



カブリ数物連携宇宙研究機構

Kavli Institute for the Physics and  
Mathematics of the Universe  
(Kavli IPMU)



**MEXT**

**World Premier International  
Research Center Initiative**

**“Globally Visible Research Centers”**



How did the Universe begin?  
Does the Universe have an end?  
What is the Universe made of?  
What are the laws of the Universe?  
Why do we exist in it?  
Questions since the dawn of humankind  
Now with the power of science!

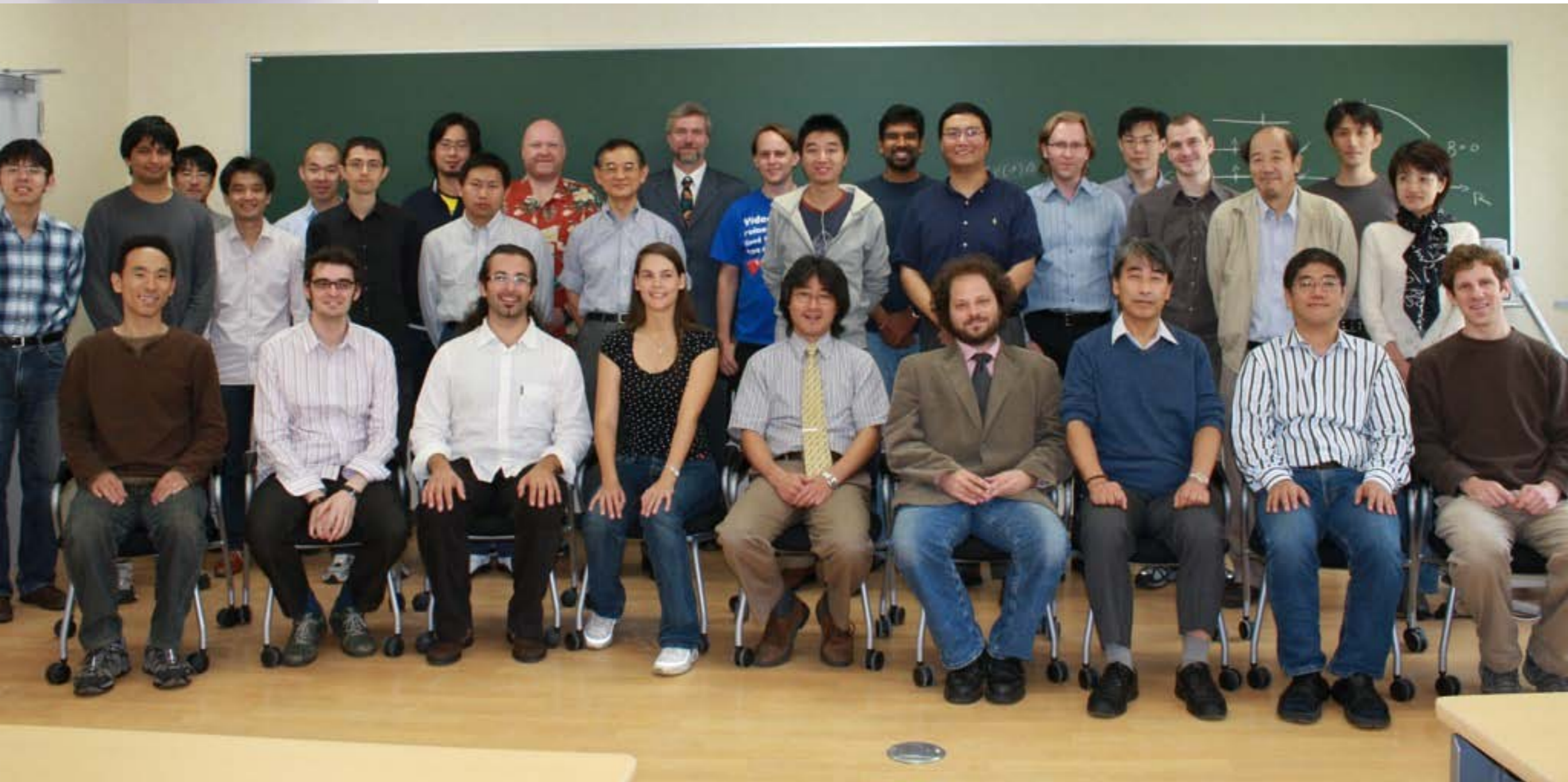


Combine mathematics, physics, and astronomy

