Subaru Access Interests from China

- Response to EAO/Subaru new initiative

Suijian Xue

National Astronomical Observatories
Chinese Academy of Sciences

NAOJ, Mitaka, Jan. 18, 2018

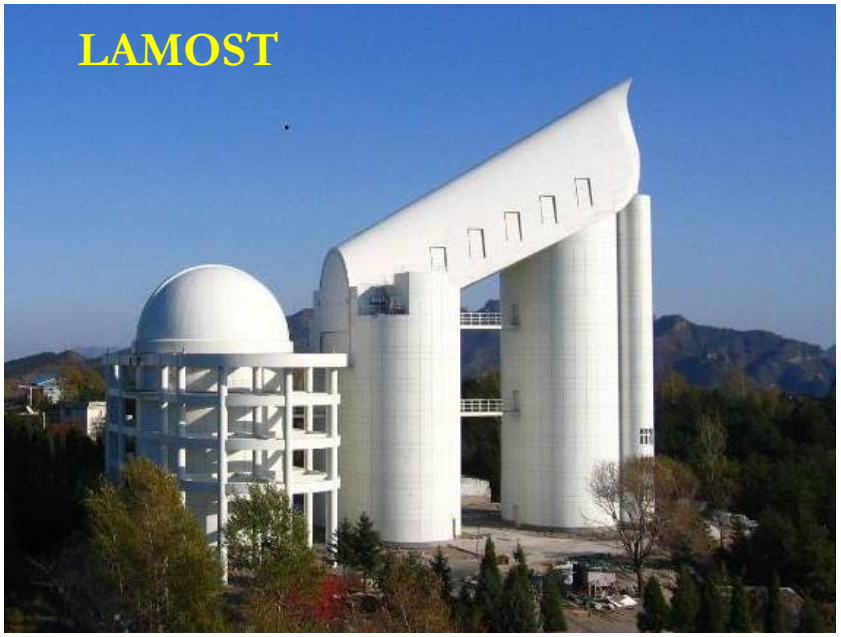
1. Searching for outlying populations in the Milky Way

- Galactic stars showing abnormal kinematics and/or chemical compositions, i.e., outlying populations were formed during
  - Enrichment of the early generation of SN: metal-poor stars
  - Merging history of the halo: moving groups, low-α stars
  - Particular nucleosynthesis environments: chemically peculiar stars
- Outlying populations constrain the environment and mechanism of their birth and evolution: key to fully understand the history of our Galaxy
- LAMOST provides a great opportunity to enlarge the sample

Subaru/HDS follow-up spectroscopy for a large sample of outlying populations found with LAMOST

(PIs: Gang ZHAO & Wako AOKI)

- High-resolution spectra are demanded to really understand the nature and origin of these peculiar stars
- LAMOST+Subaru joint searching project since 2014



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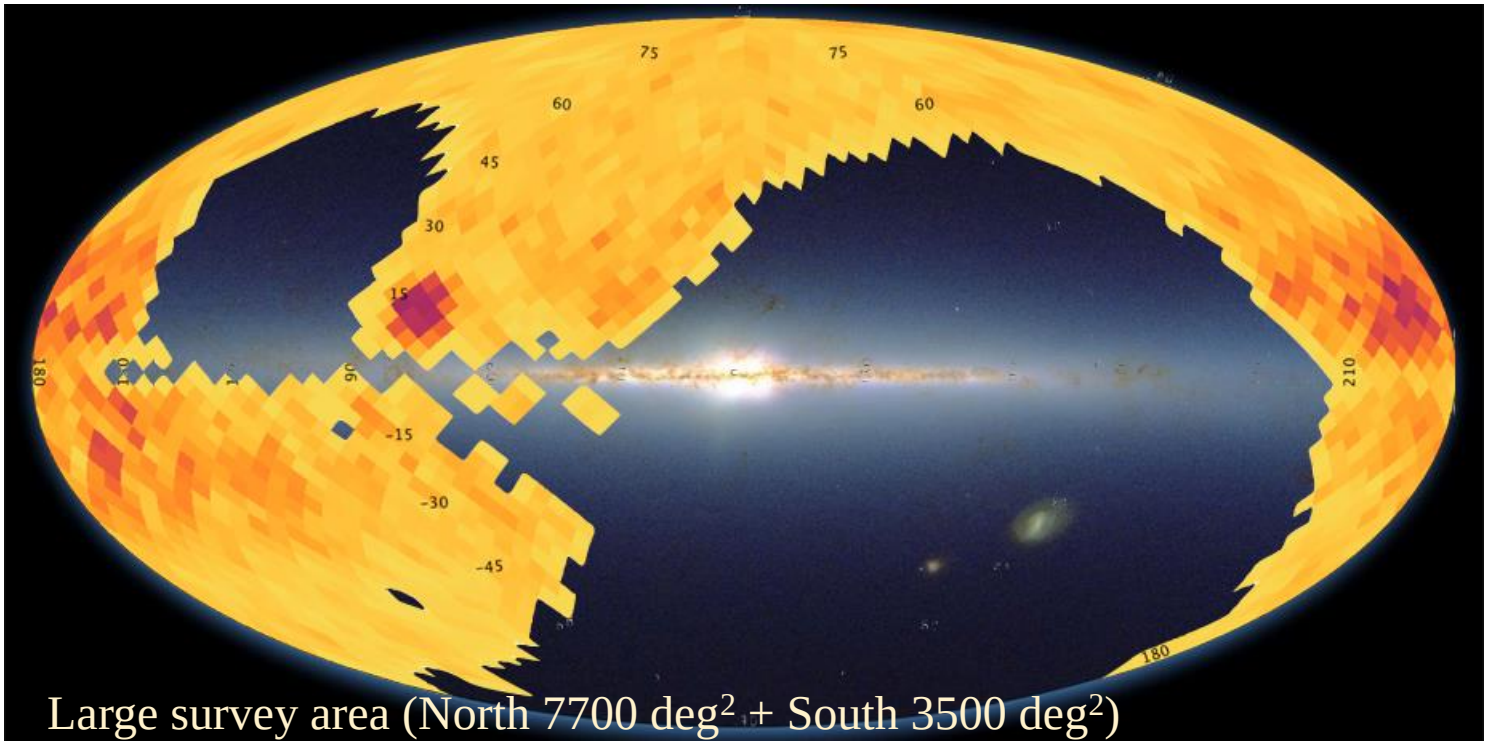
LAMOST data releases (DR5) 06/19

