

# Ups and Downs of the SUMIRE Project



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**Princeton-DENET meeting:** "Science Opportunities with Wide-Field Imaging and Spectroscopy of the Distant Universe"

**Nov. 9-11, 2009 @Princeton Center for Theoretical Science, Princeton Univ.**



JSPS 日本学術振興会

Core-to-Core Program

**DENET**

International Research  
Network for Dark Energy

By far the most important lesson from my talk: **SMIRE is pronounced as S-me-lé**

- Don't pronounce SUMIRE as Smile
  - I = **【i】** ≠ **【ai】**
  - E = **【e】** ≠ silent
- but don't care whether R or L
  - “R=L” is the most well-known identity in Japanese



Japanese: すみれ  
Chinese: 堇  
English: violet  
(more specifically,  
Viola mandshurica)

# Outline of this talk

- Be careful; not a scientific talk at all
- What is DENET ?
- Brief history of the SUMIRE project with particular emphasis on future collaboration possibilities
- Purpose of this meeting

# DENET (International Research Network for Dark Energy)

JSPS 日本学術振興会  
Core-to-Core Program  
**DENET**  
International Research  
Network for Dark Energy

- A core-to-core program of JSPS (Japan Society of Promotion of Sciences)
- Promote international collaborations
- Budget: ~\$250k per each Japanese fiscal year (for three years: 2009 April – 2012 March)
  - Exchange rate \$1=100yen adopted just for simplicity
- should be used exclusively for *travel/visit expenses of Japanese participants* at the international collaboration institutes
- 28 Japanese participants in this meeting receive **generous** support from the grant

# International Research Network for Dark Energy (JSPS, core-to-core program 2007-2012)

## DENET

**Princeton U.**  
Dept. of  
Astrophys. Sci.  
coordinator  
**Edwin Turner**

CMB  
Gravitational lens  
Baryon oscillation

**Edinburgh U.**  
Royal Obs.  
coordinator  
**John Peacock**

Univ. of Tokyo  
Res. Center for the  
Early Universe  
coordinator  
**Yasushi Suto**

Tohoku  
Univ.

NAOJ

Hiroshima  
Univ.

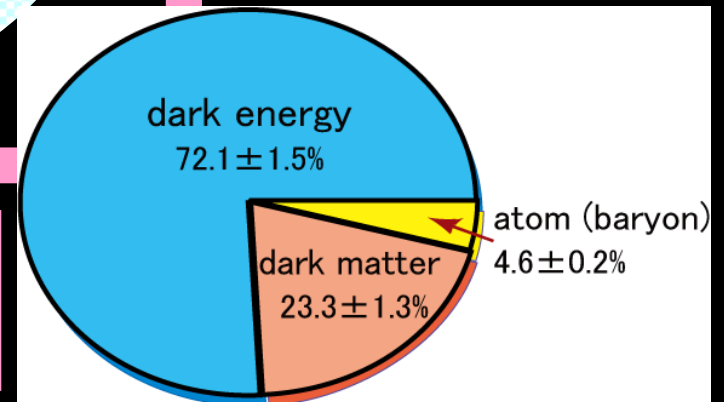
Kyoto  
Univ.

Nagoya  
Univ.

**Institut  
d'Astrophysique  
de Paris**  
coordinator  
**Jerome Martin**

Modified gravity  
Extra-dimension  
backreaction

Theoretical model  
Baryon oscillation  
Weak lens mapping



# DENET activity

year	International conference in Japan	Dark energy in the universe: Summer school in Japan	Conference at international partner institutes (outside Japan)
2007	Cosmology with wide-field imaging surveys (Univ. of Tokyo)	Hakone (N.Kaloper, D.Parkinson, M.Doi)	Decrypting the universe (Royal Observatory Edinburgh)
2008	Astroparticle physics and cosmology (Univ. of Tokyo)	Asamushi (A.Frolov, A.Heavens, K.Koyama)	Cosmology near and far: Science with WFMOS (Kona, Hawaii)
2009	Joint Subaru-Gemini Science workshop (Kyoto Univ.)	Okinawa (A.Starobinski, W.Percival, M.Seiffert)	<b>Science Opportunities with Wide-Field Imaging and Spectroscopy of the Distant Universe (Princeton Univ.)</b>



$$\frac{\delta l(\theta, \phi)}{T_c} = \sum_{l,m} a_{lm} Y_{lm}(\theta, \phi)$$

$$\frac{k^2}{\sqrt{k^2 + m_\nu^2(\bar{\chi})}} \left( \frac{1}{2} + n_b \right) dk$$

$$\ddot{\phi} + 3H\dot{\phi} + V'(\phi) = 0$$

$$= 8\pi G T_w$$

$$\left( \frac{T_c}{10^{14} \text{ TeV}} \right)^4 \left( \frac{m_\nu}{10^{10} \text{ GeV}} \right)$$