# Oct 2007

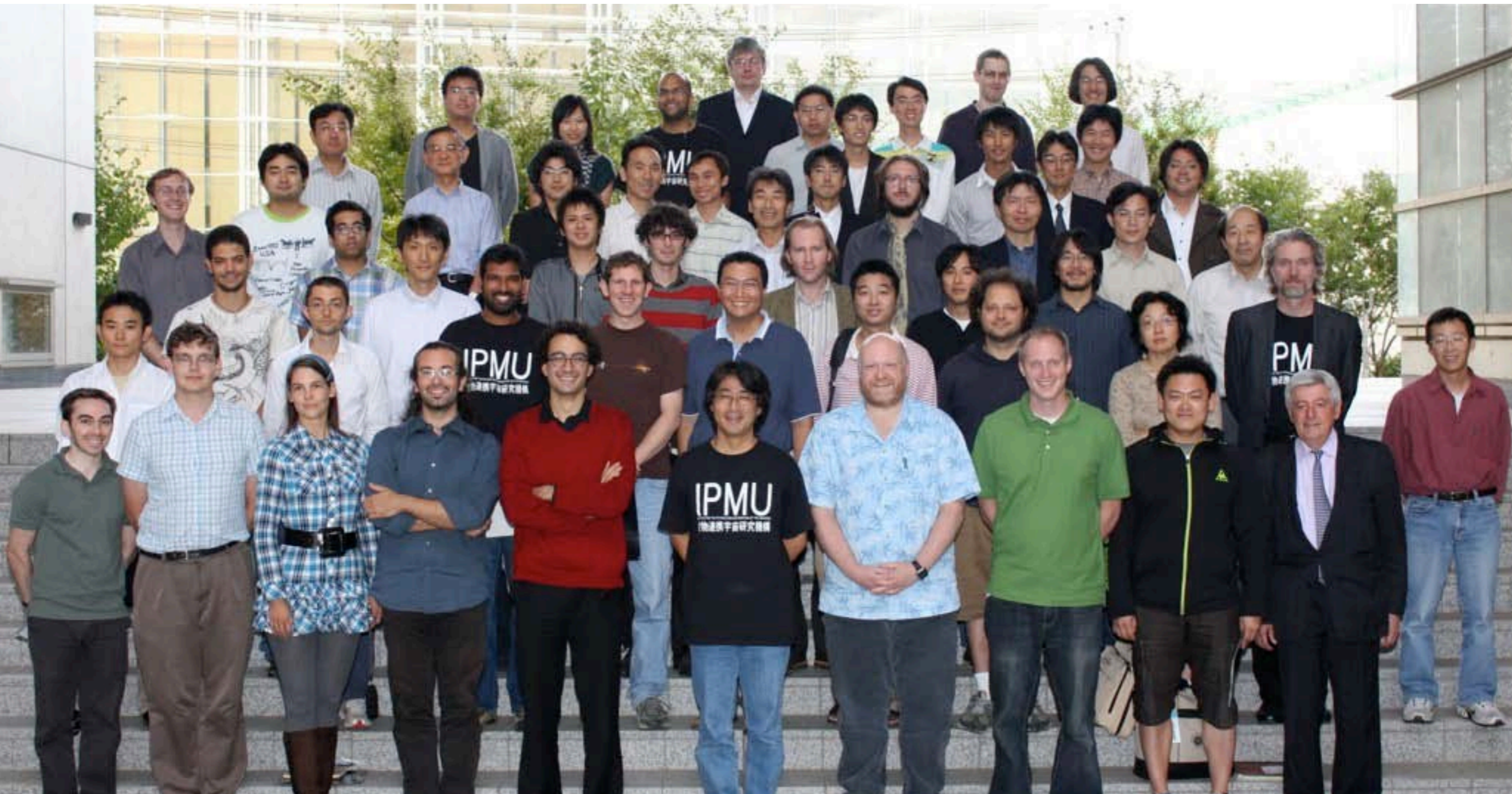
5 selected out of 33 proposals

Oct 2008



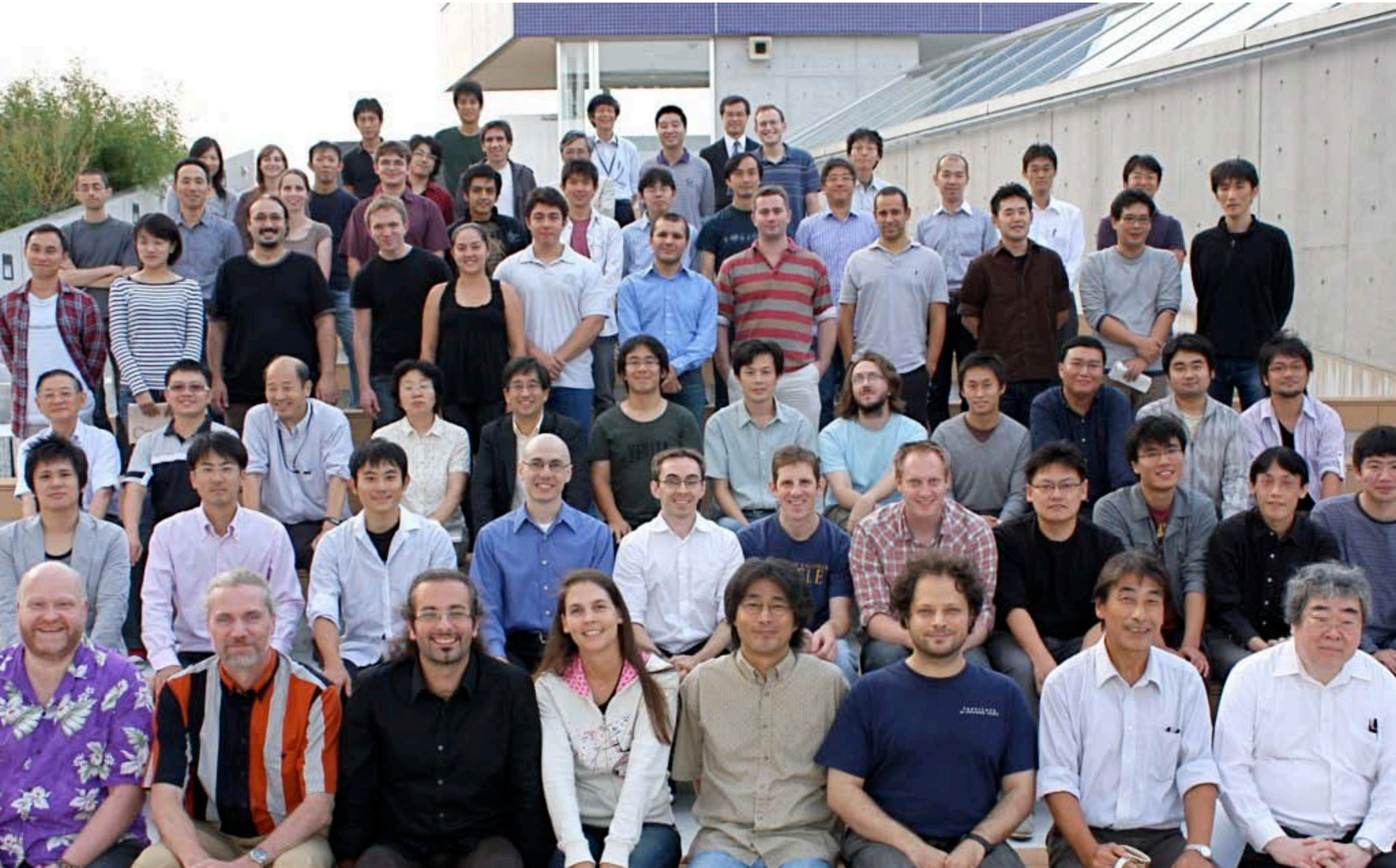


Oct 2009





# Oct 2010





# Oct 2011



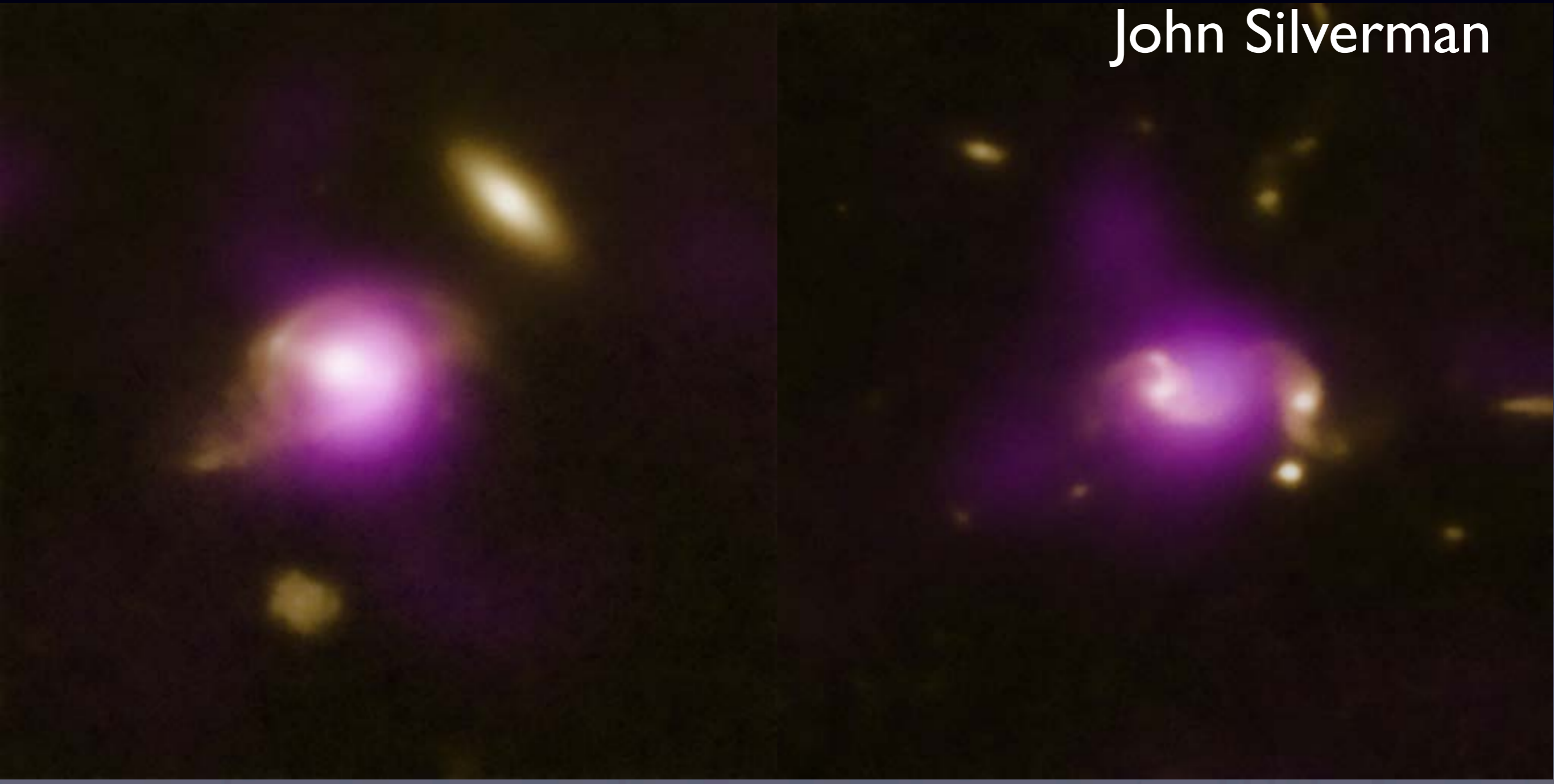
**56% of full-time scientists are not Japanese**