DR5 ~ 7,500,000 spectra (sn>10); AFGK catalogue ~ 5,300,000 stars



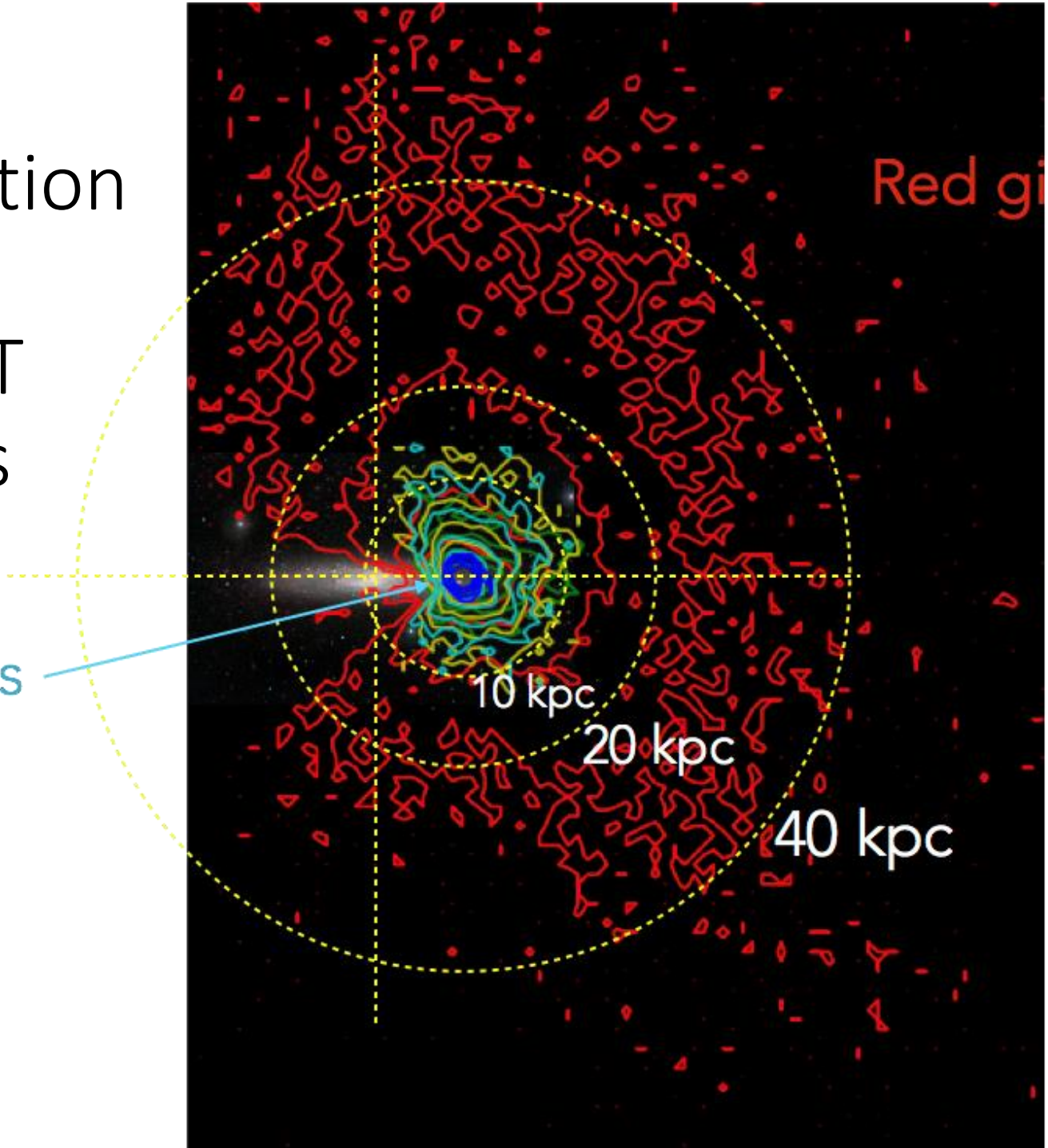
Large survey area (North 7700 deg^2 + South 3500 deg^2)