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

# Hongo campus Univ. of Tokyo

## JSPS core-to-core program workshop

# Cosmology with wide-field imaging surveys of galaxies

June 7 - 8, 2007, Koshiba Hall

Invited Speakers

The University of Tokyo



# Decrypting the Universe

## Large Surveys for Cosmology

### Invited Speakers

D. Spergel  
S. Cole  
E. Copeland  
M. Doi  
A. Helmi  
O. Lahav  
R. Maartens  
Y. Mellier  
S. Miyazaki  
A. Murphy  
M. Takada  
T. Yamada

24<sup>th</sup>-26<sup>th</sup> October 2007  
Edinburgh, Scotland

Joint Royal Observatory Edinburgh / JSPS  
Core-to-Core Program Workshop

[www.roe.ac.uk/roe/workshop/2007](http://www.roe.ac.uk/roe/workshop/2007)

**Royal  
Observatory  
Edinburgh  
Scotland**

### Local Organising Committee

A. Heavens  
R. Ivison  
A. Nicol  
P. Norberg (Chair)  
P. Simon  
F. Simpson  
A. Taylor

**20 Japanese  
participants  
supported by  
DENET**







# COSMOLOGY NEAR & FAR: SCIENCE WITH WFMOSS

May 19-21, 2008 @Marriot, Kona, Hawaii



Astronomy  
Australia  
Ltd.



Science & Technology  
Facilities Council

30 Japanese participants supported by DENET



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# THE JOINT SUBARU-GEMINI SCIENCE CONFERENCE

May 18-21, 2009



Gemini Users Meeting

May 22, 2009



Kyoto University

# SUMIRE

## ■ Project: SUMIRE

- **SU**baru **M**easurement of **I**maging and **RE**dshift of the universe

- **PI: Hitoshi Murayama** (director of IPMU, U. of Tokyo)

- Japanese Institutes in charge: IPMU, The University of Tokyo, and NAOJ

## ■ **Imaging survey with HSC** (Hyper-Suprime Cam)

- **PI: Hiroshi Karoji** (→Hiroaki Aihara)

- Japan + Princeton + ASIAA (Taiwan)

## ■ **Spectroscopic survey with PFS** (Prime Focus Spectrograph)

- Funding, PI, organization, international collaboration: still very unpredictable

# Birth of SUMIRE: June 15, 2009

Acronym was coined by me first, then full name was invented by David in my office (Univ. of Tokyo)

SUMIRE  
Subaru Measurement of  
SU Infrared RE dist. +  
Imaging



Many people  
claim that  
“images” is  
better than  
“imaging”  
↓  
not my fault !



# SUMIRE=HSC+PFS

## ■ HSC

- Stay tuned to the next talk by Satoshi Miyazaki
- Approximately one year behind the schedule
- Hopefully first light at the end of 2011, and start imaging surveys sometime in 2012

