

Opening Remarks

RESCEU & JSPS core-to-core
program DENET Summer School

Dark energy in the universe

July 26-29, 2011



Yasushi Suto

Department of Physics & RESCEU The University of Tokyo

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

DENET

Princeton U.
Dept. of Astrophys. Sci.
coordinator

Institut d'Astrophysique de Paris
coordinator
Jerome Martin

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

CMB
Gravitational lens
Baryon oscillation

Modified gravity
Extra-dimension
backreaction

Tohoku Univ.

NAOJ

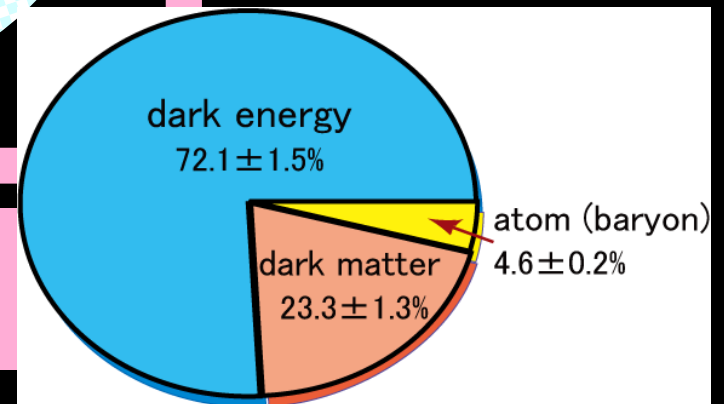
Hiroshima Univ.

Kyoto Univ.

Nagoya Univ.

Edinburgh U.
Royal Obs.
coordinator

Theoretical model
Baryon oscillation
Weak lens mapping



John Peacock

DENET activities

- Promotion of international collaboration on dark energy in the universe (SUMIRE)
- Exchange of researchers and students among the participating institutes
- Summer schools
- International conferences

Galaxy survey project: SuMIRe

Subaru *M*easurement of *I*maging and *R*edshift of the universe

- **PI: Hitoshi Murayama** (director of IPMU, U. of Tokyo)
 - Japanese Institutes in charge: IPMU, The University of Tokyo, NAOJ +
- **Imaging survey with HSC** (Hyper-Suprime Cam)
 - Japan + Princeton + ASIAA (Taiwan)
- **Spectroscopic survey with PFS** (Prime Focus Spectrograph)
 - Japan + Various international collaboration scheme is under discussion

DENET summer schools

- 2007 Hakone (with hot spring)
 - Nemanja Kaloper, David Parkinson, Mamoru Doi
- 2008 Asamushi (with hot spring)
 - Alan Heavens, Andrei Frolov, Kazuya Koyama
- 2009 Okinawa
 - Alexei Starobinsky, Michael Seiffert, Will Percival
- 2010 Kochi
 - Dragan Huterer, Jerome Martin, Massimo Meneghetti
- 2011 Aso (with hot spring)

RESCEU & JSPS core-to-core program DENET

Summer School @ Gora, Hakone

Dark energy in the universe **Sept. 1-4, 2007**

Three invited lecturers (2007)

■ **Nemanja Kaloper (UC Davis)**

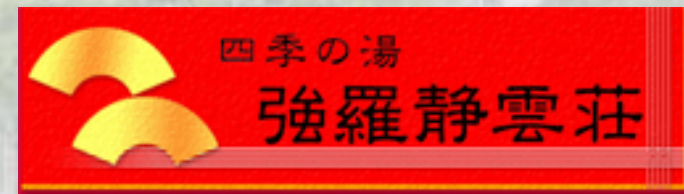
- Cosmological Constant and Other Dark Energies
- Challenging the Cosmological Constant
- Charting a Landscape of Modified Gravity

■ **David Parkinson (Univ. of Sussex)**

- The effect of dark energy on large-scale structure
- Large-scale structure as a probe of dark energy
- Recent BAO observations and plans for the future

■ **Mamoru Doi (IoA, Univ. of Tokyo)**

- Supernova observations for dark energy



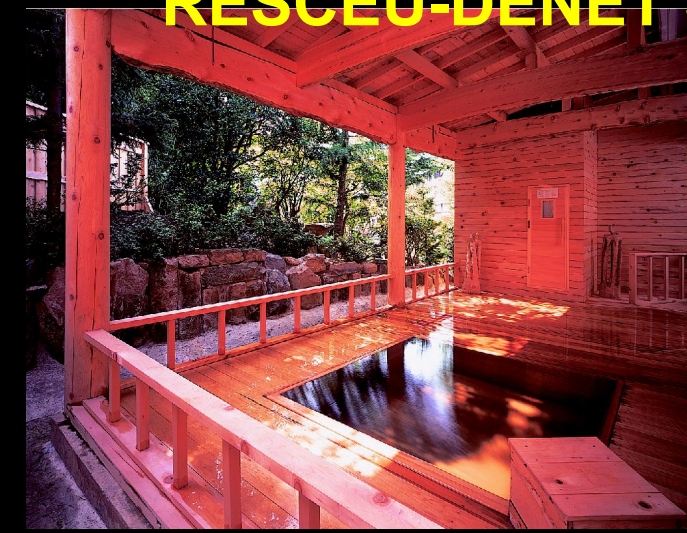
2007 summer school





Aug. 31-Sept. 2, 2008

RESCEU-DENET Summer School @Asamushi, Aomori



Three invited lecturers (2008)