Target selection

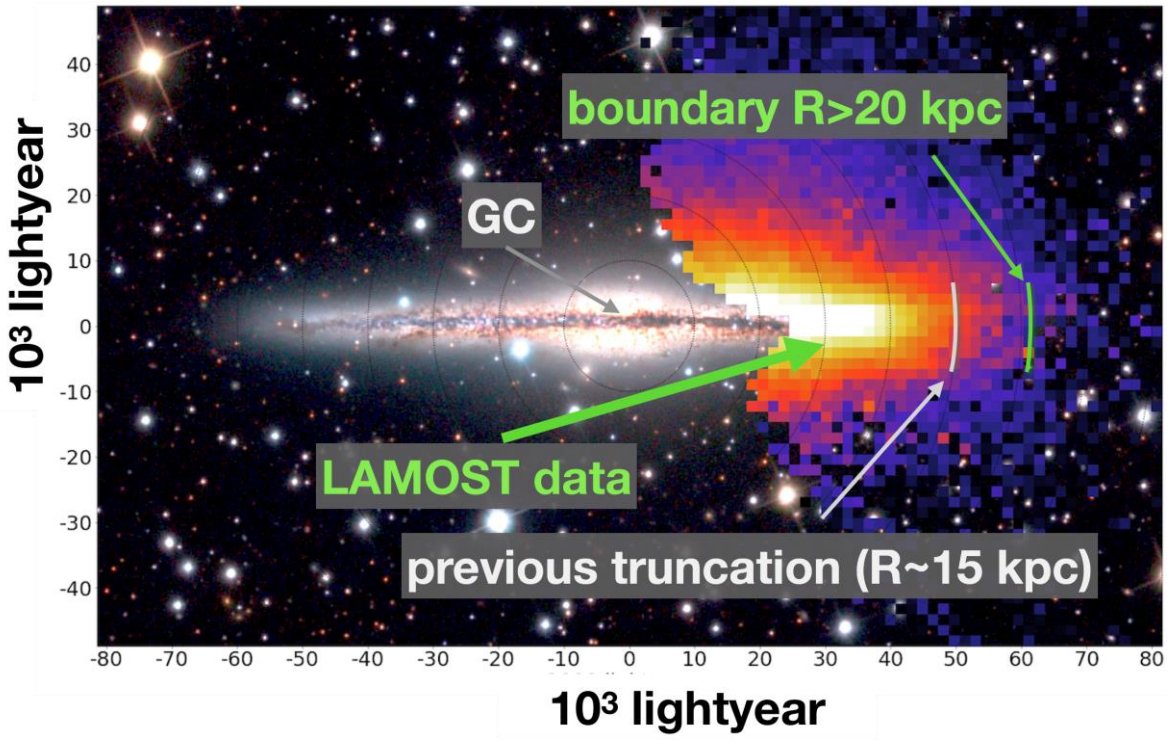
Random selection for a given magnitude/temperature range.