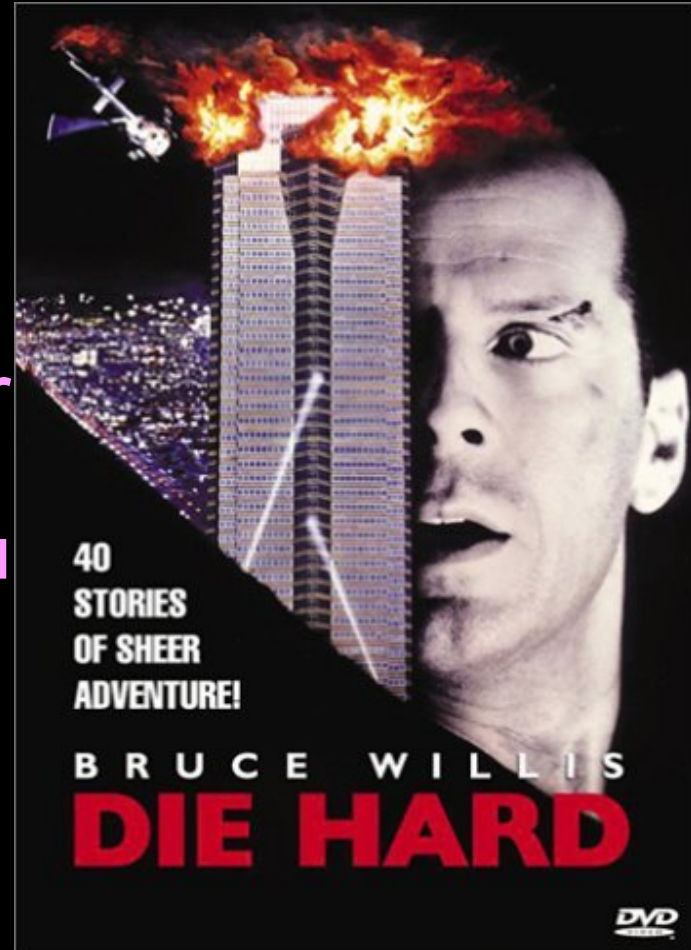
## ■ PFS

- ex-WFMOS but with more cosmology-oriented
- From a Subaru-Gemini joint project to an international collaboration led by Subaru
- Funding still very unclear (as of Nov. 2009)

# Die Hard: WFMOS

- **2002:** KAOS discussed as Gemini's wide-field survey project
- **2003:** WFMOS proposed as Gemini's next-generation instrument at Aspen, but soon realized not feasible on Gemini
- **2004:** Hiroshi Karoji (director of Subaru Obs. at the time) suggested WFMOS on Subaru

**Wide-field  
Fibre  
Multi-Object  
Spectrograph**



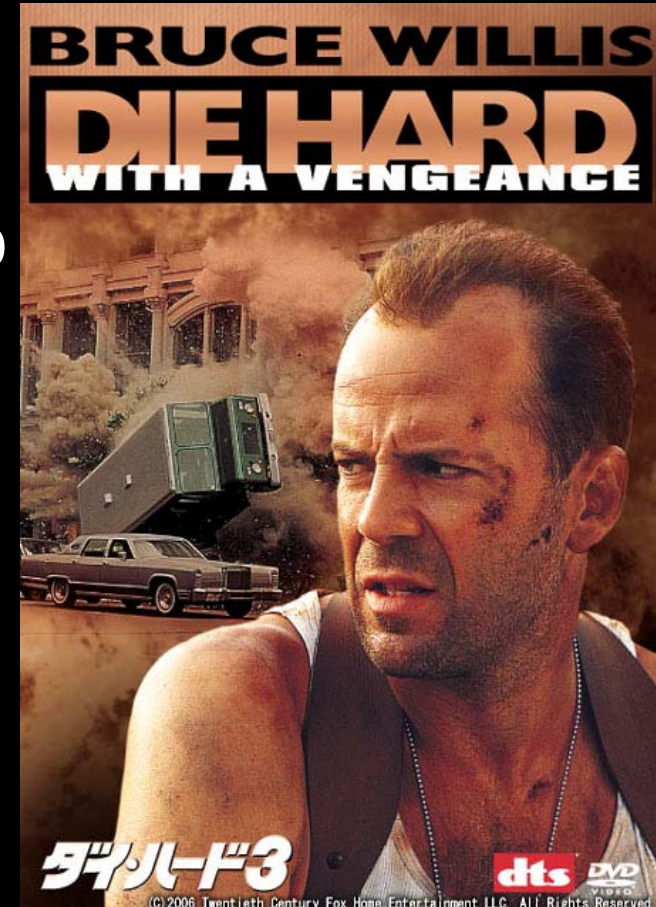
# Die Hard 2: WFMOS

- **Mar. 2005** WFMOS Feasibility Study; from Gemini to Subaru
- **Dec. 2005** Gemini started WFMOS conceptual design study (team A vs. team B)
- **May 2006** WFMOS conceptual design study was suspended
- **July 2006** HSC grant (\$18M) was approved in Japan (PI:H.Karoji)
- **May 2007 resumed WFMOS conceptual design study**



