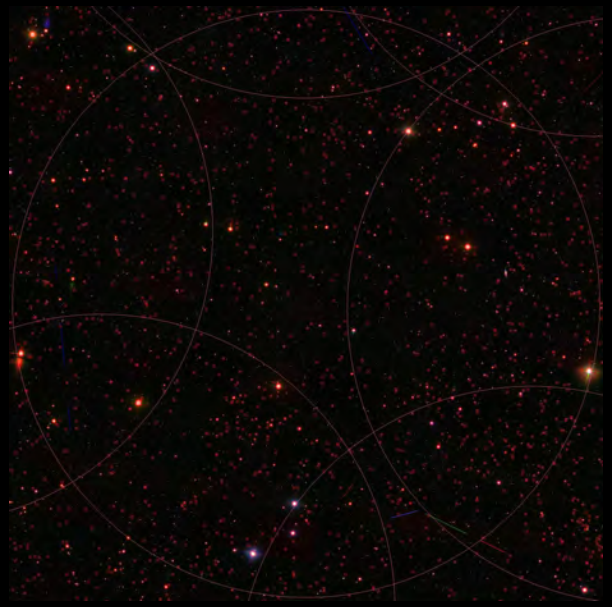
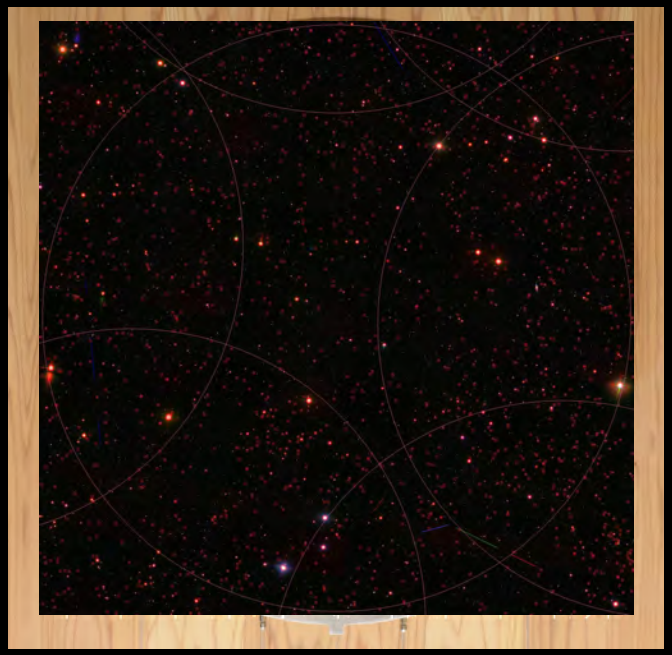
Universe unveiled through holes of aluminum plates





The 2019 Kyoto Prize Workshop: Basic Sciences

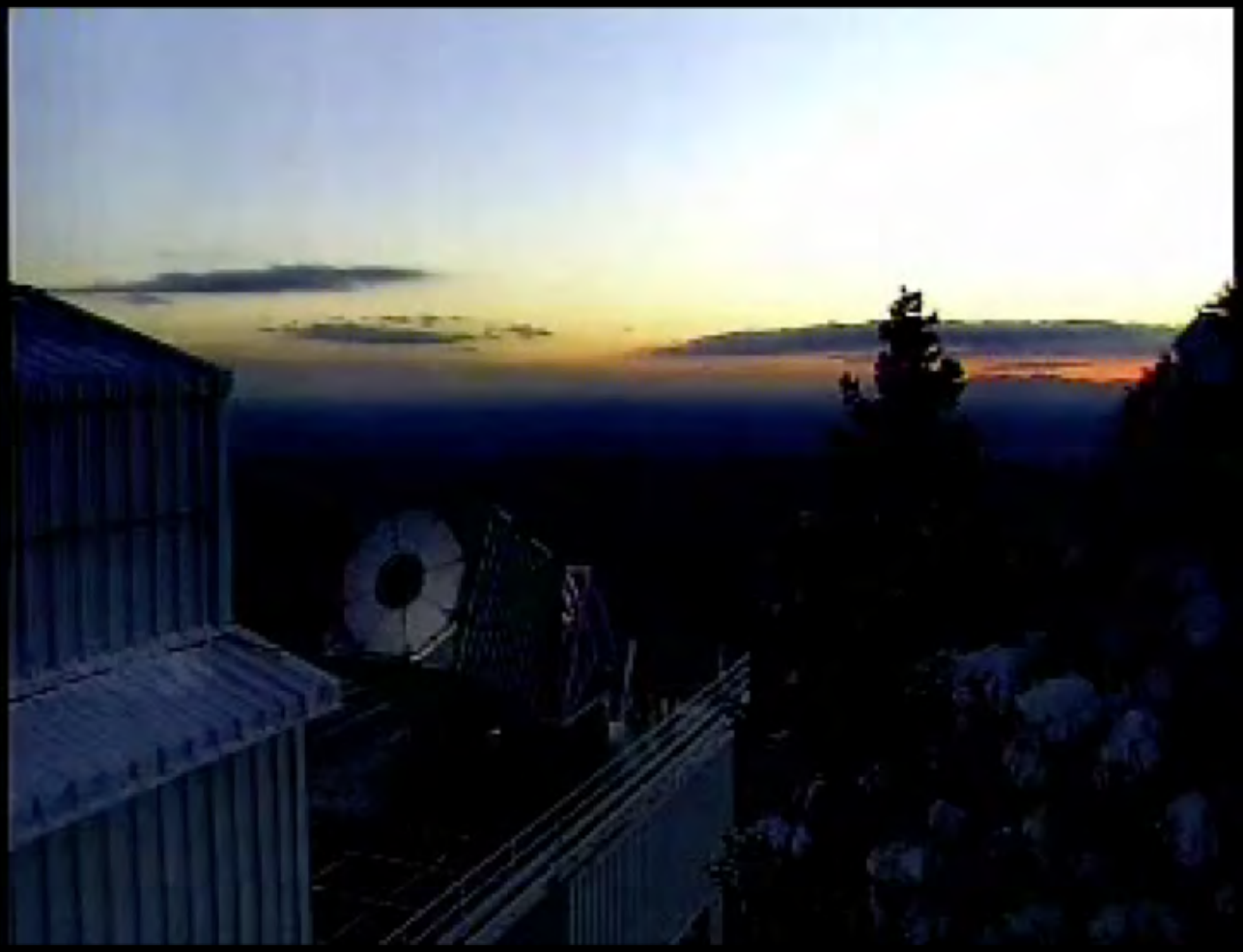
Wide-Field Sky Survey of the Universe: From the Past to the Future of Astronomy

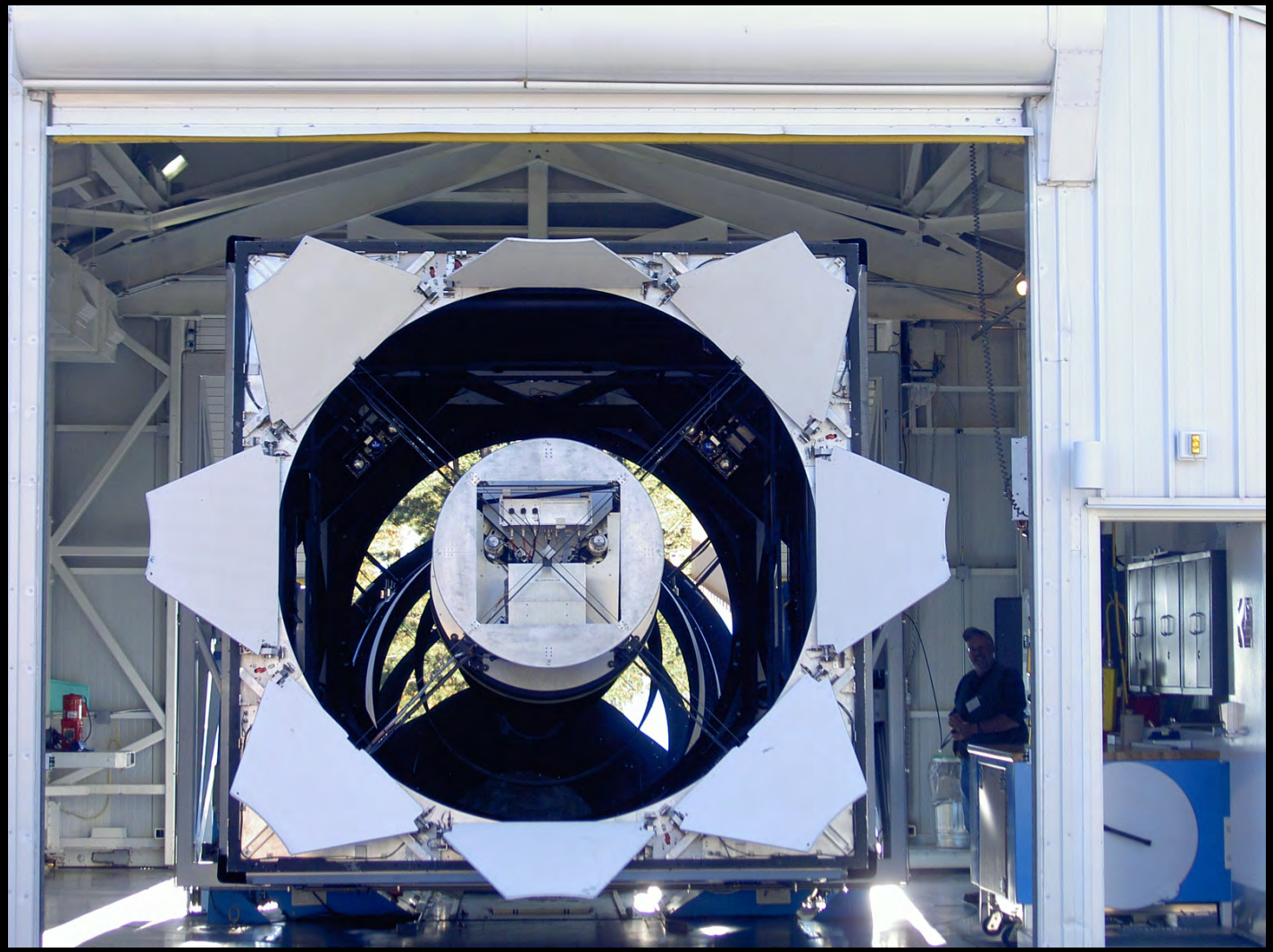
November 13, 2019 @ Tetsumon Memorial Auditorium, the University of Tokyo