suitable for investigating statistics

Spatial distribution of the LAMOST samples



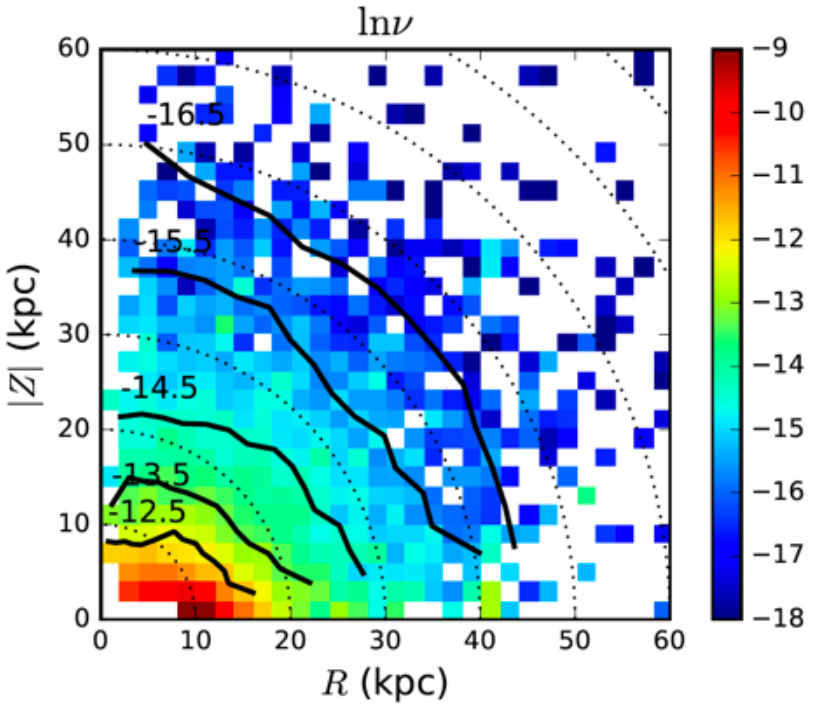
LAMOST reveals a large Galactic disc



LAMOST data shows that the Galactic disc does not truncate within 20 kpc

Liu et al. 2017, RAA, 17, 96

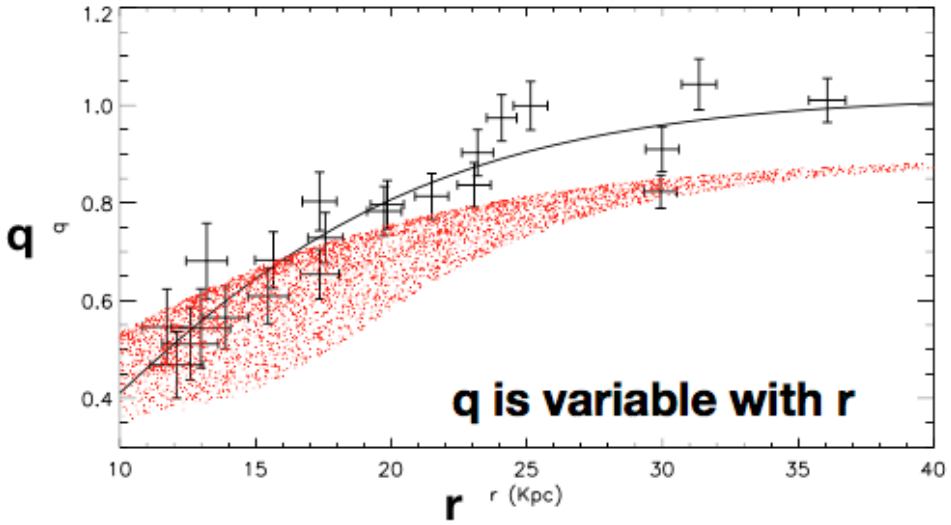
The stellar halo is oblate inside and spherical outside

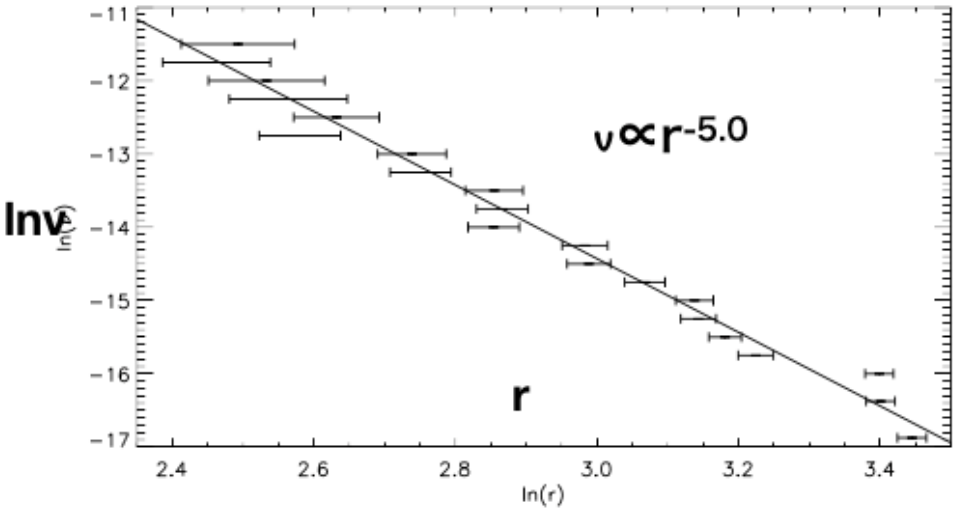


Liu et al. 2017, RAA, 17, 96

- The axis eratio q changes from 0.5(r~12kpc) to around 1 (r~30 kpc)
- The density profile follows a single power law with index of-5

