quasars from Infrared Medium-deep Survey

- Faint quasars at z ~ 5 to 6 (2.1m, Magellan, Gemini)
- Also, galaxy clusters at 0.8 < z < 1.4



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Illumination of the Early Universe by Quasars: Korea's 1st Result as Limited Gemini Partner

November 10, 2015

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The following is based on a translation of the Korean press release.

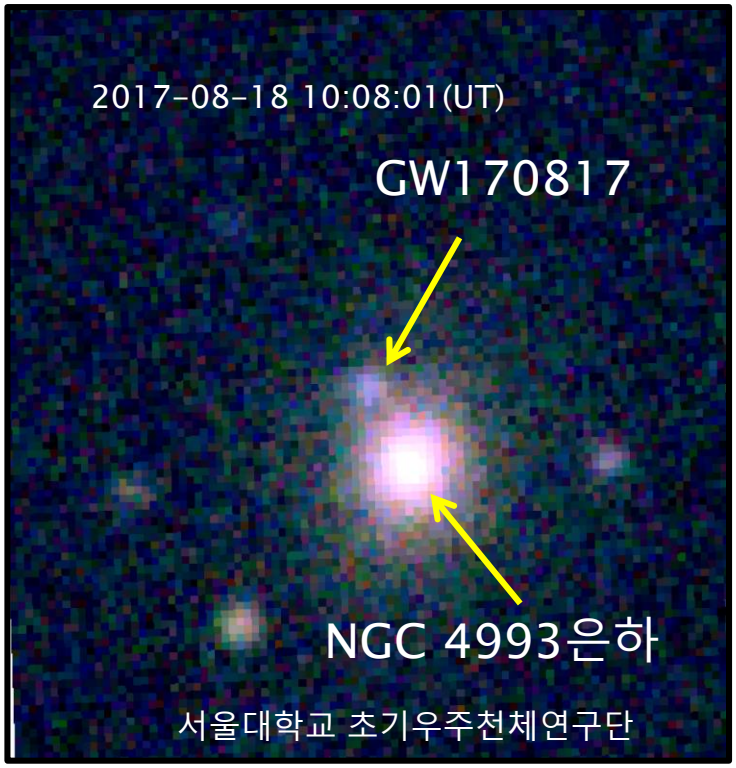
A team of Korean astronomers discovered a faint quasar in the early Universe which sheds light on the main sources of illumination about 1 billion years after the Big Bang. The team used the Gemini South telescope in Chile, and several telescopes on Maunakea in Hawai'i, to make the discovery. This is the first published scientific result from the Korean astronomical community since the Korea Astronomy and Space Science Institute (KASI) joined in a limited partnership with Gemini at the beginning of 2015.

The history of objects we see today in the Universe started when the first stars formed a few hundred million years after the Big Bang. However, it has been unclear what types of objects illuminated the intergalactic medium in order to ionize neutral atoms (called the re-ionization of the universe).

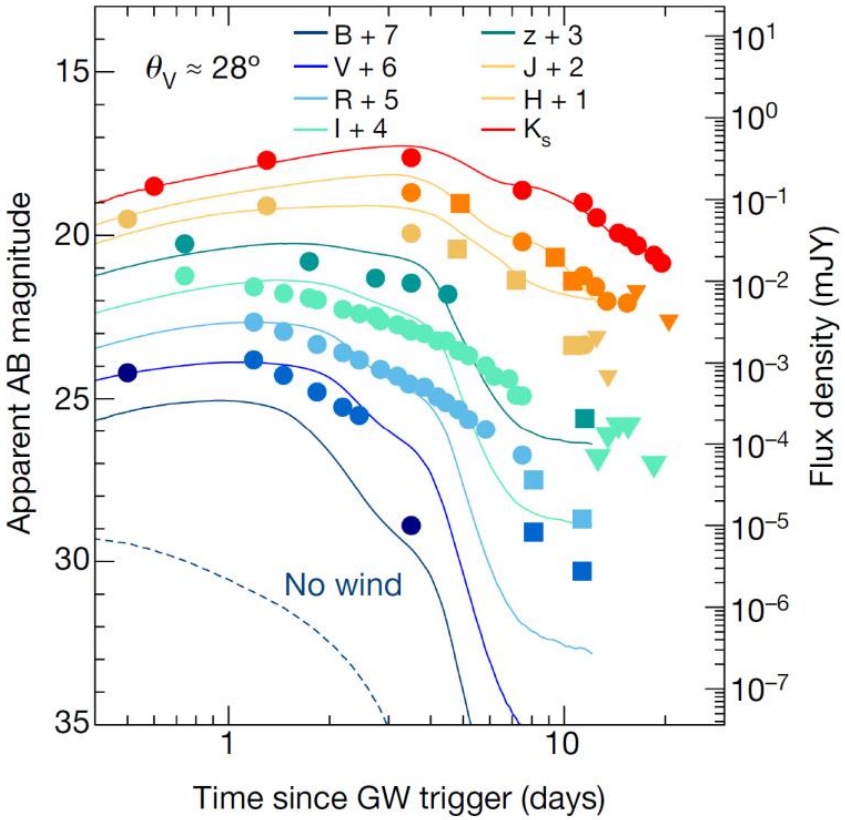
Quasars, because they are so bright, have been suggested as one of the main "culprits" for the source of re-ionizing energy. Quasars shine when supermassive black holes at the centers of galaxies vigorously accrete gas and stars – they can blaze at up to 100 times the total brightness of their host galaxies. Knowing the number of quasars in the early Universe with moderate luminosity (from about a few to 10 times more luminous than our Milky Way galaxy) can provide an important clue to solving this puzzle, since moderate luminosity quasars dominate the available illumination provided by quasars.

Kim et al. 2015 ApJL, 2018 ApJ

GW170817 (Kilonova)



21hrs after GW emission
LSGT at SSO
(Im et al. 2017 ApJL, 2018 in prep,
Abbott et al. 2017 ApJL)



KMTNet follow-up observation
(Troja, …, Im, M., et al. 2017, Nature)

Future

- Specific science project collaboration
  - Examples) High-z QSO, Galaxy clusters
  - Time-domain study (GRB, SNe, GW)
- Project-based collaboration
  - Past example: SDSS, AKARI
- University-based center/institution
- Workshops (e.g., EA-AGN)