Yasushi Suto ***Department of Physics and Research Center for the Early Universe, The University of Tokyo***

NHK TV program “Science Zero”

broadcasted on June 11, 2003

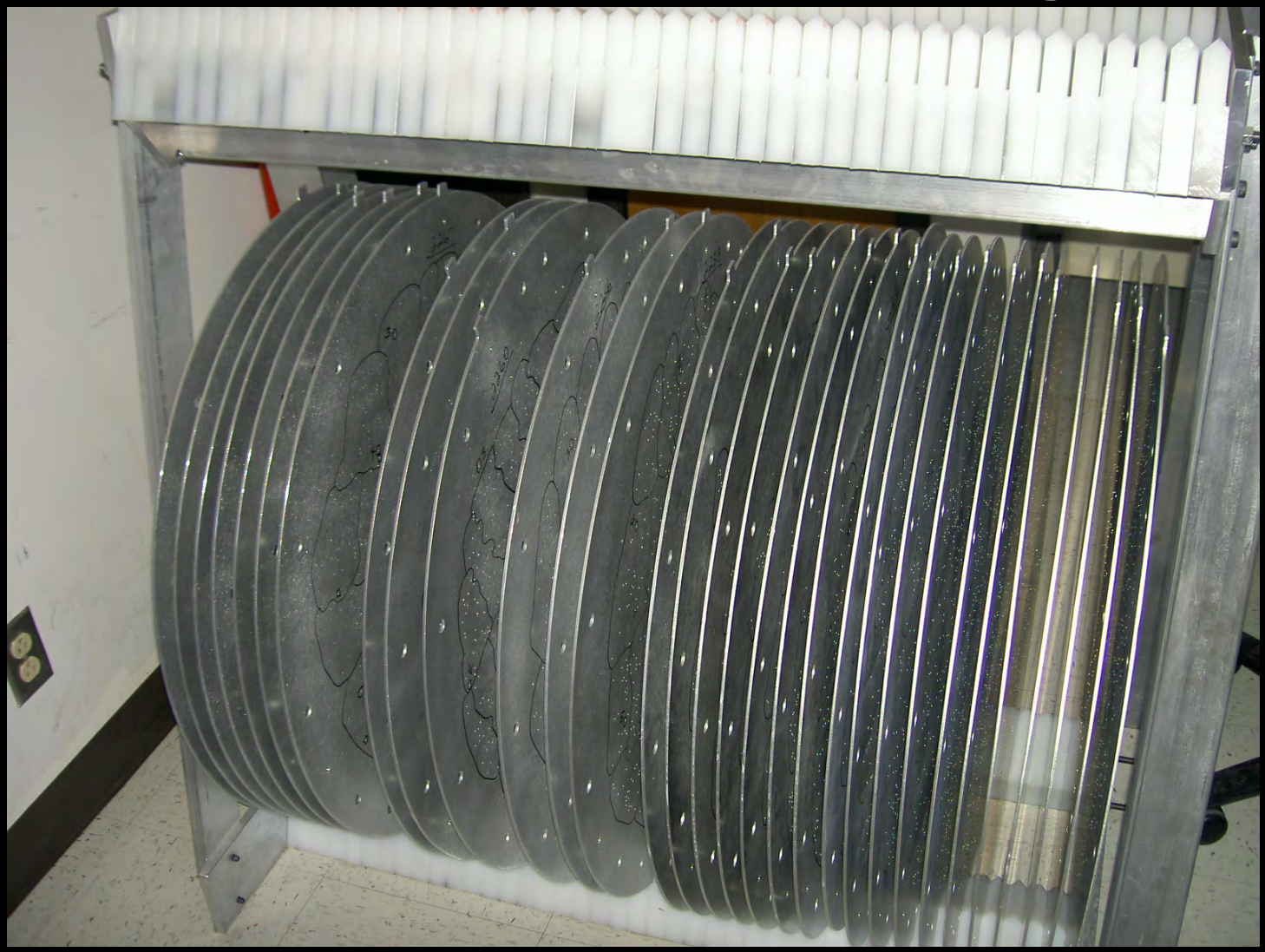


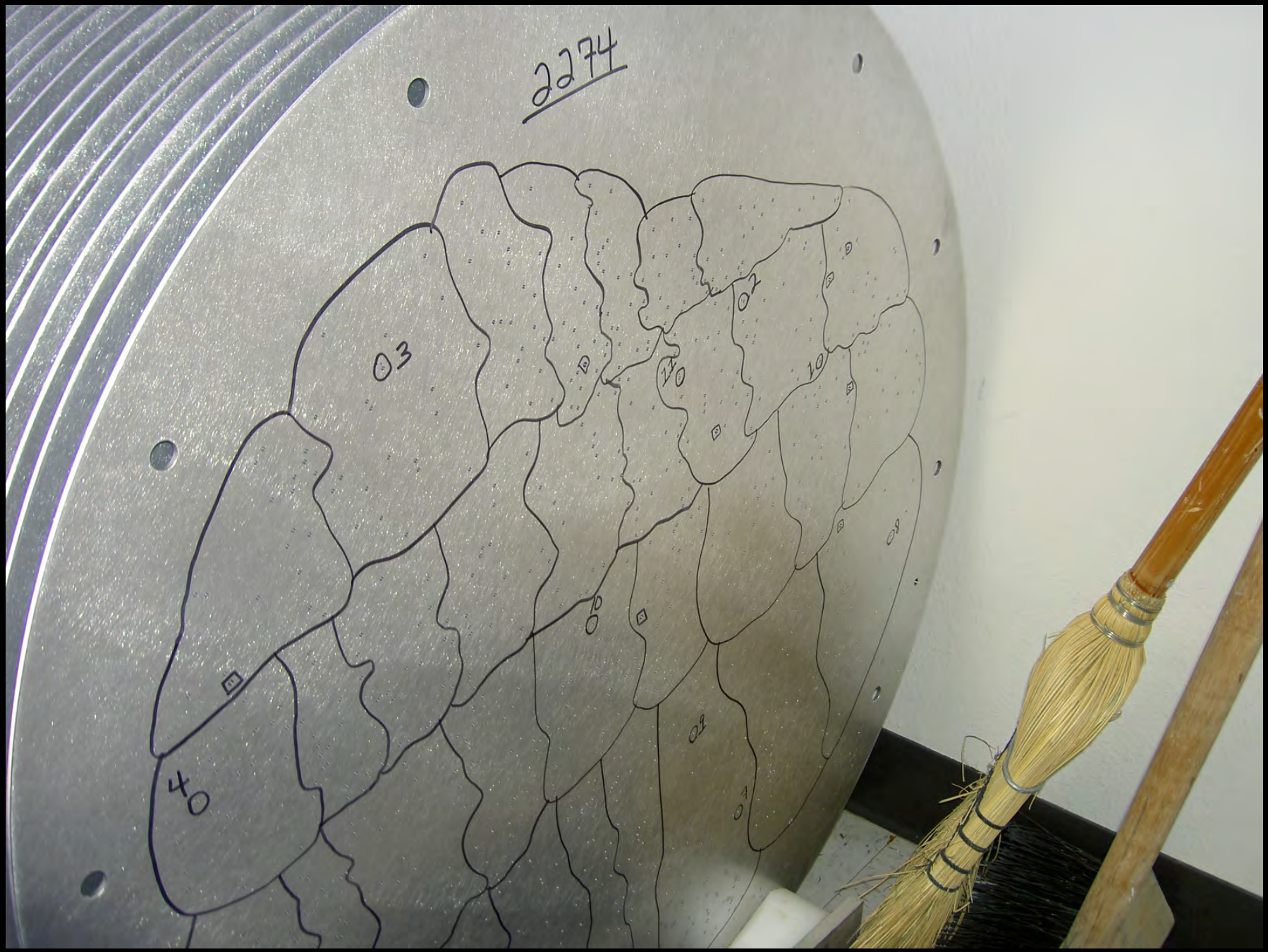


SDSS spectrograph

- Imaging objects on 2D sphere
- Select bright objects (about 1%)
- Simultaneous spectroscopy of 640 objects at a time (x 2565 plates)
- Distance from the Hubble-Lemaitre law ⇒ 3D map of the universe