- **Kazuya Koyama** (Univ. of Portsmouth)
 - *Modified gravity as an alternative to dark energy*
- **Alan Heavens** (Univ. of Edinburgh)
 - *Probing dark energy with weak lensing*
- **Andrei Frolov** (Simon Fraser Univ.)
 - *Dark energy models in $f(R)$ gravity*

RESCEU & JSPS core-to-core program DENET Summer School @ Okinawa *Dark energy in the universe* August 31-September 2, 2009



Three invited lecturers (2009)

- **Alexei Starobinsky** (Landau Institute)
 - Reconstruction of dark energy properties from observational data
 - Overview of dark energy models
- **Michael Seiffert** (JPL)
 - Cosmology with galaxy surveys
- **Will Percival** (Univ. of Portsmouth)
 - Dark Energy and Observational Methods
 - Measuring Galaxy Clustering and Making Predictions
 - Current Galaxy Clustering Measurements and Cosmological Constraints

RESCEU & JSPS core-to-core program

DENET Summer School at Kochi

Dark energy in the universe

August 30-September 1, 2010



あて-て つないで のみ-ちい-ゆ-け-ば みんな かあ-い こどりに-

靴が鳴る
清水かつら 作詞
弘田龍太郎 作曲
1920

お手つないで
野道を行けば
みんな可愛い
小鳥になつて
唄をうたえば
靴が鳴る
晴れたみ空に
靴が鳴る

花をつんでは
お頭にさせば
みんな可愛い
うさぎになつて
はねて踊れば
靴が鳴る
晴れたみ空に
靴が鳴る

な-つて う-た-え-ば くつ-が-なる は-れた-み-せ-ら-に くつ-が-なる

Three invited lecturers (2010)

- **Dragan Huterer** (University of Michigan)
 - *Accelerating Universe: Observations and Phenomenology*
 - Discovery of dark energy
 - Descriptions of dark energy
 - Cosmological analysis: likelihood methods
- **Jerome Martin** (Institut d'Astrophysique de Paris)
 - *Particle Physics Models of Dark Energy*
 - The accelerating Universe & the cosmological constant
 - Quintessence & high energy physics
 - Other models of dark energy
- **Massimo Meneghetti** (Universita di Bologna)
 - *Lensing by massive structures in the Universe*
 - An introduction on gravitational lensing
 - Unveiling the structure of galaxy clusters using lensing
 - Cosmology with lensing clusters

RESCEU & JSPS core-to-core program

DENET Summer School at Aso

Dark energy in the universe

July 26-29, 2011



Three invited lecturers + one special lecturer (2011)

- **Roy Maartens** (University of Portsmouth)
 - Theoretical models for the accelerating universe
- **Shirley Ho** (Berkeley/ Carnegie Mellon University)
 - Large scale structure of the Universe
- **Toru Yamada** (Tohoku University)
 - Observing High- z Universe
- **Alexei Starobinsky** (Landau Institute)
 - Recent progress in $f(R)$ gravity

DENET international conferences

- 2007 **Decrypting the universe** (Edinburgh)
- 2008 **Cosmology near and far** (Hawaii)
- 2009 **Science Opportunities with Wide-Field Imaging and Spectroscopy of the Distant Universe** (Princeton)
- 2010 **The Observational Pursuit of Dark Energy after Astro2010** (Caltech)
- 2011 **Subaru HSC Workshop** (Taipei)
- 2011 **The Accelerating Universe** (IAP)

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

24th-26th October 2007
Edinburgh, Scotland

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

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





COSMOLOGY NEAR & FAR: SCIENCE WITH WFMOSS

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



DENET and Princeton joint conference:
*Science Opportunities
with Wide-Field Imaging and
Spectroscopy of the Distant Universe*
November 9-11, 2009@Princeton Univ.

<http://www.astro.princeton.edu/astroevents/widefieldsurveys/program.php>

28 Japanese participants supported by DENET



DENET-Caltech conference:
The Observational Pursuit of Dark
Energy after Astro2010
October 7-9, 2010@Cahill Center for
Astronomy and Astrophysics, Caltech



DENET 2011 Subaru HSC Workshop

March 7 & 8, 2011

ASIAA, Taiwan



Institute of Astronomy and Astrophysics
中央研究院 天文及天文物理研究所

Souma, Fukushima (July 8, 2011)



Souma high school (July 8, 2011)



Souma high school (July 8, 2011)



Souma high school (July 8, 2011)



Conclusion

*Welcome to Aso,
enjoy the summer school,
and look for the bright future
of the universe dominated
by dark energy*

IAP-DENET International Conference “The Accelerating Universe”

October 24-26, 2011

Institut d'Astrophysique de Paris

