

A03 Overview

Naoshi SUGIYAMA

School of Science, Nagoya University

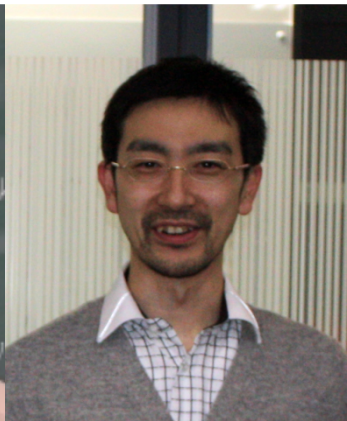
Kavli-IPMU

A03: Structure of the Universe and Dark Energy

- From Particles, Field Theory to Observational Cosmology



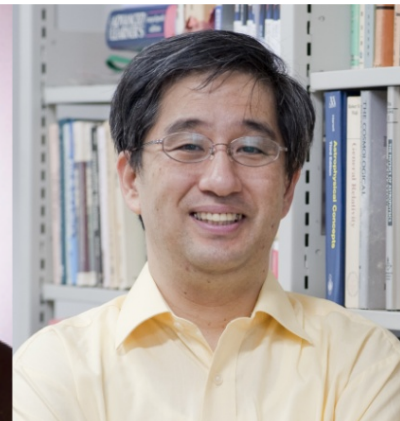
S. Nojiri



K. Ichiki



S. Tsujikawa



N. Sugiyama

Members (formally, or

informally) involving this grant

C Lab: Obs. Cosmology Group in Nagoya

- Faculties

Red's are members of A03, & Tenured
Green's award "Koubo-Kenkyu"

- Professor

- Naoshi Sugiyama 杉山直

- Associate Professor

- Kiyotomo Ichiki 市來淨與

Magnetic Fields, Perturbation, Neutrino

- Lecturer

HSC

Magnetic Fields, 21cm

- Atsushi Nishizawa 西澤淳, Hiroyuki Tashiro 田代寛之

- Assistant Professor

Inflation

Primordial Gravitational Wave

- Yuko Urakawa 浦川優子, Sachiko Kuroyanagi 黒柳幸子,

GW

Atsushi Nishizawa 西澤篤志, Kenji Hasegawa 長谷川賢二,

Hironao Miyatake 宮武広直

Radiative Transfer Simulation, 21cm

HSC

- PD

General Relativity

Red's are members of A03

Green's award "Koubo-Kenkyu"

- Daisuke Nitta 新田大輔 (hired by A03) Blue's are hired by A03

Naoya Kitajima 北嶋直弥

Axion Cosmology

Jean-Baptiste Durrive (hired by A03)

- PhD Students

- Shoichiro Horiguchi, Masato Kobayashi, Junpei Ohba, Shun Arai, Takao Endo, Yuka Matsui

- Master Course Students

- Ryo Iida, Takumi Sumida, Taichi Takeuchi, Toshiyuku Tanaka, Mjutsumi Minoguchi, Teppei Minoda, Rika Ando, Kenta Katou, Kazuhiro Kogai, Hinako Sakakibara, Daiki Hashimoto

- Researchers in other groups

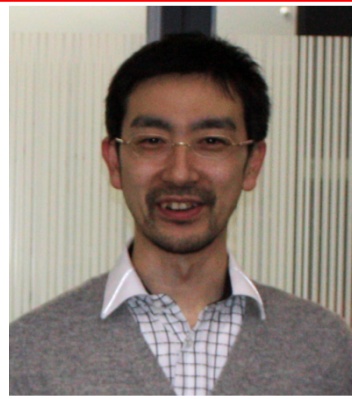
- Shinichi Nojiri 野尻伸一

Models of Dark Energy, Modified Gravity

- Chulmoon Yoo 柳哲文

- Tsujikawa Shinji 辻川信二 (東京理科大)

members of A03



Awarded "Koubo Kenkyu"