Simultaneous spectroscopic observation of 640 objects




2274
03
02
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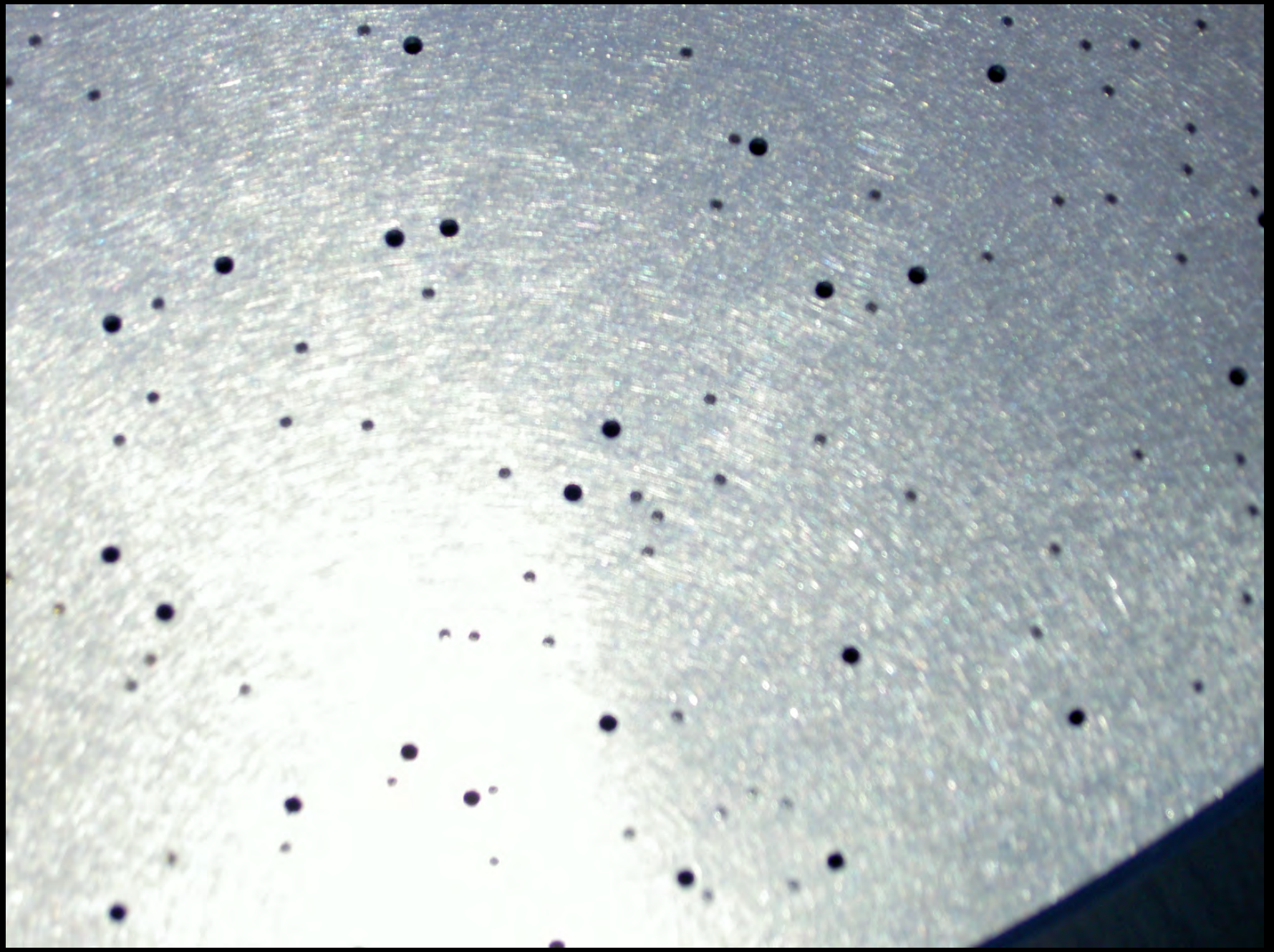
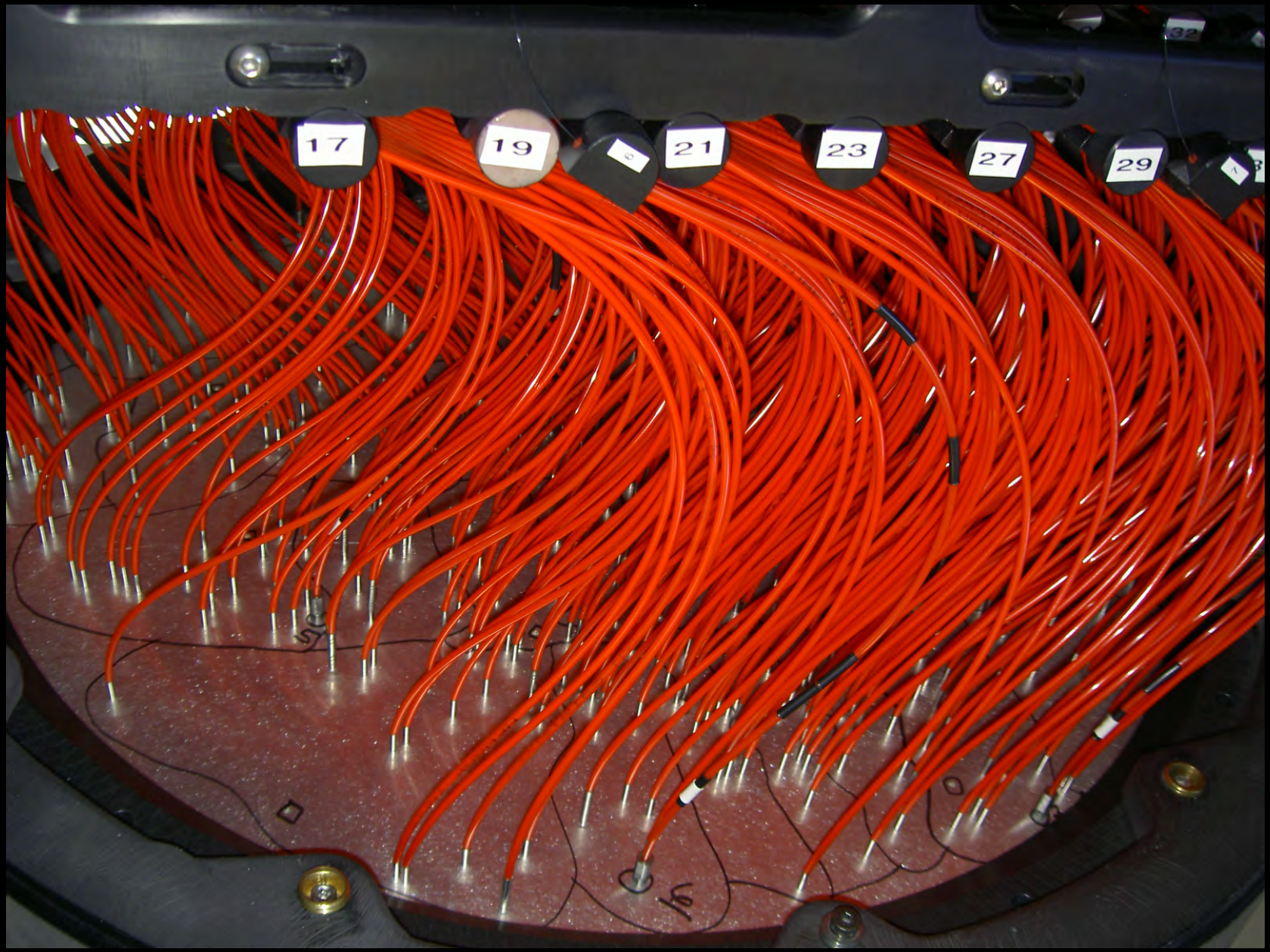
08
40