# Approaching galaxies stimulate the growth of supermassive blackholes



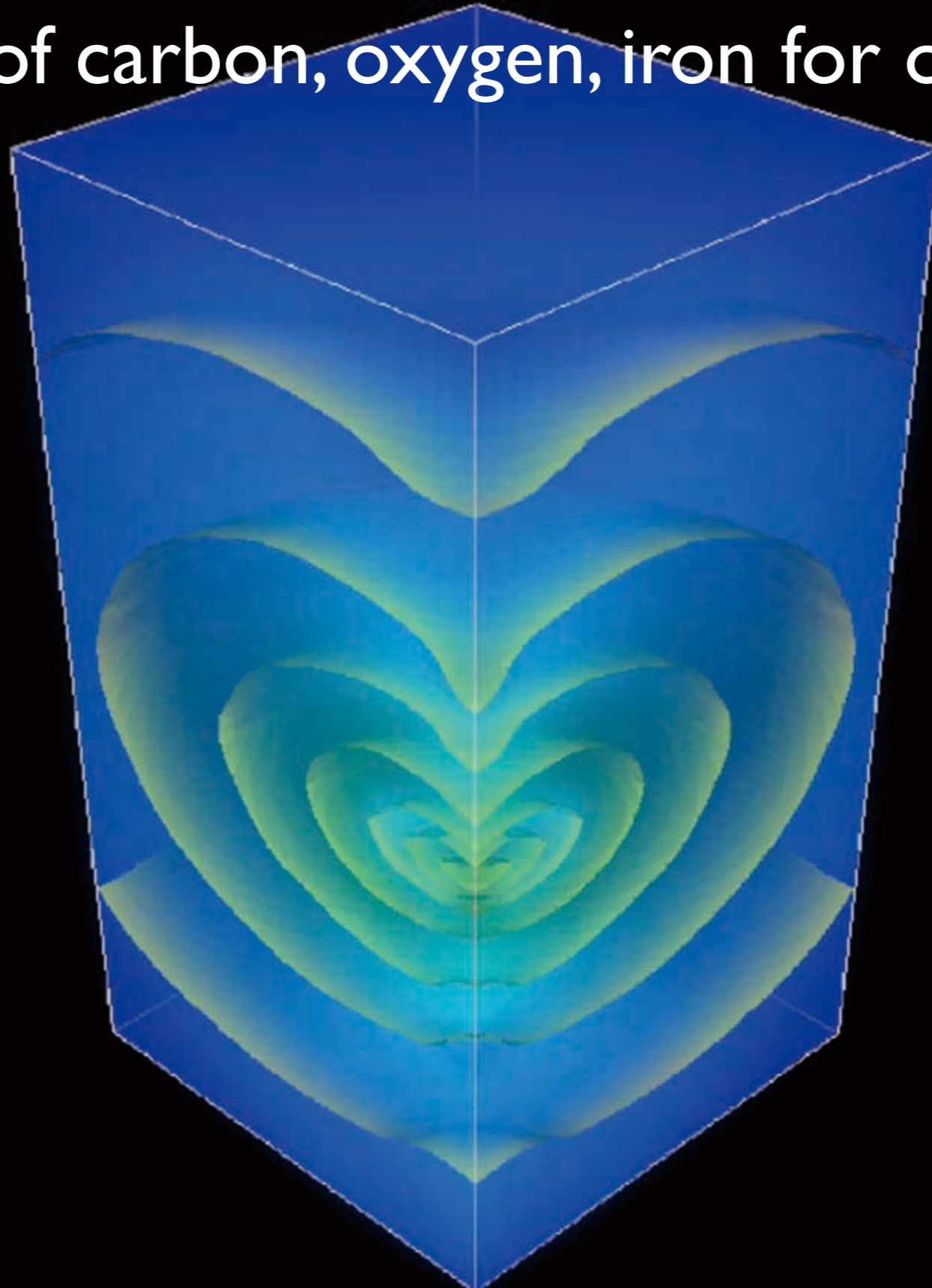
Assistant Prof.  
John Silverman



# Birth of First Stars

grow to 40 times the solar mass

source of carbon, oxygen, iron for our body



Assoc Prof

Naoki Yoshida

# Young Minds

- Explain the cosmic ray data **with decaying dark matter**: Chen et al, *Phys. Lett.* **B671**, 71 (2009)  
83 citations
- **possibility of renormalizable theory of quantum gravity**:  
Orlando and Reffert, *Class. Quant. Grav.* **26**, 100521 (2009)  
107 citations



based on SLAC spires database

# Kavli Foundation

STANFORD  
UNIVERSITY

HARVARD



- donated \$7.5M endowment to institutions

NTNU  
Norwegian University of  
Science and Technology

- joining the prestigious club

- evidence for international visibility



COLUMBIA UNIVERSITY  
IN THE CITY OF NEW YORK

UNIVERSITY OF  
CAMBRIDGE

- launch on April 1, 2012



- research support in perpetuity

- seed money for emerging ideas, recruiting the best minds



University of California, San Diego

- next challenge: secure funds beyond WPI

- we'd like to boost endowment for named professorships, named fellows!