Xu, Liu et al. 2018, MNRAS, 473, 1244





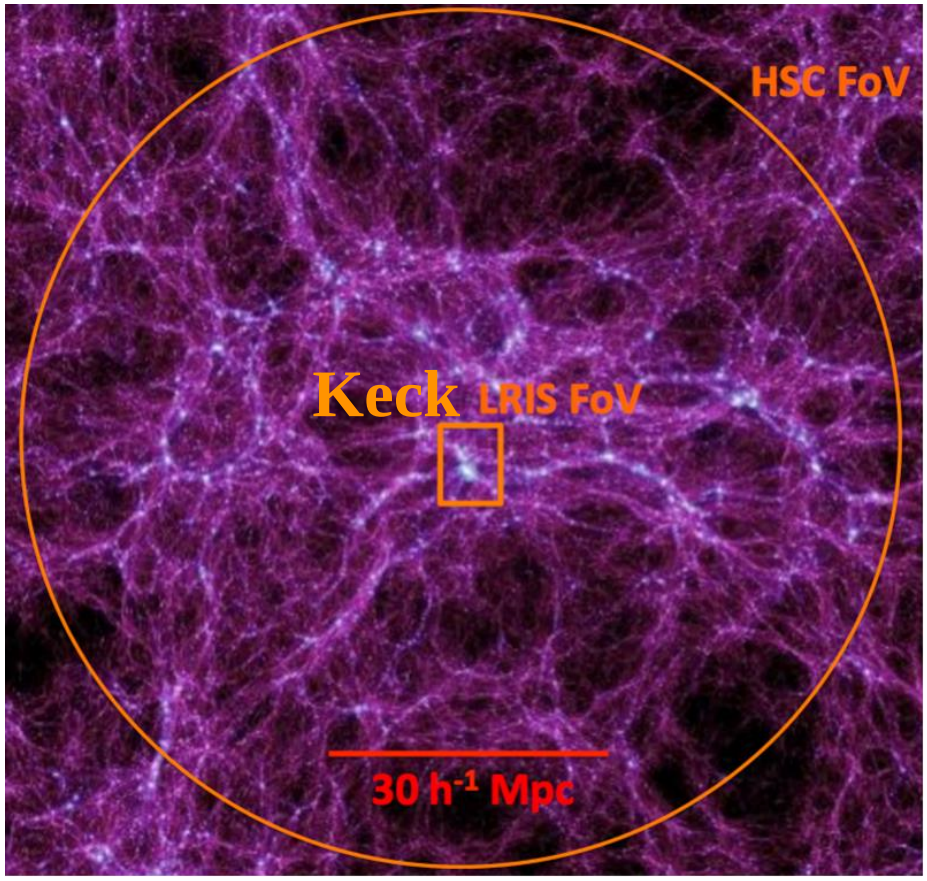
Subaru/HDS follow-up spectroscopy for a large sample of outlying populations found with LAMOST

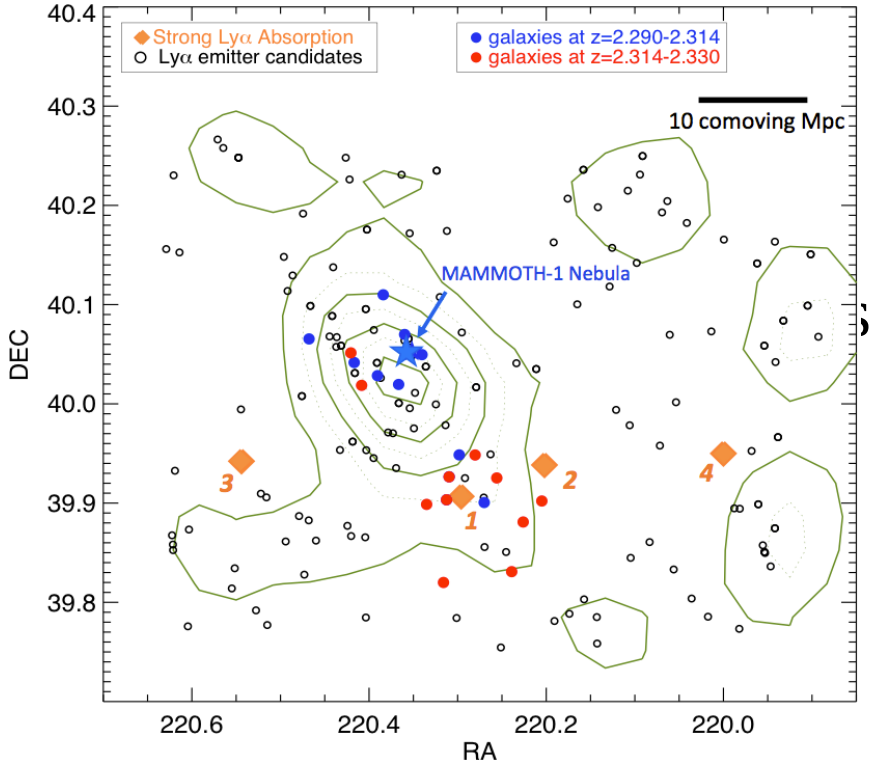
(PIs: Gang ZHAO & Wako AOKI)

- Joint proposal for Subaru open-use program
  - Normal + Service + Intensive
- CAS-JSPS joint project (on-going)
- Important results obtained
  - Large sample of ~350 very/extremely metal-poor stars
  - A dozen (super) Li-rich giants
  - A dozen moving group member and low-α stars
- A number of refereed papers published
- Interests on EAO/Subaru time allocation