6

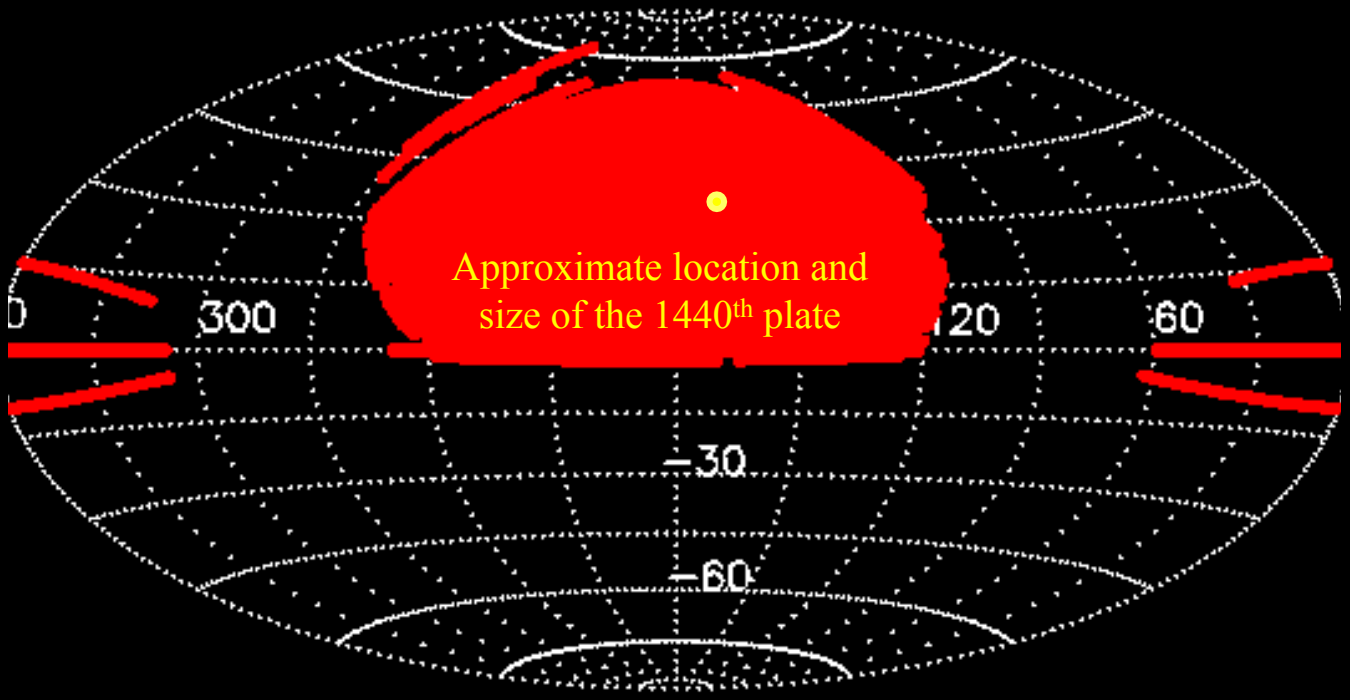

17
19
21
23
27
29

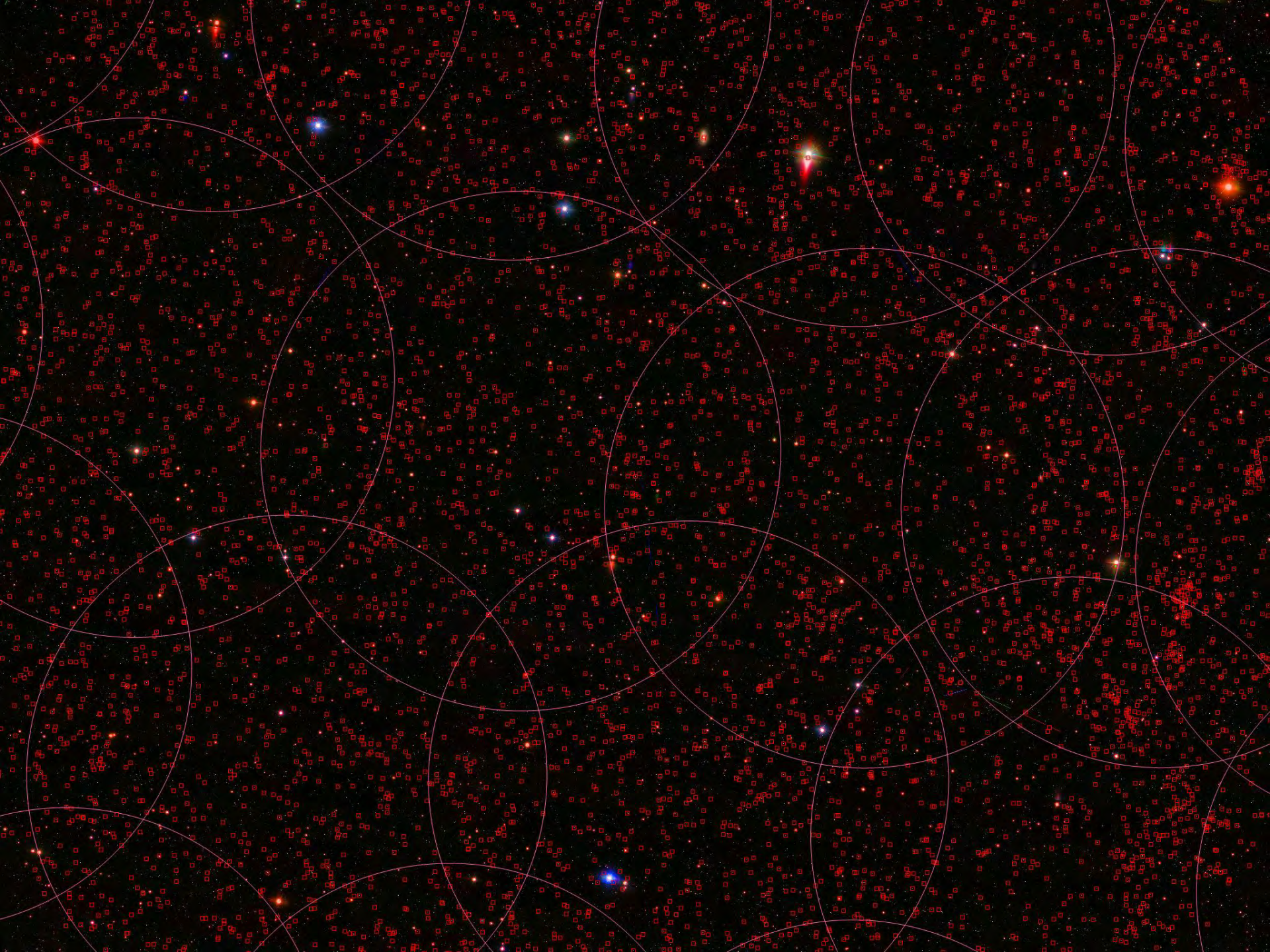
The 1440th plate on the wall of Kochi Mirai-Kagaku museum (my hometown)

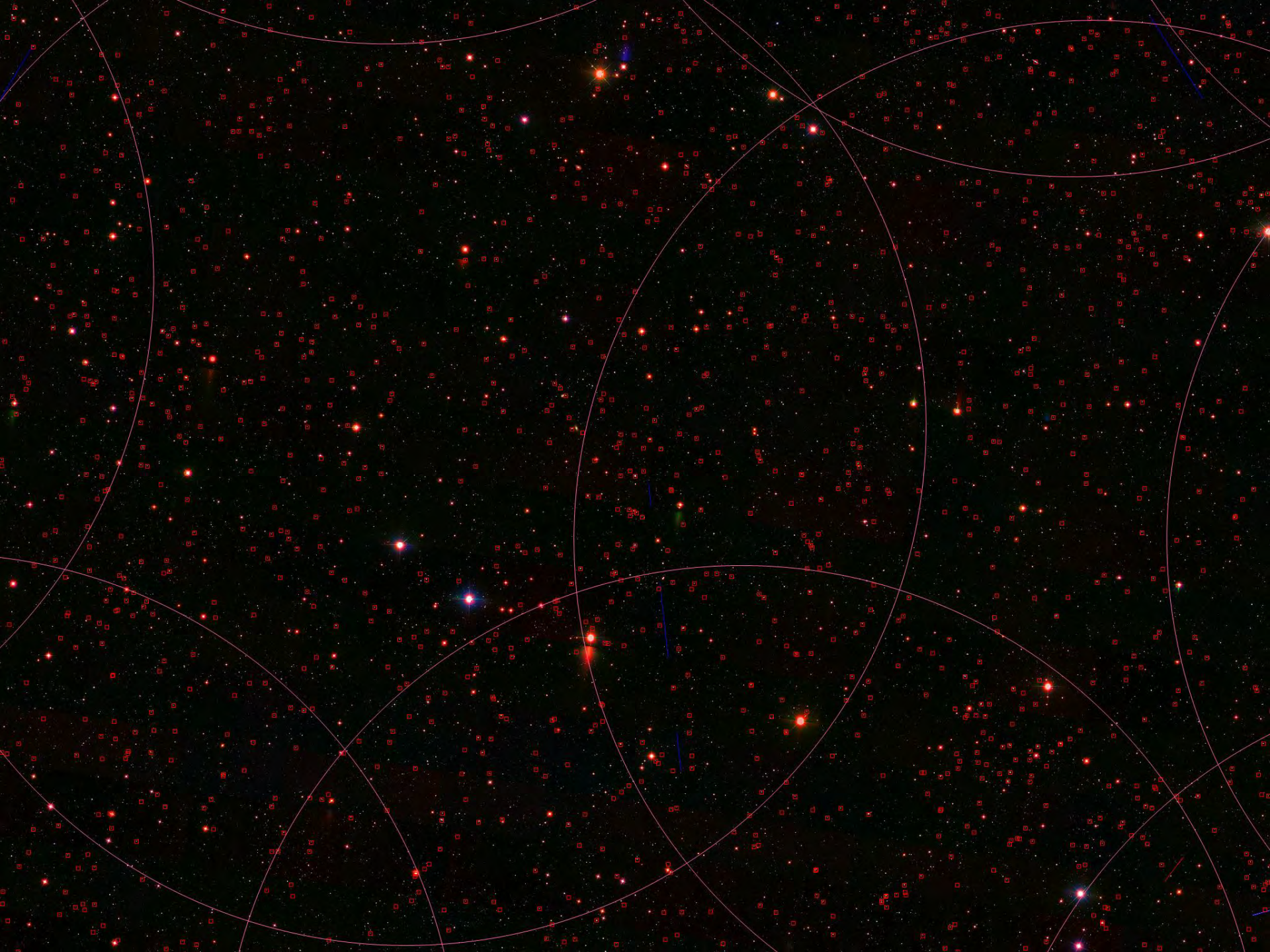
About 100 SDSS plates are distributed in museums and schools all over Japan through the generous support by RESCEU (～1 million yen)