# Die Hard 3: WFMOS to SUMIRE

- **Feb. 2009** team B design (PI: R.Ellis, Caltech/JPL) was selected
- **May 2009** **Gemini cancelled WFMOS**@The Joint Subaru-Gemini Science Conference, Kyoto
- **July 2009** Japanese cabinet called for the proposal of the stimulus funding plan (\$2700 M for 30 top-researchers in Japan)
- **Sept. 5, 2009** **Sumire (PI: Hitoshi Murayama)** was approved as one of the stimulus proposals





# Die Hard 4.0 : SUMIRE

- **Sept. 16, 2009** New Japanese government (Prime Minister Yukio Hatoyama) started
- **Oct. 17, 2009** total budget for the stimulus package was cut down from \$2700M to \$1000M, budget/proposal < \$50M
- **As of Nov. 9 2009, we heard nothing for the amount assigned for SUMIRE**
- **To be continued...**  
**Die Hard 4.1 or 5 ?**



# Ups and downs of SUMIRE funding

- **May 18, 2009: \$0 (for WFMOS)**
  - the first talk by the Gemini director D.Simons at the Joint Subaru-Gemini conference
- **September 4, 2009: \$90M**
  - approved by the prime minister Aso, 5 days after the historical defeat of his Liberal-Democratic party at the Japanese general election on August 30, 2009
- **October 17, 2009: \$33M~\$50M**
  - announced by Japanese cabinet, but the detail procedure is still unknown
- **November XX, 2009: \$??M**
  - Stay tuned...

# Original SUMIRE proposal presented by Murayama at 15 min interview on Aug. 14, 2009

- **Title:** *Revealing the past and future of the universe: unveiling the nature of dark matter and dark energy with ultra-wide-field imaging and spectroscopy*
- **Budget requested:**  
HSC(\$35M) + PFS(\$54M) + misc(\$6M) = \$95M
  - again exchange rate \$1 = 100yen adopted
- **Organization:**
  - PI: H.Murayama
  - Central institutes: IPMU, Univ. of Tokyo, NAOJ
  - International partners: UC Berkeley, Princeton Univ., Caltech/JPL, ASIAA,,,

# Substantial revision is necessary, but the situation is still very unclear

- **Possibility #1:** \$33M case ( $=\$1000\text{M}/30$ )
  - complete HSC and forget PFS at all !
- **Possibility #2:** \$50M case (upper limit)
  - complete HSC and start PFS as a Japan leading project
  - the remaining  $\sim\$20\text{M}$  + additional funding from Japan and other international partners
- **Possibility #3:** \$33M case
  - complete HSC and propose PFS as a fully international collaboration project
  - similar to the original Subaru-Gemini WFMOS idea
    - Subaru: telescope modification for both HSC and WFMOS, 300 Subaru nights for WFMOS survey, operation and maintenance
    - Gemini: deliver WFMOS ( $\sim\$60\text{M}$ ) + 150 Gemini nights for Subaru users

# Requirements

- Use up the money efficiently by the end of 2013 (Japanese fiscal year; March 2014)
  - This is why they call it stimulus package
  - Should go to Japanese companies
- World-top ( $\neq$  world-level) scientific results by the end of 2013
  - Not only for the construction money
  - Initial results from HSC survey (2012-2017?) essential
- Japan should lead the project
  - Whatever the PFS collaboration framework is, Japan should lead the project if we use the SUMIRE budget

# Issues

- **Dark energy study is likely to be the primary goal for PFS**
  - Our PI (Murayama) is a particle theorist
  - In Japan, much more cosmology/galaxy evolution people than Galactic archaeology people
- **What does PFS cost in reality ?**
  - PFS design and possible descope
  - Funding situation for other possible international partners does not look optimistic
- **Support/interest from our community**
  - Non-cosmology people in Subaru community simply lose their chance of Subaru observations
  - How many international institutes are seriously interested in working together on PFS with us ?

# Purpose of this meeting

- Status of HSC
- HSC and PFS sciences
- Status of other competing/complementary/synergetic surveys
- Ideas on PFS design
- Inspire/motivate Japanese young astronomers for international collaboration
- (Informal) discussion of possible future collaboration on SUMIRE PFS

# Goal of DENET (2007-2012)

- A successful example: HSC/SEEDS collaboration
  - discussion between Ed Turner and me started on July 28, 2006
  - Conference at Univ. of Tokyo on Nov.9 &10, 2006
  - MOU between NAOJ & Princeton on Jan. 18, 2009







**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**

- Hopefully, another successful collaboration on SUMIRE PFS established through DENET
- Enjoy this meeting !