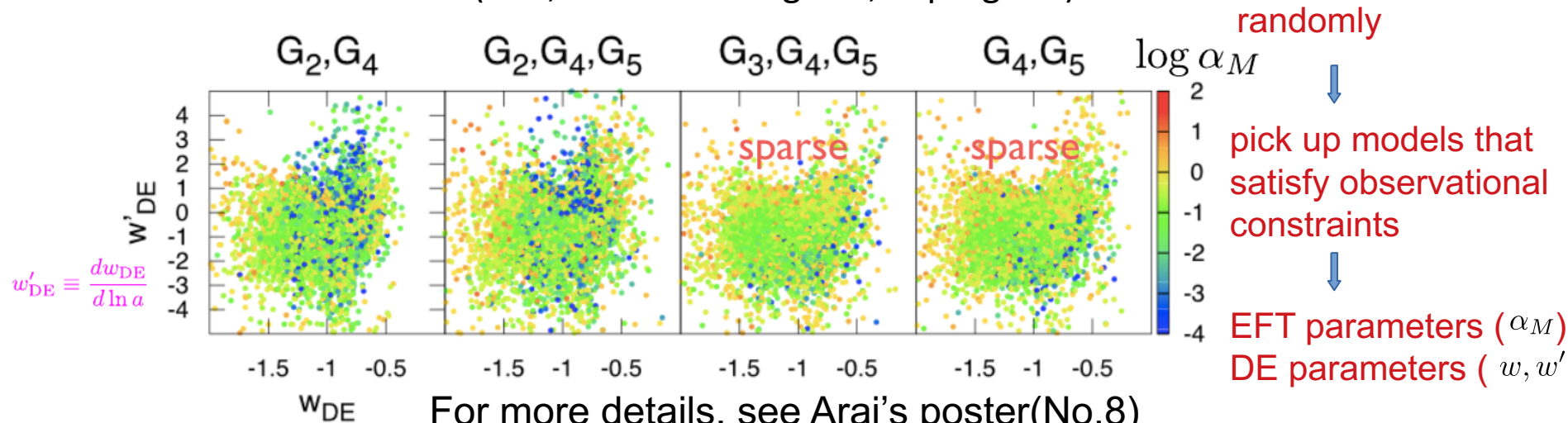
Hired by A03



What we have done so far

- Publish many papers: more than 12 papers
- One International Workshop at Nagoya, Aug. 28-30
- Two days meeting with A01 and B01, Sep. 25-26

Classification of dark energy models in Horndeski theory with MC simulations (Arai, Ichiki & Yamaguchi, in progress)



Papers

● Dark energy in vector-tensor theories and observational constraints

1. Cosmological constraints on scalar-tensor gravity and the variation of the gravitational constant, PTEP (2017) id.043E03 (Ooba, Ichiki, Chiba, Sugiyama)
2. Updated observational constraints on quintessence dark energy models, PRD in press (Durrive, Ooba, Ichiki, Sugiyama)
3. Weak lensing from self-ordering scalar fields, PRD 95, id.123524 (Saga, Horiguchi, Ichiki)
4. Sequestering mechanism in scalar-tensor gravity , Phys. Rev. D 96 (2017) no.12, 124003 (Tsukamoto, Katsuragawa and Nojiri)
5. Cosmology in beyond-generalized Proca theories, Phys. Rev. D 95, 104001 (2017) (Nakamura, Kase, Tsujikawa)
6. Observational constraints on generalized Proca theories, Phys. Rev. D 95, 123540 (2017) (De Felice, Heisenberg, Tsujikawa)
7. Suppression of matter couplings with a vector field in generalized Proca theories, Phys. Rev. D 96, 084005, (2017) (Nakamura, Kase, Tsujikawa)

Papers

● Surviving dark energy models after GW170817

1. Dark energy survivals in massive gravity after GW170817: SO(3) invariant, JCAP 1801, 044 (2018) (Heisenberg, Tsujikawa)
2. A dark energy scenario consistent with GW170817 in theories beyond Horndeski, to appear soon (Kase, Tsujikawa)
3. Cosmological Bound from the Neutron Star Merger GW170817 in scalar-tensor and F(R) gravity theories, Physics Letters B (Nojiri, Odintsov)