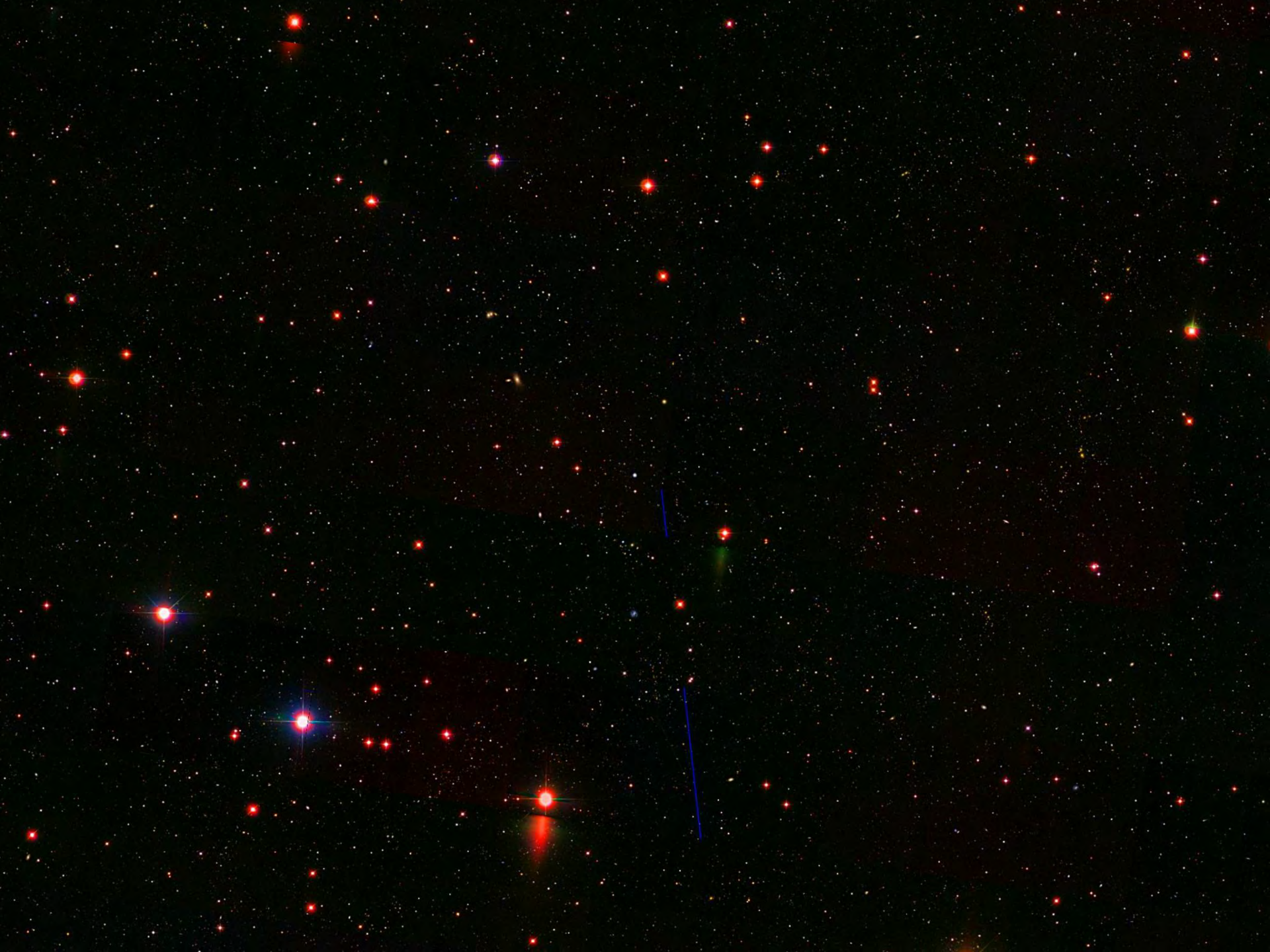
SDSS surveyed 25% of the entire sky

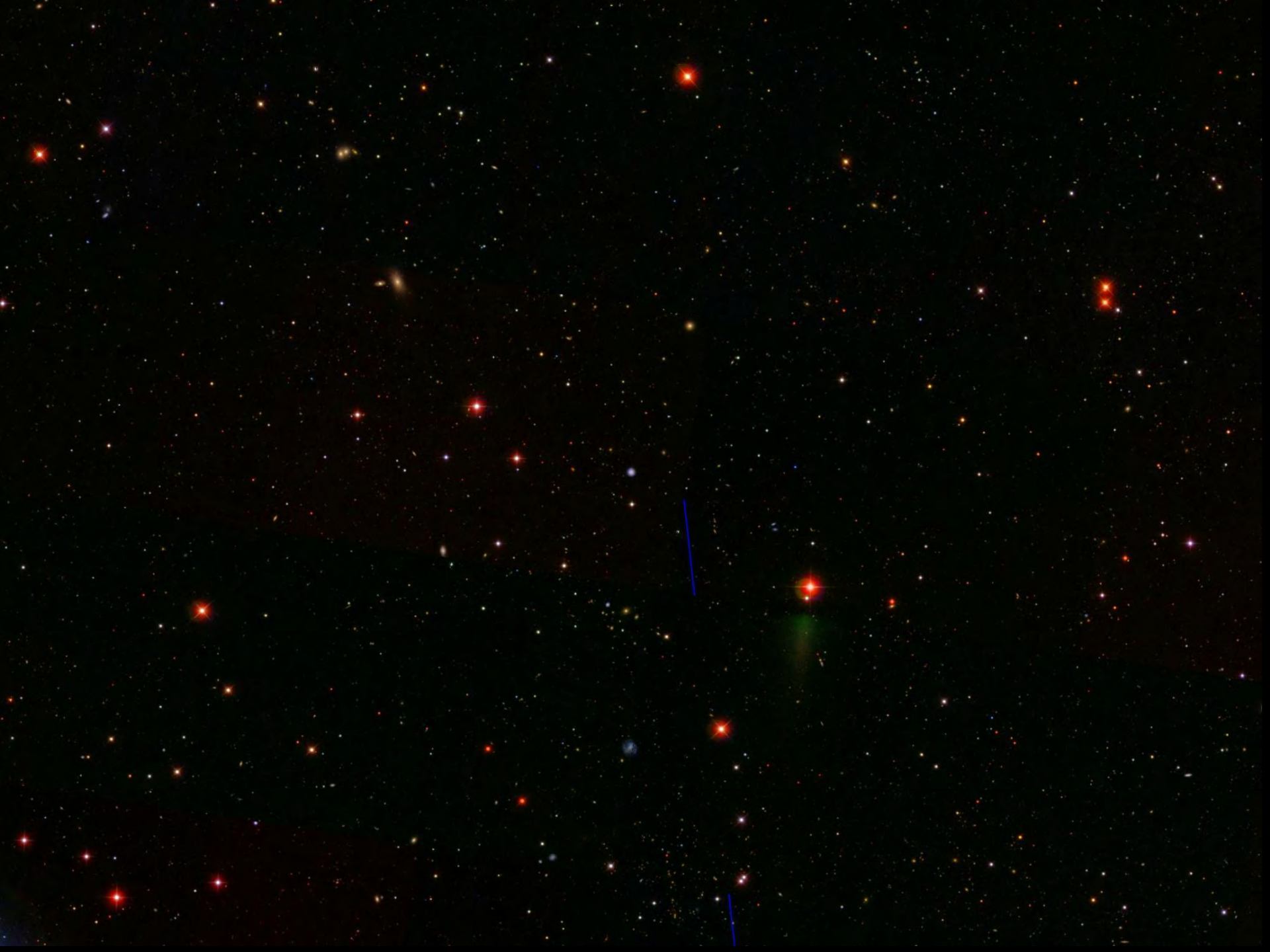
2565 aluminum plates in total (712 USD/plate)
The Japanese group bought more than half of the plates (～100 million yen !)