2. MApping the Most Massive Overdensity Through Hydrogen (MAMMOTH)

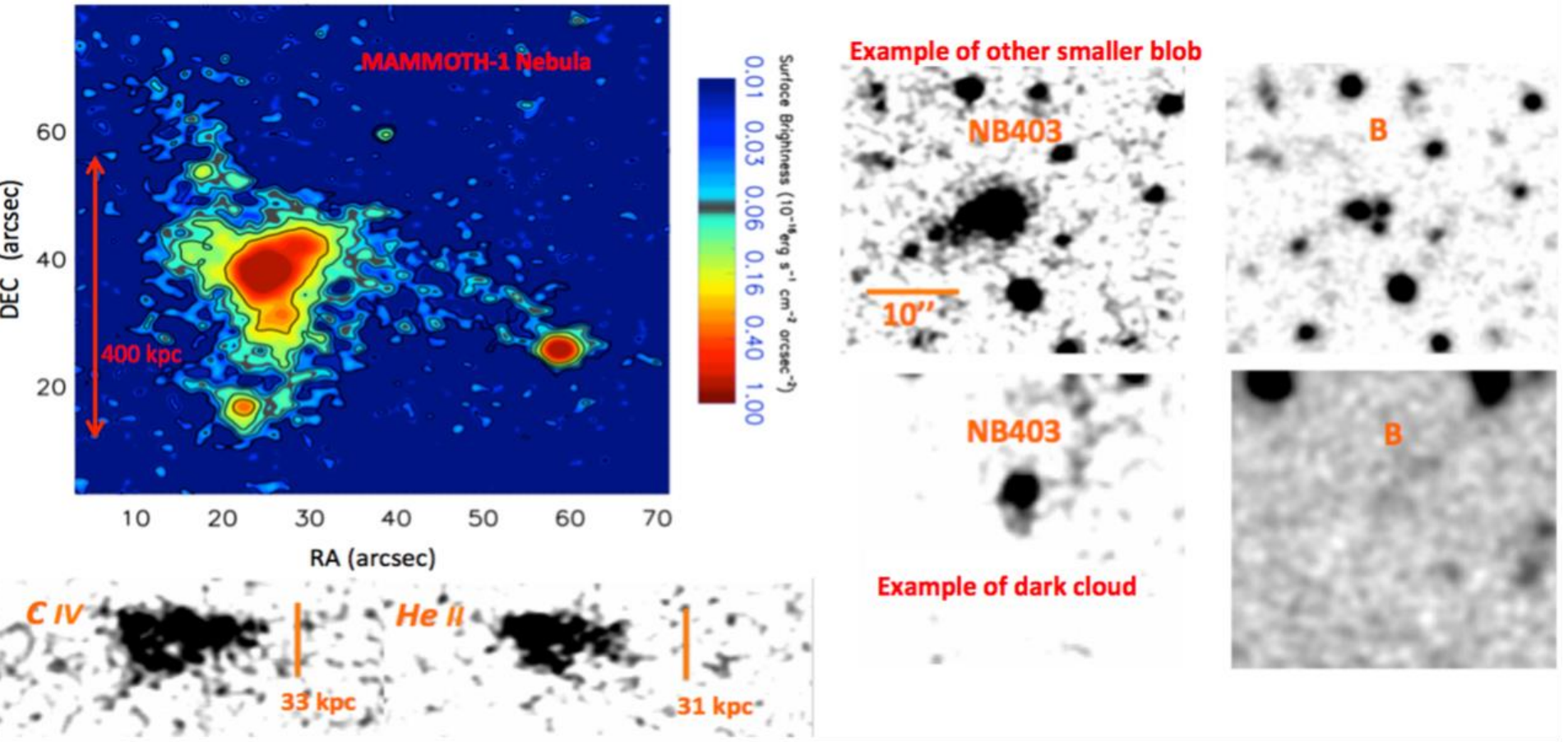
The most massive protocluster at z=2.3 traced by group of Lya absorption, Subaru/HSC can go much deeper and also go wider area to completely reveal the large-scale structures at high-z





Cai et al. 2017b

Reveal the intergalactic medium using the Lyman alpha emission utilizing giant Lya nebula in extreme overdensities