● Black hole solutions in modified gravity

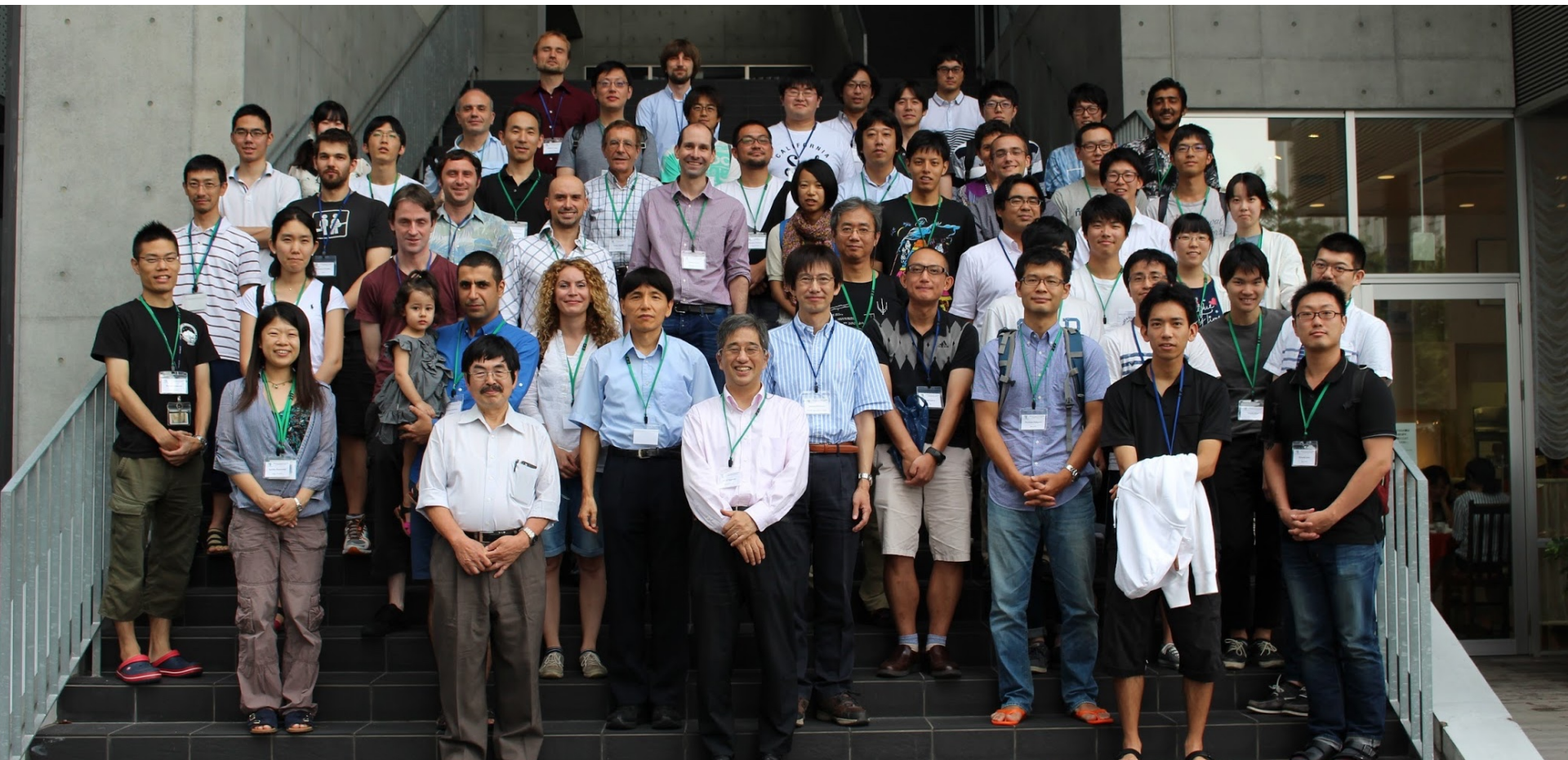
1. Hairy black-hole solutions in generalized Proca theories, Phys. Rev. D 96, 084049 (2017) (Heisenberg, Kase, Minamitsuji, Tsujikawa)
2. Regular multihorizon black holes in modified gravity with nonlinear electrodynamics, PRD 96 (2017) no.10, 104008 (Nojiri, Odintsov)