UCSB  
UNIVERSITY OF CALIFORNIA  
SANTA BARBARA

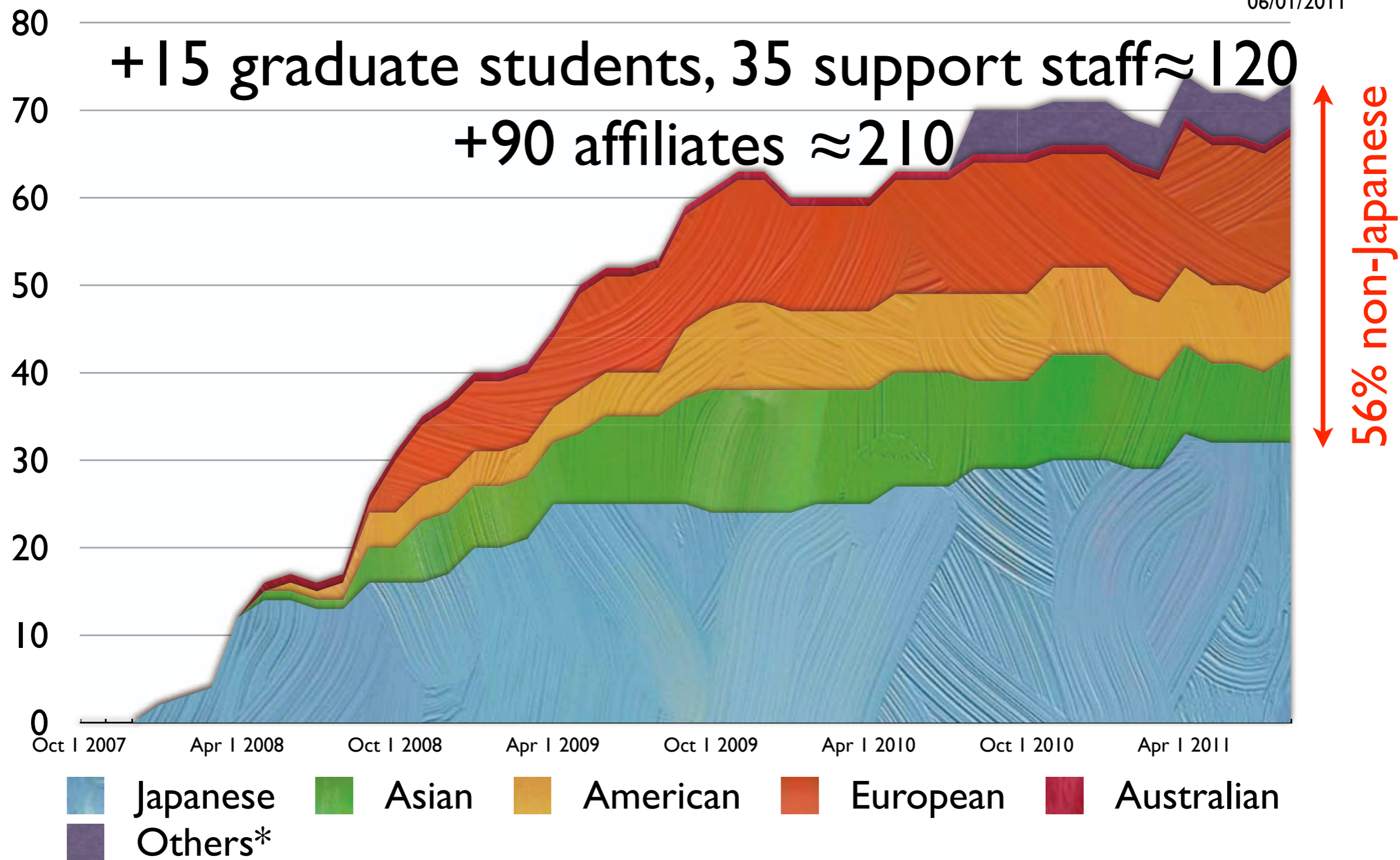
TU Delft  
Delft University of Technology



**supplemental  
material**

# paid full-time staff

06/01/2011



\*Argentina, Brazil, Canada

# WPI Interim Evaluation

## **Interim evaluation: S**

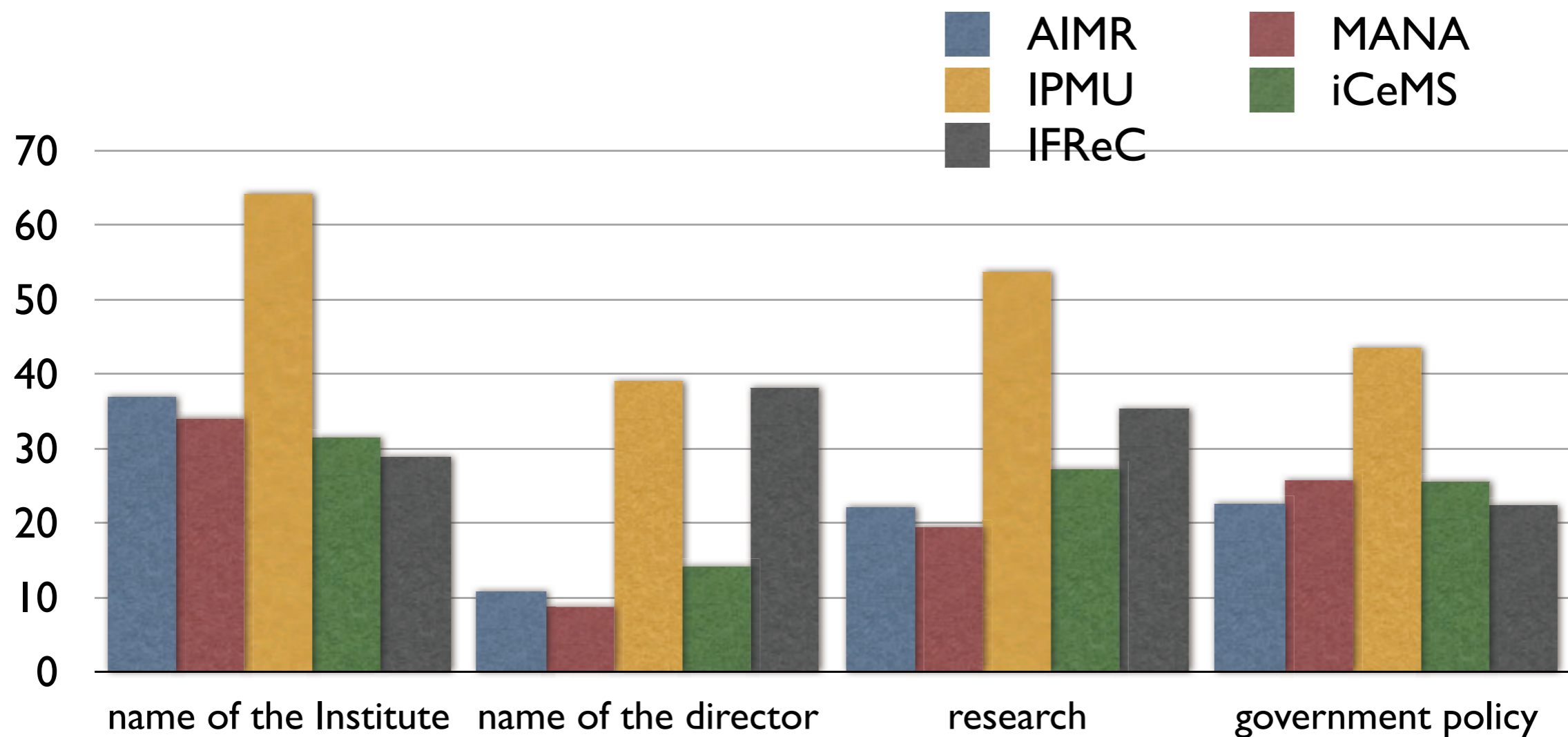
We all highly evaluate IPMU's past 4 years of activities and scientific achievements. During a short period, IPMU has established itself as a world-renown institute from scratch.