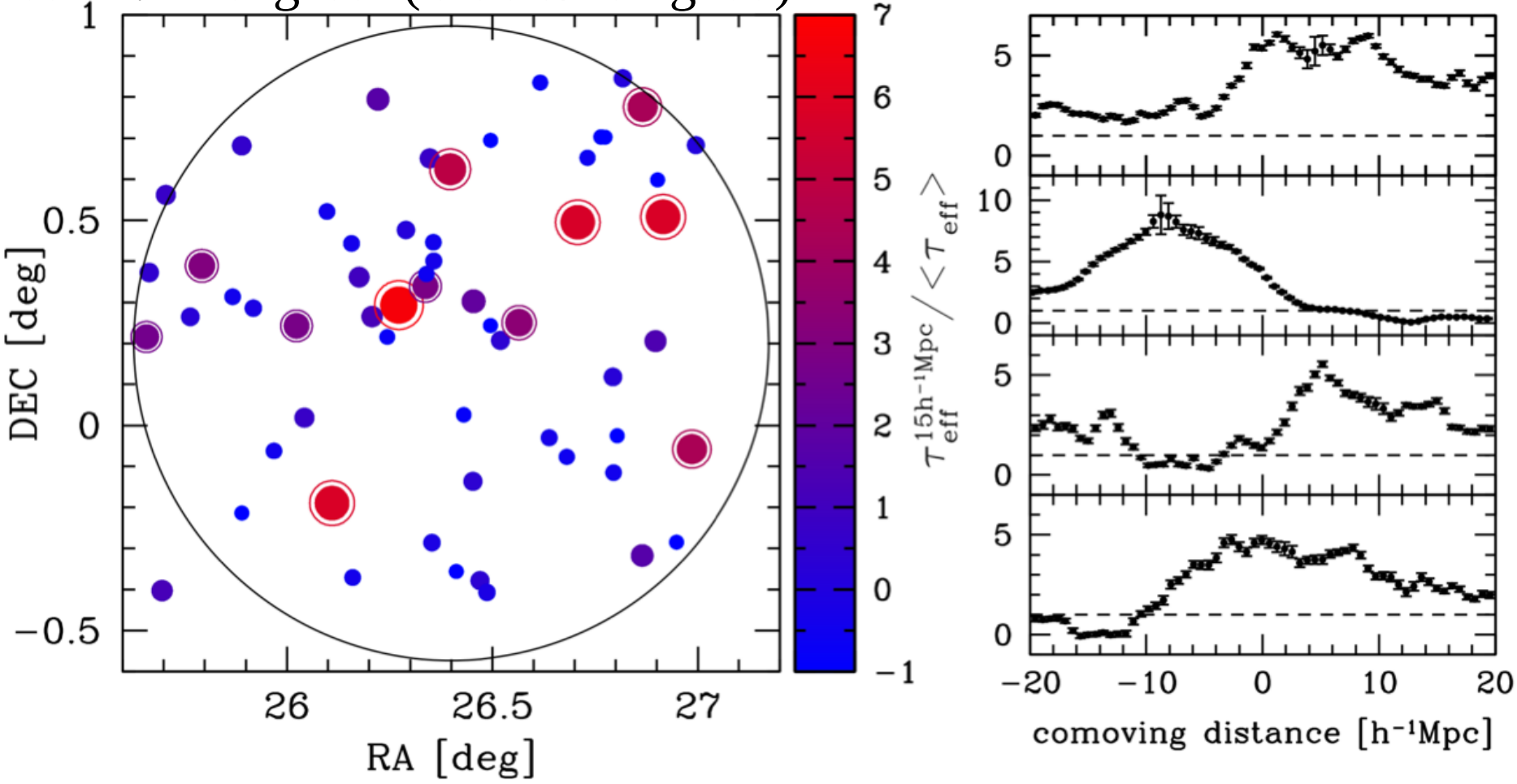
largest Lya nebula at z=2.3, Cai et al. 2017a

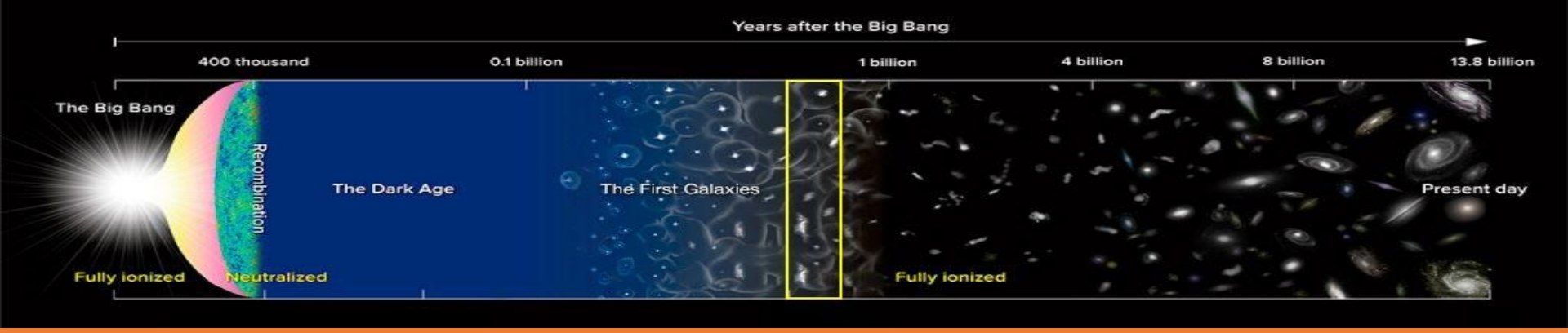
Each Subaru HSC field contains >20 background SDSS QSOs; HSC will detect LAEs; SDSS-III QSO can provide IGM absorption. Fully probing LAE- HI correlation.

Subaru-MAMMOTH project (3-night in 17B);

PI: Nobunari Kashikawa;

co-PI: Zheng Cai (UCSC/Tsinghua)





3. Lyman Alpha Galaxies in the Epoch of Reionization (LAGER)

CHINA

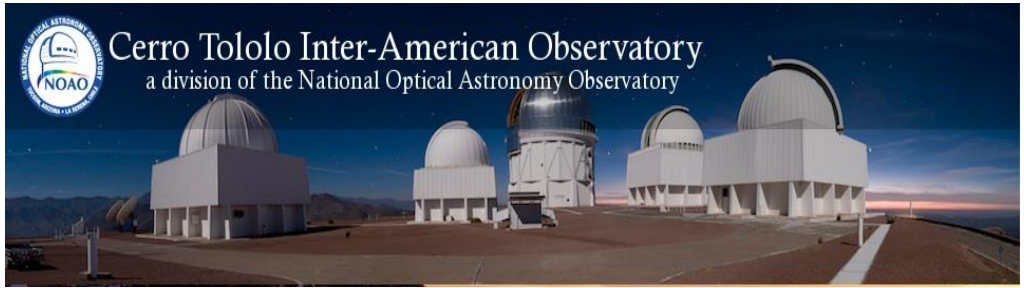
Junxian Wang (USTC),
Zhenya Zheng (SHAO)
Weida Hu (USTC),
Wenyong Kang (USTC)
Linhua Jiang (PKU/KIAA),
Chunyan Jiang (SHAO),
Xu Kong (USTC),
Xianzhong Zheng(PMO) …