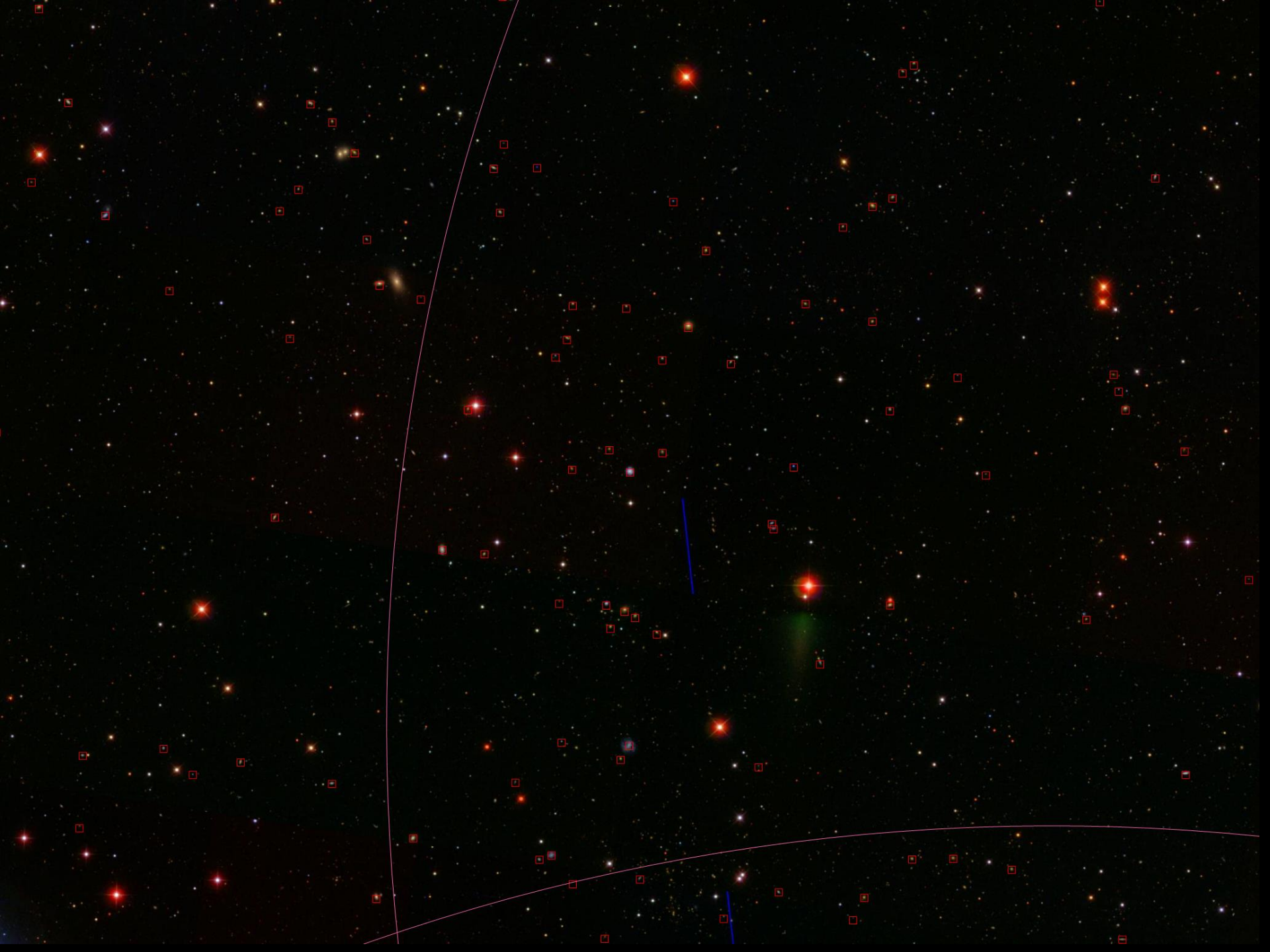


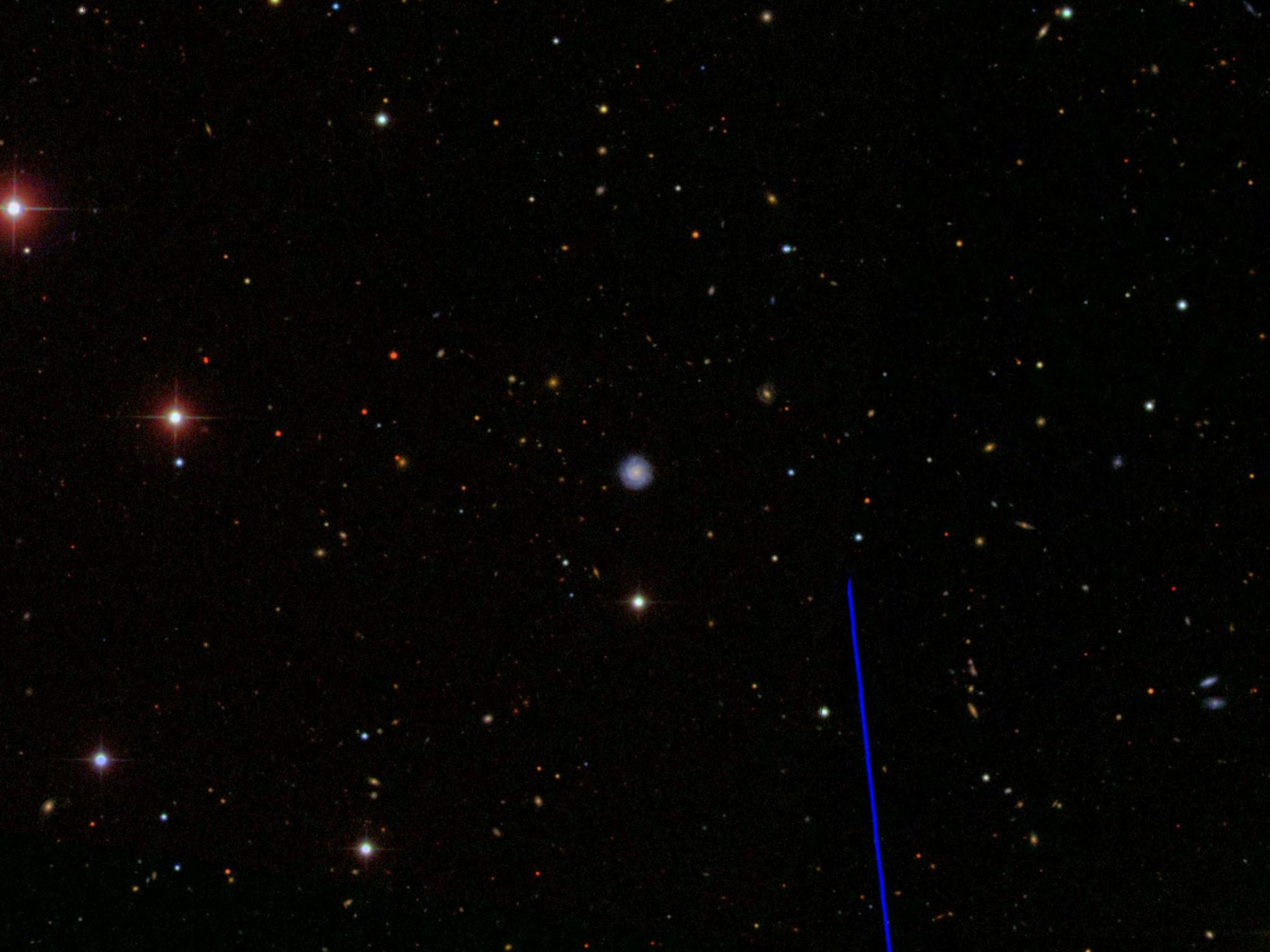


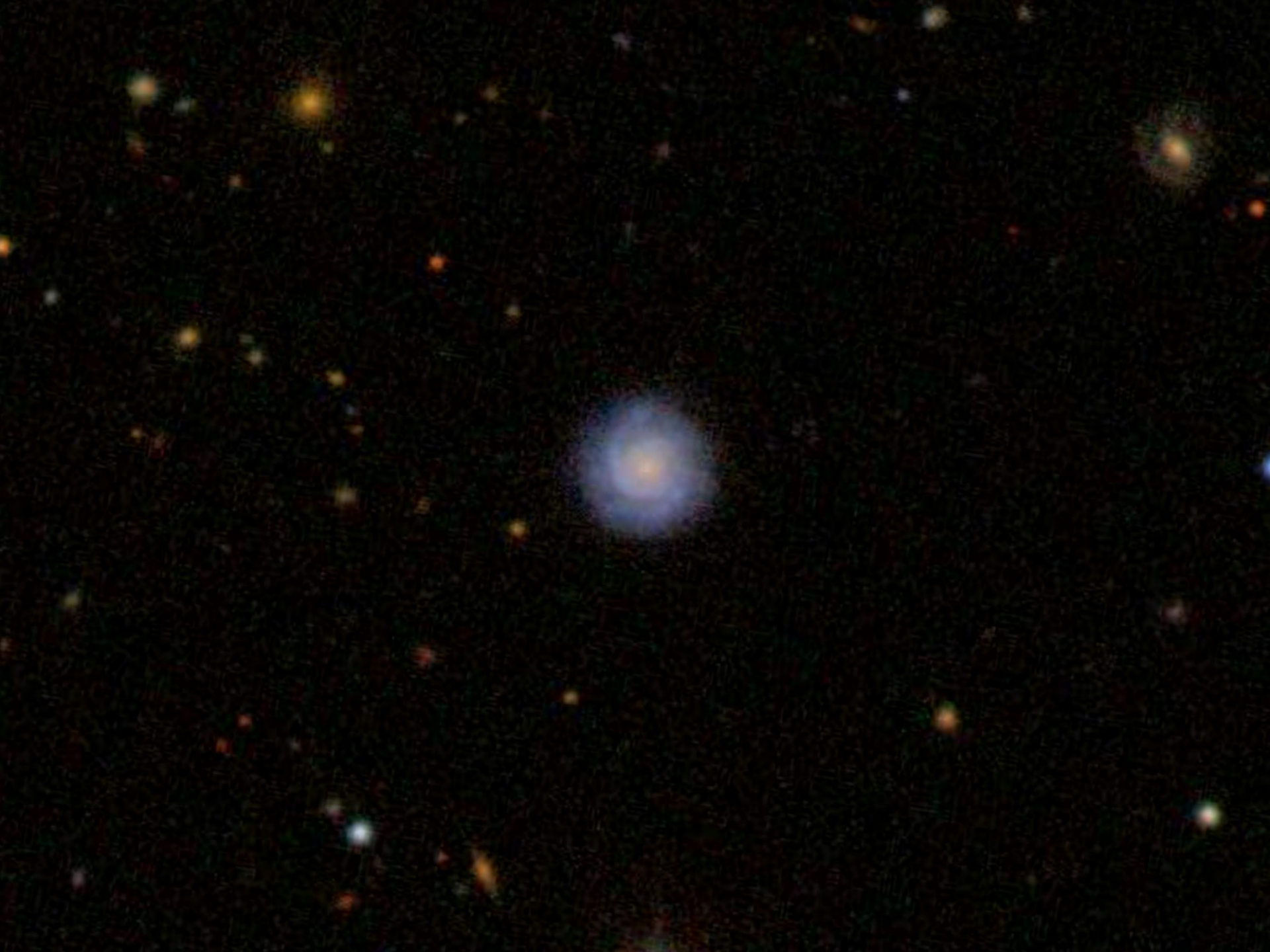


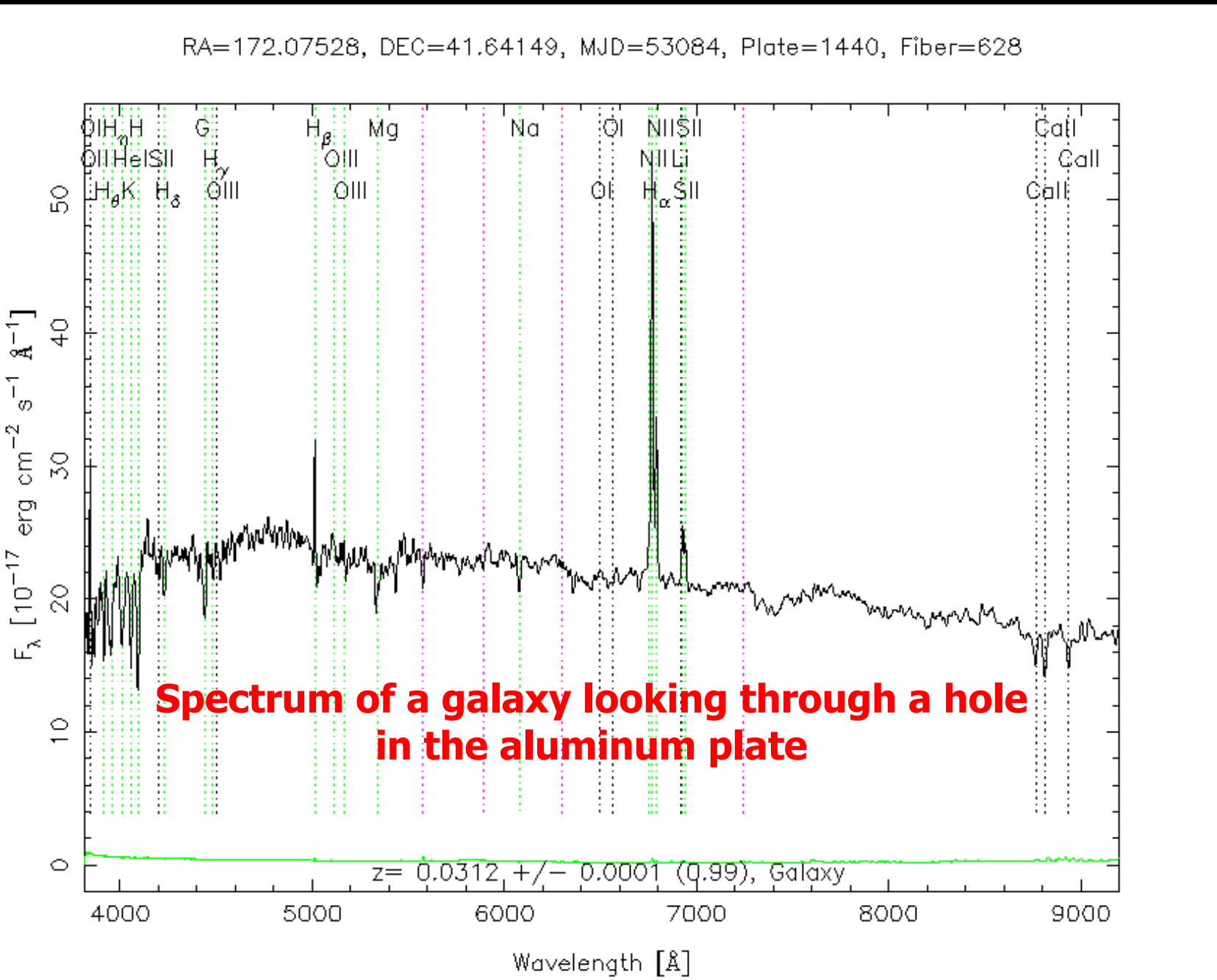








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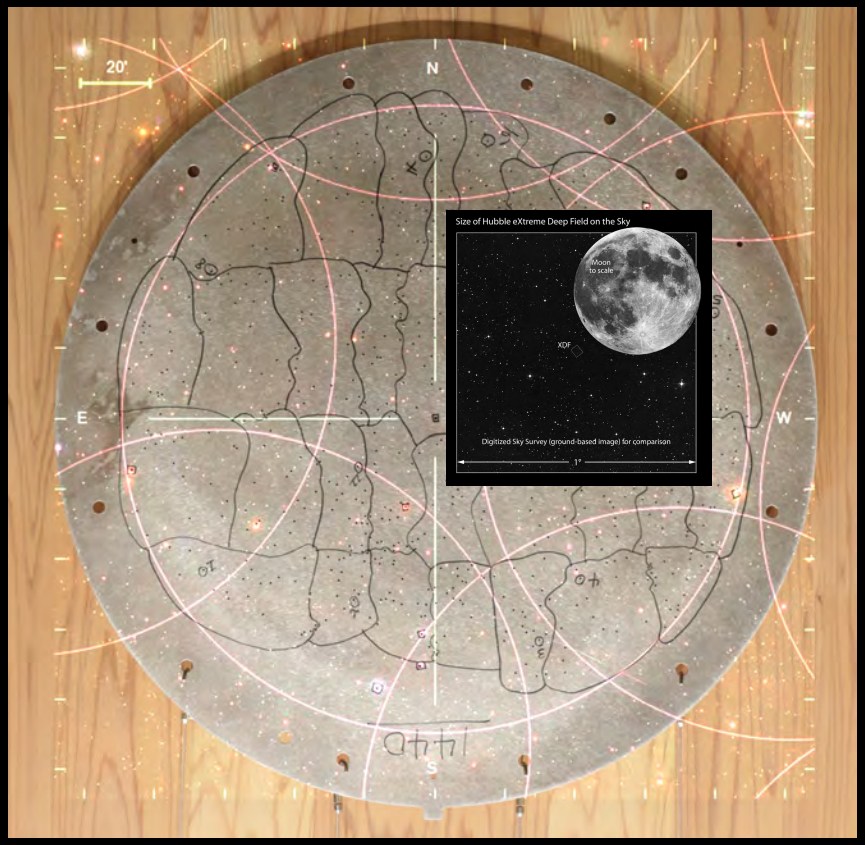
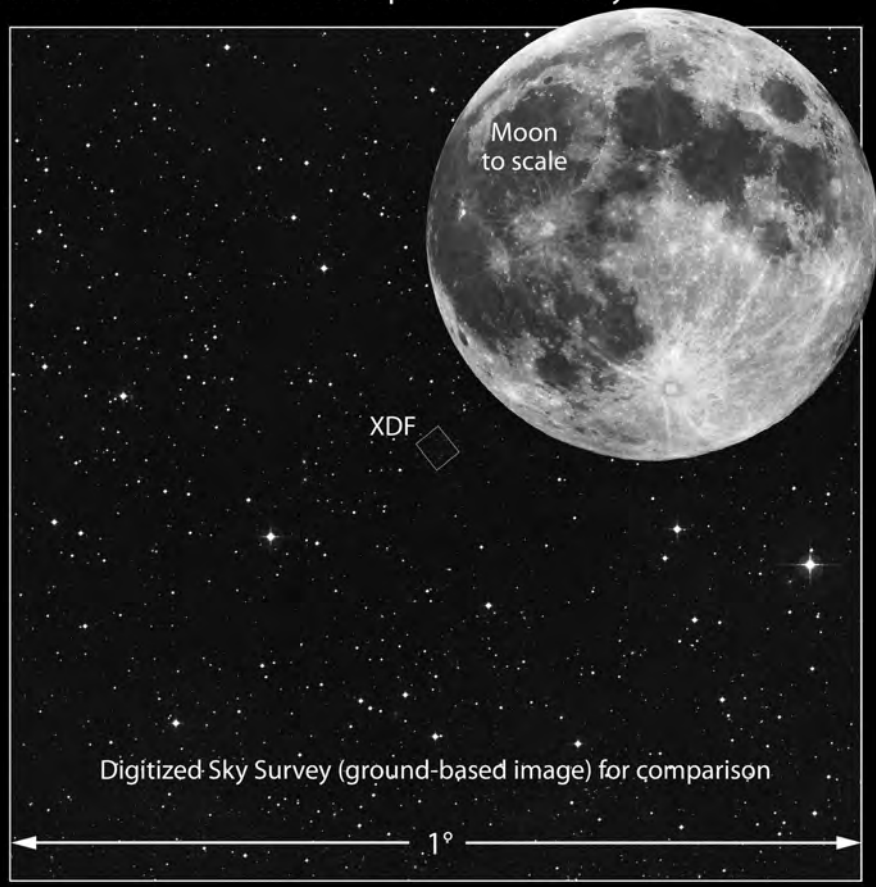
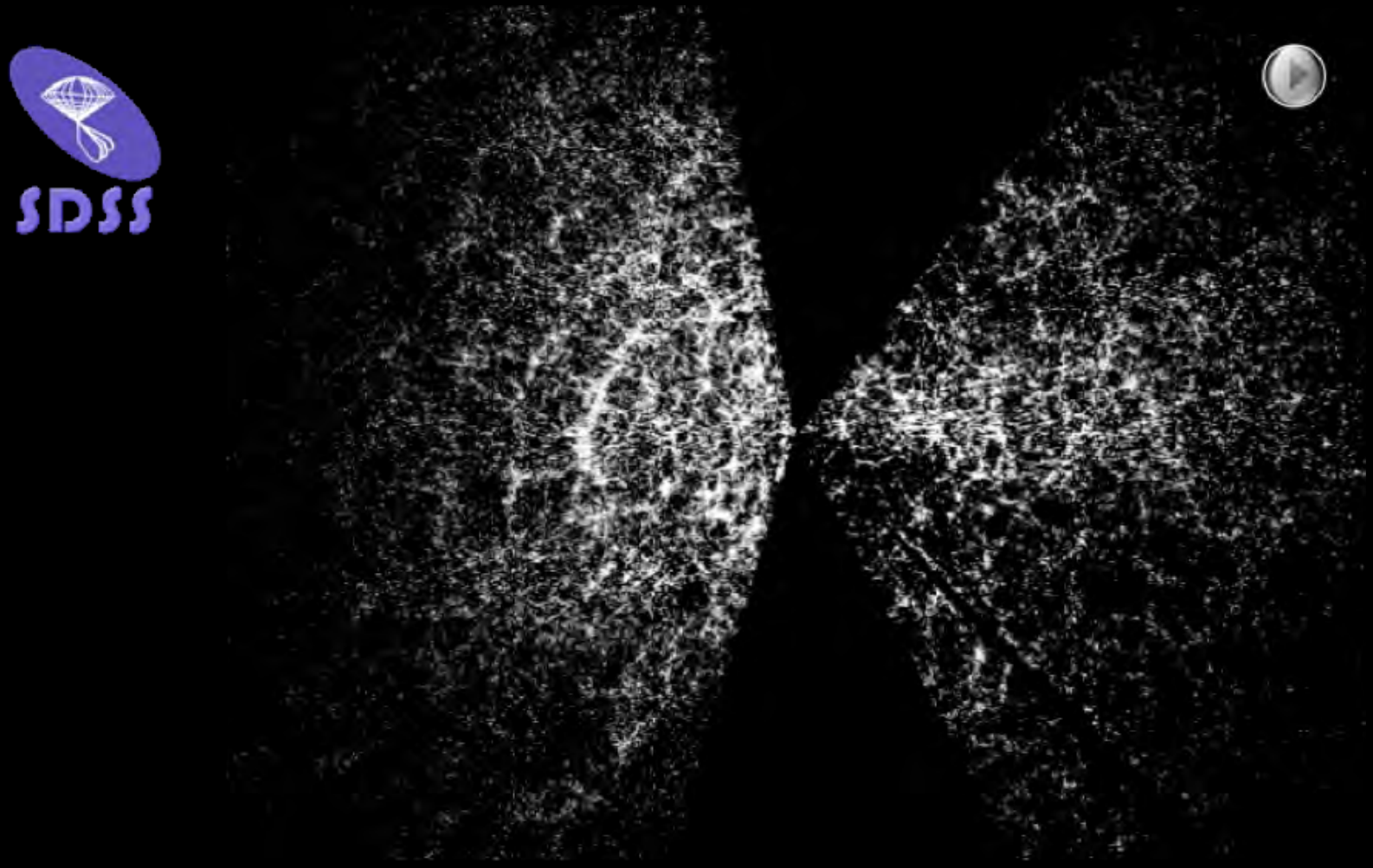
OII
H$_\eta$
H
G
H$_\beta$
Mg
Na
OI
NII
SII
CaII
OII
HeI
SII
H$_\gamma$
OIII
NII
Li
CaII
H$_\theta$
K
H$_\delta$
OIII
OIII
OI
H$_\alpha$
SII
CaII
F$_\lambda$ [10^{-17} erg cm^{-2} s^{-1} Å^{-1}]
0
10
20
30
40
50
z= 0.0312 +/- 0.0001 (0.99), Galaxy
4000
5000
6000
7000
8000
9000
Wavelength [Å]
Spectrum of a galaxy looking through a hole
in the aluminum plate

We payed for the aluminum plates, but the SDSS surveyed the universe through those holes where we threw away the aluminum