IPMU has demonstrated outstanding progress toward achieving the goals of the WPI program in all areas – quality of science, globalization, interdisciplinary approach, and organizational reform.

The leadership of Professor Murayama is highly appreciated.

AIMR Tohoku: B, iCeMS Kyoto:A<sup>-</sup>,  
IFReC Osaka:A、 MANA NIMS:A

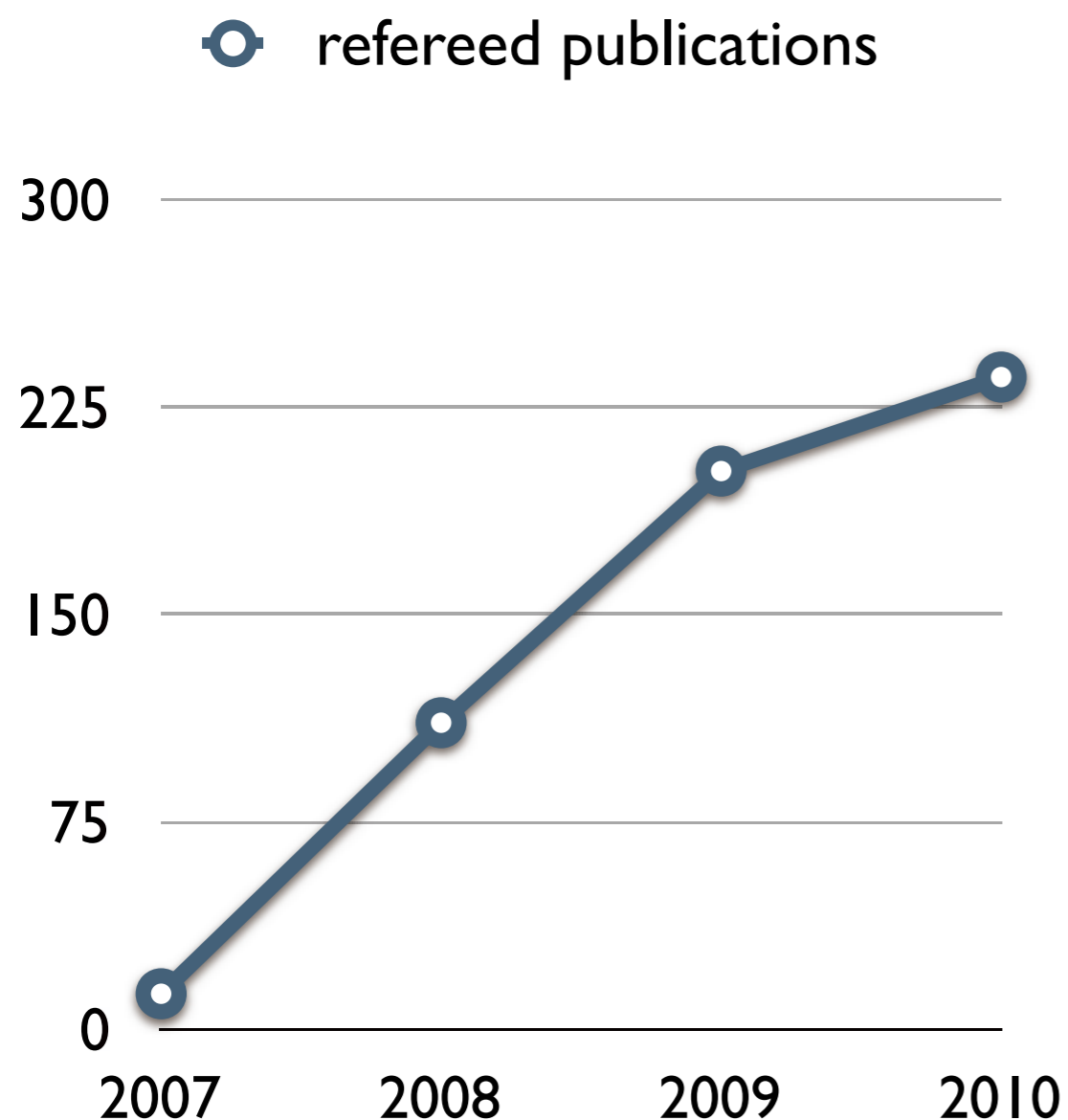
# international visibility



survey of randomly selected authors in relevant journals



# publications



institute	average citation counts	#papers with >50 citations
<b>IPMU</b>	<b>7.6</b>	<b>8</b>
IAS Princeton	7.3	18
KITP Santa Barbara	8.1	8
YITP Kyoto	6.5	3
Perimeter Institute	9.6	13
ICTP Trieste	4.5	4