USA

James Rhoads (ASU, NASA),
Sangeeta Malhotra (ASU, NASA),
Alicia Gonzalez (ASU),
Tianxing Jiang (ASU),
Vithal Tilvi (ASU) ,
Steven Finkelstein (U. Texas), …

CHILE

Leopoldo Infante (LCO),
Huan Yang (LCO)
Felipe Barrientos (PUC),
Gaspar Galaz (PUC),
Franz Bauer (PUC),
Alistair Walker (NOAO-CTIO)
Pascale Hibon (ESO), …



NOAO press release

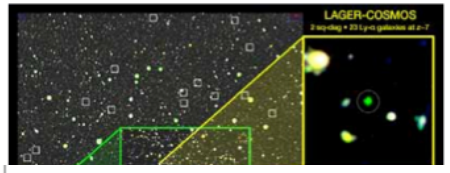
National Optical Astronomy Observatory NEWS

Education and Public Outreach • 950 N. Cherry Ave • Tucson, AZ • 85719 • 520.318.8285 • FAX 520.318.8451

Media Contact:

Dr. Joan Najita, Chief Scientist
National Optical Astronomy Observatory
950 N Cherry Ave
Tucson AZ 85719 USA
+1 520-318-8416
E-mail: najita@noao.edu

FOR IMMEDIATE RELEASE: July 11, 2017
RELEASE NO: NOAO 17-03



occurred. Image Credit: NAOJ.

Science Contacts

Dr. Junxian Wang
Department of Astronomy
University of Science and
Technology of China
96 Jinzhai Road Hefei, Anhui
230026 China
Email: jxw@ustc.edu.cn

Distant Galaxies 'Lift the Veil' on the End of the Cosmic Dark Ages

Astronomers studying the distant Universe have found that small star-forming galaxies were

Junxian Wang (USTC), the organizer of the study, further explained, "Our finding that the intergalactic gas is 50% ionized at z ~ 7 implies that a large fraction of the first galaxies that ionized and illuminated the universe formed early, less than 800 million years after the Big Bang."

For Zhenya Zheng (Shanghai Astronomical Observatory, CAS), the lead author of the paper describing these results, "800 million years is the current frontier in reionization studies." While hundreds of LAEs have been found at later epochs, only about two dozen candidate LAEs were known at 800 million years prior to the current study. The new results dramatically increase the number of LAEs at this epoch.

CTIO 4m Blanco Telescope

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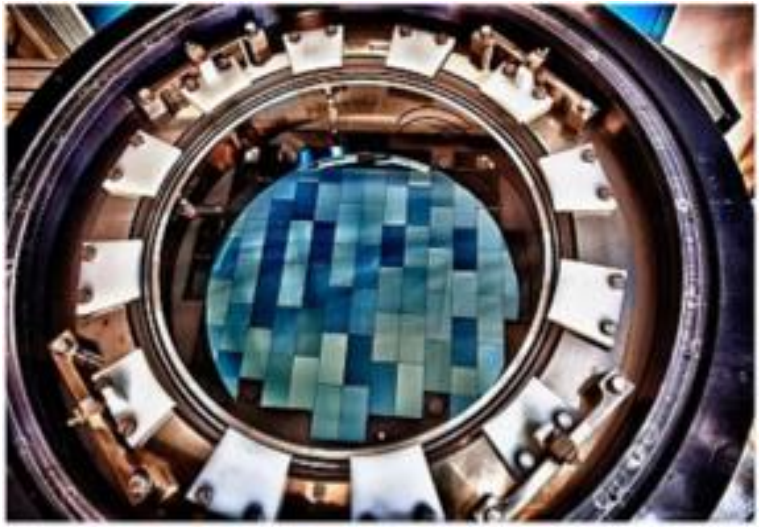
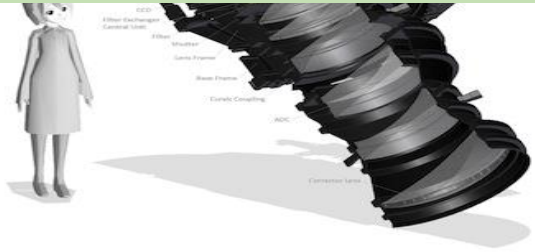


DECam (FOV = 3 sq-deg)

Go deeper and wider Collaboration!

Subaru 8m



HSC, 1.5deg FOV

Summary & suggestion

- **Strong interests from different groups**
- **Main concern is the expensive cost, one night ~ 100K US$**
- **A suggested solution is the combination of "cash + in-kind"**

  e.g. one night charge

  - **2/3 goes to operation**
  - **1/3 goes to soliciting for manpower, supporting astronomers, engineers, and technicians**