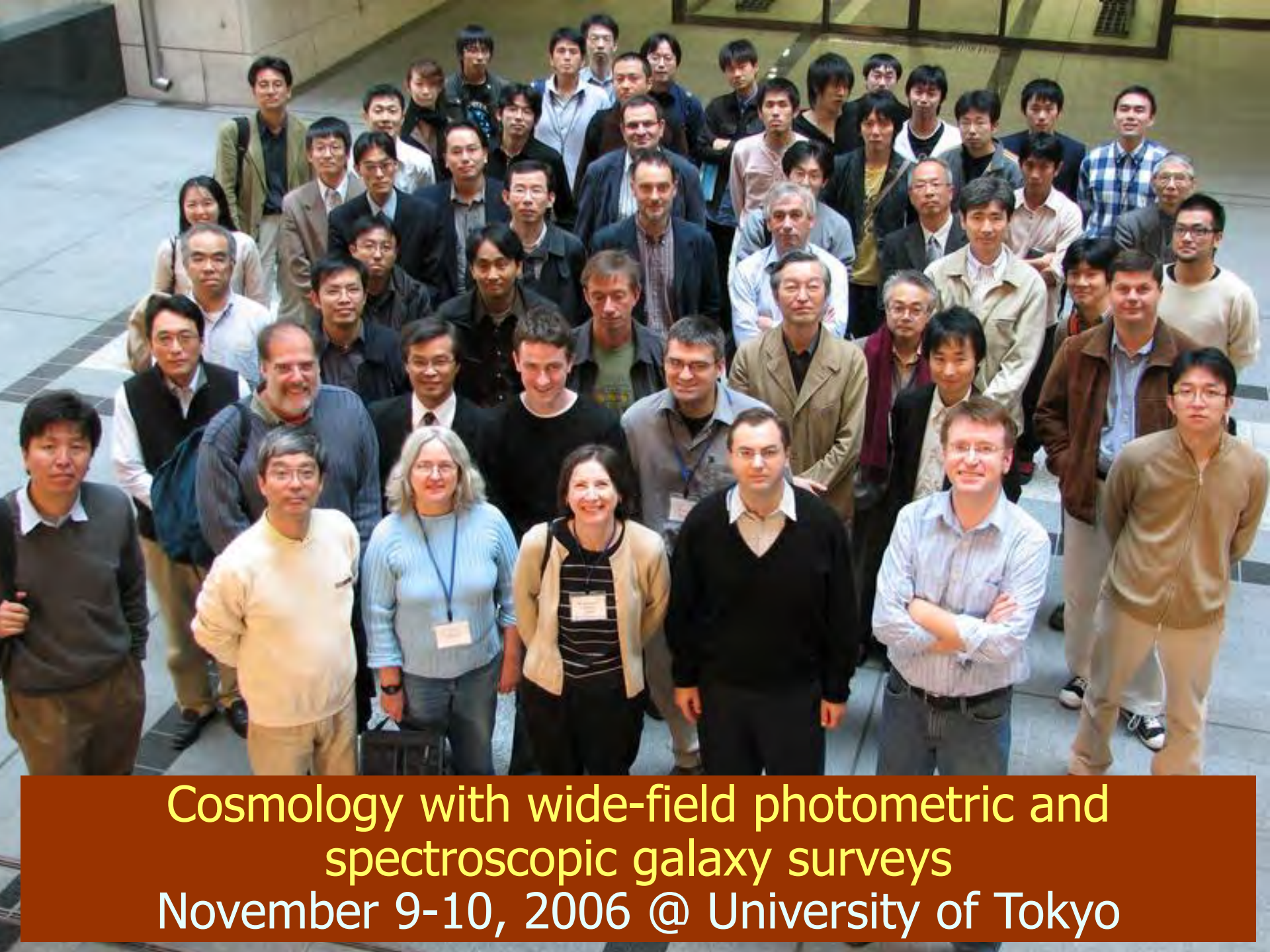
3D map of 0.8 million galaxies unveiled through holes of aluminum plates



NHK TV program "Science Zero" broadcasted on June 11, 2003

Legacy of SDSS = Science + People

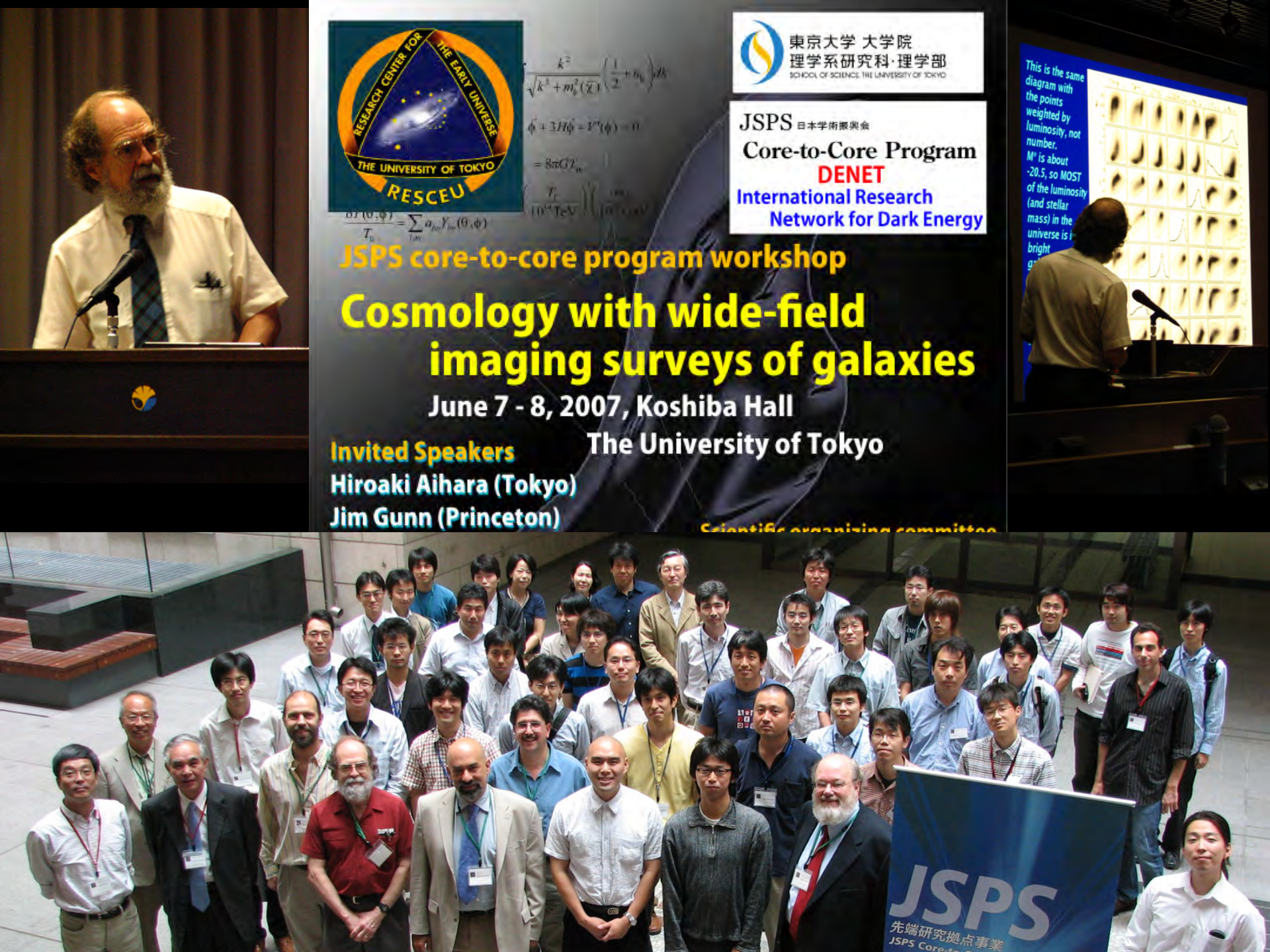
- ***The 3D map of the universe is not the end of SDSS. It is not even the beginning of the end. But it is the end of the beginning.***
- **SDSS triggered new generation surveys**
  - SDSS provided excellent opportunities for Japanese young astronomers to work together on international collaborations, using Subaru telescope among others.
  - Stay tuned to talks in the afternoon



Cosmology with wide-field photometric and spectroscopic galaxy surveys

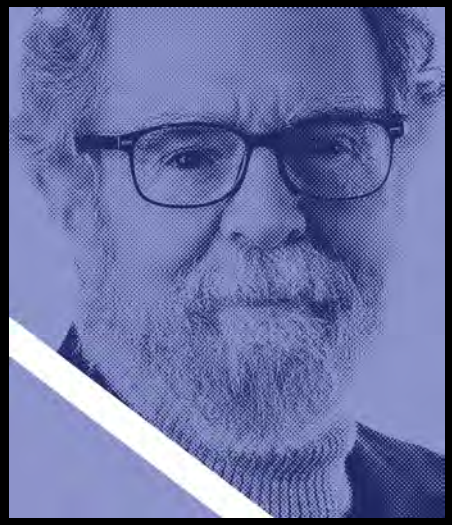
November 9-10, 2006 @ University of Tokyo

Discussion on NAOJ-Princeton collaboration over *Shabu-shabu*
December 19, 2006@Kisoji


RESEARCH CENTER FOR THE EARLY UNIVERSE
THE UNIVERSITY OF TOKYO
RESCEU
東京大学 大学院
理学系研究科・理学部
SCHOOL OF SCIENCE, THE UNIVERSITY OF TOKYO
JSPS 日本学術振興会
Core-to-Core Program
DENET
International Research
Network for Dark Energy
JSPS core-to-core program workshop
Cosmology with wide-field
imaging surveys of galaxies
June 7 - 8, 2007, Koshiba Hall
The University of Tokyo
Invited Speakers
Hiroaki Aihara (Tokyo)
Jim Gunn (Princeton)
This is the same diagram with the points weighted by luminosity, not number.
M* is about -20.5, so MOST of the luminosity (and stellar mass) in the universe is i
bright
JSPS
先端研究拠点事業

Jim changed Japanese astronomy!

- For Japanese optical astronomers, SDSS was the first big international collaboration.
- Many Japanese young (at that time) students enjoyed working with you and SDSS, and they are now leading HSC and PFS surveys with Subaru.



- We have learned a lot from you, and we are sorry that we still need you for the next 30 years (at least) !