● Review Paper

1. Modified Gravity Theories on a Nutshell: Inflation, Bounce and Late-time Evolution,“ Phys. Rept. 692 (2017) 1 (Nojiri, Odintsov, Oikonomou)

4th Korea-Japan joint workshop on Dark Energy at KMI

August 28-30, 2017, KMI, Nagoya University



4th Korea-Japan joint workshop on Dark Energy at KMI

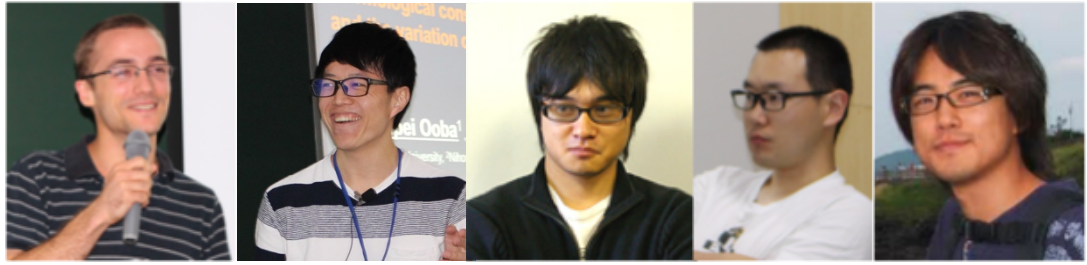
- About 60 Participants
- Nagoya, Tokyo University of Science, KASI
- Invited Speakers include



- Martin Kunz
- Junichi Yokoyama
- Shinji Mukohyama
- Antonio De Felice
- Emilio Elizalde
- Edmund Copeland
- Kei-chi Maeda
- Lavinia Heisenberg
- Takashi Chiba
- Gianluca Calcagni
- Nabila Aghanim



Short Talks



- 9:00 Naoshi Sugiyama
A03 Overview
- 9:15 Jean-Baptiste “JB” Durrive
Updated observational constraints on quintessence Dark Energy models
- 9:30 Junpei Ooba
Planck constraints on the non-flat Lambda-CDM inflation model
- 9:45 Daisuke Nitta
Equivalence principle violation after reheating
- 10:00 Takao Endo
Effect of Dark Energy Perturbation on Cosmic Voids Formation
- 10:15 Chulmoon Yoo
On Observational Effects of Spherical Inhomogeneity

28 August

Photos: day 1

[Opening]

9:15~9:30 Naoshi Sugiyama

Morning session (Chair: Shinji Tsujikawa)

[Keynote talks]

9:30~10:10 Martin Kunz **“Dark energy after Planck and before Eucli”**

10:10~10:50 Jun'ichi Yokoyama "Inflation (and dark energy) : Large or Small?"

10:50~11:10 Coffee break

[Invited talks: Observational aspects of dark energy]

11:10~11:40 Arman Shafieloo **“Beyond the Standard Model of Cosmology”**

11:40~12:10 David Parkinson **“Tests of fifth forces using large-scale structure”**

12:10~12:40 Cristiano Sabiu **“Dark Energy constraints from higher order clustering statistics”**

12:40~14:00 Lunch

Afternoon session (Chair: Lavinia Heisenberg)

[Invited talks: Modified gravity and dark energy]

14:00~14:30 Shinji Mukohyama **“Minimally Modified Gravity”**

14:30~15:00 Antonio De Felice **“Chameleon bigravity and minimal quasidilaton”**

15:00~15:30 Emilio Elizalde **“On the concept of Bing Bang and a renormalization group improved, unified accelerating scenario”**