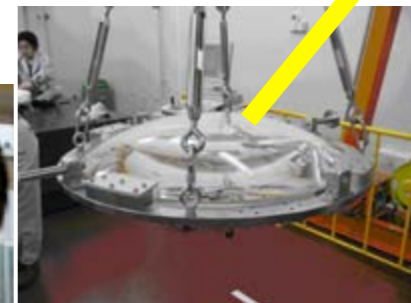
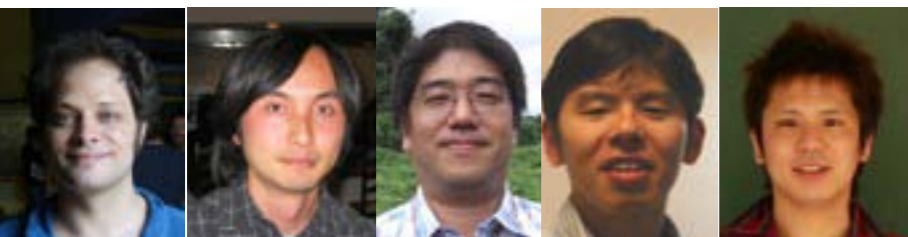
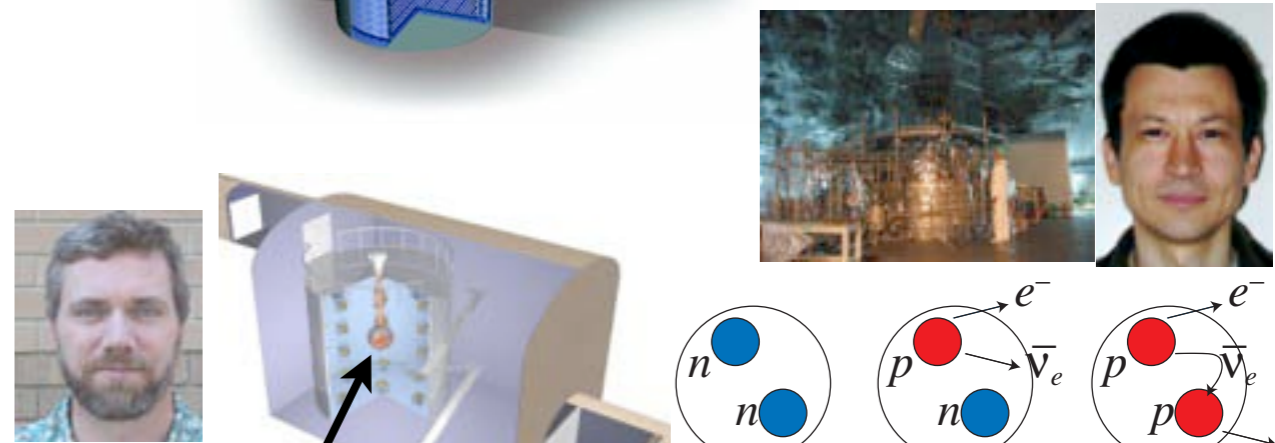
Thomson Reuters, excluding reviews  
 fields: astronomy, astrophysics, particle and fields,  
 multidisciplinary physics, mathematics, applied mathematics  
 published 2008-2011 as of March 2011



# Research Program

IPMU

- observe **supernova neutrinos** from billions of light years away using Super-Kamiokande (with ICRR)
- explore **why matter remained but anti-matter disappeared** using KamLAND (with Tohoku)
- direct detection of **dark matter** particles (with ICRR)
- reveal the nature of **dark matter & dark energy** using Subaru telescope (with NAOJ)
- **ultimate unified theory** based on the fusion of physics and mathematics



# Today's Strong Support



- President Hamada's vision: FOREST 2015
- **IPMU Research Building**
- creation of **TODIAS**
- flexibility as a “special district”
- **merit-based salary**
- **9 from Today's admin staff**
- new international lodge



# Public outreach

- bring results back to taxpayers
- communication to general public
- “Ask a Scientist” video clips
- mobilized more than 7000 people to outreach events
- IPMU News (16 issues)
- 600 media appearances (28 on TV)
- popular science books

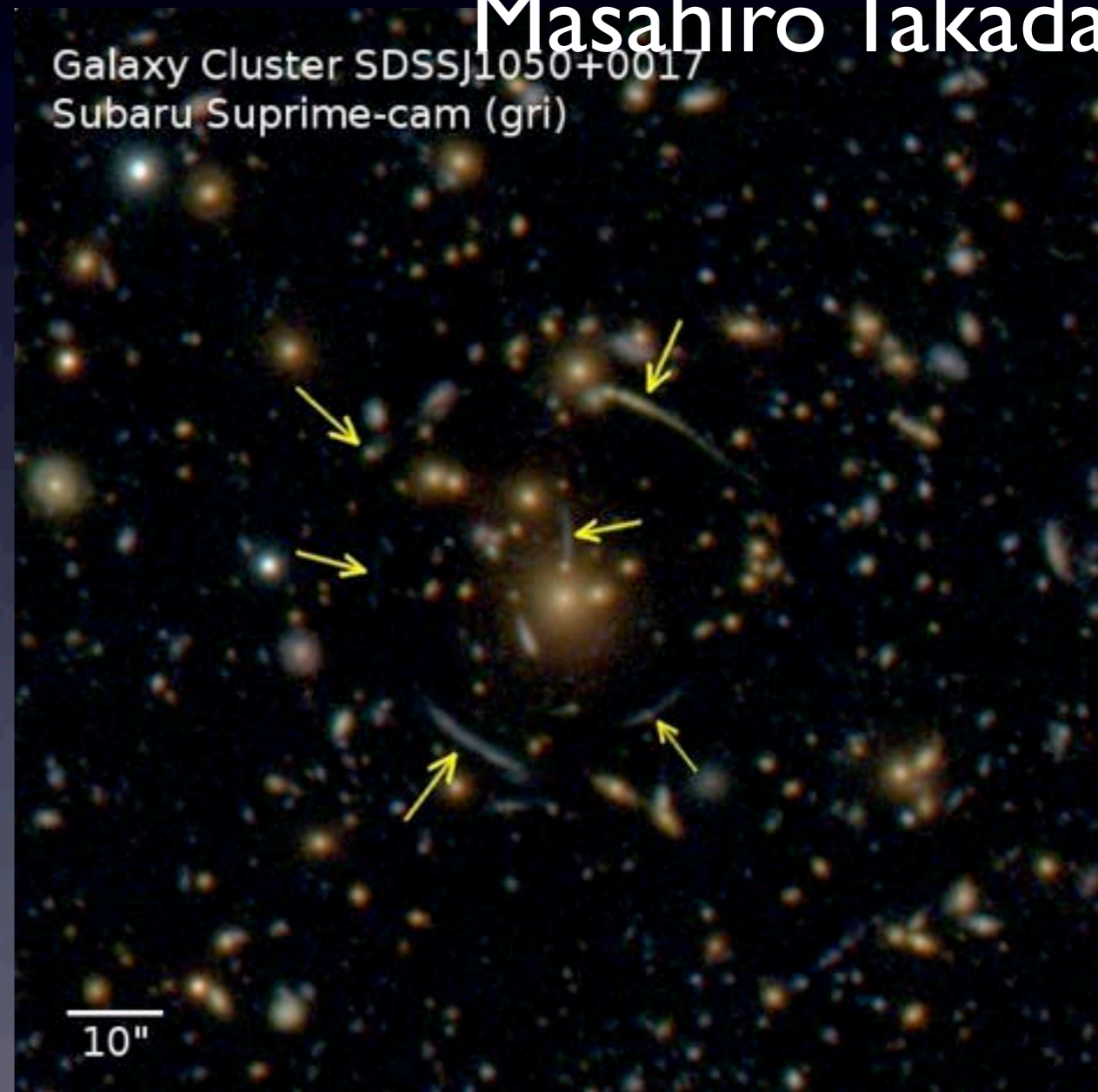
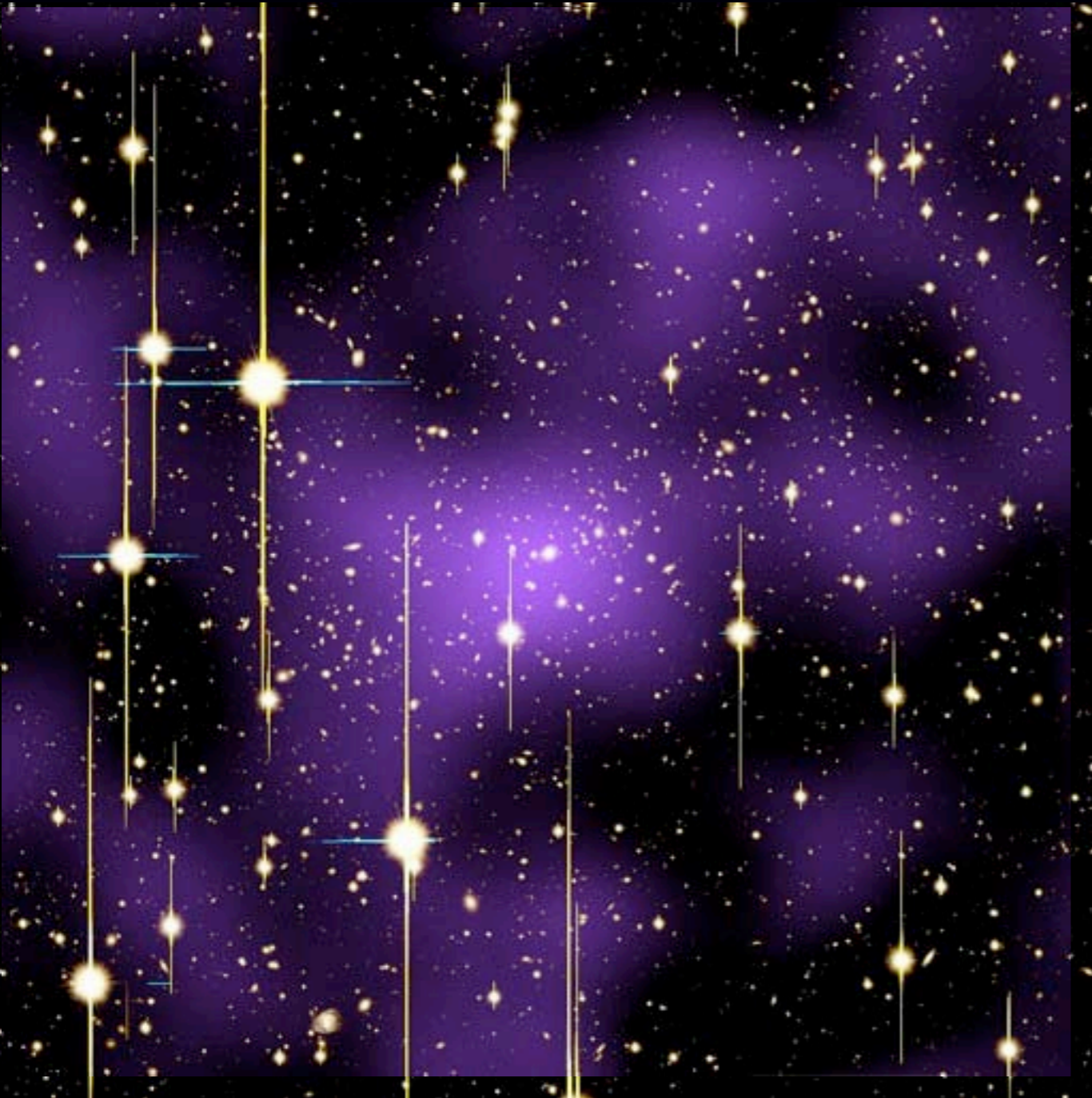


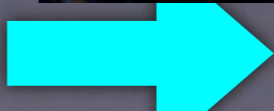
TODIAS 創立記念  
シンポジウム  
900人

# “See” the invisible dark matter



Assoc Prof  
Masahiro Takada



distorted **images** of background galaxies  2D maps of dark matter

- largest image of the Universe with more than a trillion pixels
- international partnership (Sloan Digital Sky Survey)