15:30~16:00 Coffee break

[Short talks]

16:00~16:15 Shun Arai **“Constraints on generalized Horndeski theory with Gravitational Waves observations”**

16:15~16:30 Yuka Matsui **“Constraints on cosmic strings and superstrings from gravitational wave background”**

16:30~16:45 Junpei Ooba **“Cosmological constraints on scalar-tensor gravity and the variation of the gravitational constant”**

16:45~17:00 Kouichirou Horiguchi **“Effects of the features in initial power spectrum on baryon acoustic oscillations”**

29 August

Photos: day 2

Photos: banquet

Morning session (Chair: Antonio De Felice)

[Keynote talks]

9:30~10:10 Edmund Copeland **“Dark Energy and Screening Mechanisms”**

10:10~10:50 Kei-ichi Maeda **“Matter coupling and the coincidence problem”**

10:50~11:10 Coffee break

[Invited talks: Theoretical aspects of dark energy]

11:10~11:40 Lavinia Heisenberg "Construction of generalized Proca theories and beyond"

11:40~12:10 Ryotaro Kase **“Cosmology in generalized Proca theories and its extension”**

12:10~12:40 Shinji Tsujikawa **“Hairy black holes in vector-tensor theories”**

12:40~14:00 Lunch

Afternoon session (Chair: David Parkinson)

[Invited talks: Early Universe, CMB]

14:00~14:30 Takeshi Chiba **“Spin Distribution of Primordial Black Holes”**

14:30~15:00 Stephen Appleby **“Using the Topology and Morphology of LSS for Cosmological Parameter Estimation”**

15:00~15:30 Benjamin L’Huillier **“Constraining the early Universe with the large-scale structure”**

15:30~16:00 Coffee break

16:00~16:15 Atsushi Nishizawa **“Nature of Binary Blackholes Probed by Cross Correlation of Gravitational Wave and Galaxies”**

16:15~16:30 Taisaku Mori **“BRS structure of simple model of Simple Model of Cosmological Constant and Cosmology”**

16:30~16:45 Taishi Katsuragawa **“Study on Chameleonic Dark Matter in F(R) Gravity”**

16:45~17:00 Teppei Minoda **“Thermal SZ effect in the IGM from the primordial magnetic fields”**

17:00~17:15 Daiki Hashimoto **“Exploring Dark Matter Signatures in the Gamma-ray Sky with HSC Catalog of Galaxy Clusters”**

30 August

Photos: day 3

Morning session (Chair: Arman Shafieloo)

[Invited talks]

9:30~10:00 Shin'ichi Nojiri **“Simple Model of Cosmological Constant”**

10:00~10:30 Gianluca Calcagni **“Detecting quantum gravity in the sky”**

10:30~11:00 Nabila Aghanim **“Cosmological parameters from Planck SZ clusters”**

11:00~11:15 Coffee break

[Invited talks: Large-scale structures]

11:15~11:45 Yong-Seon Song **“Implications of RSD”**

11:45~12:15 Minji Oh **“Measuring neutrino mass imprinted on the anisotropic galaxy clustering”**

12:15~12:45 Toyokazu Sekiguchi **“Angular power spectrum of 21 cm line fluctuations from minihalos”**

12:45~14:00 Lunch

Afternoon session (Chair: Sachiko Kuroyanagi)

[Invited talks: Inflation]

14:00~14:30 Kenji Kadota **“Cosmological exploration for light dark matter”**

14:30~15:00 Ying-li Zhang **“Oscillations of Power Spectrum from non-minimal coupling scalar fields of R^2 inflation”**

15:00~15:30 Ryusuke Jinno **“Hillclimbing inflation”**

15:30~16:00 Coffee break

16:00~16:15 Takao Endo **“Effects of dark energy perturbation on formation of cosmic voids”**

16:15~16:30 Tomohiro Nakamura **“Chameleon mechanism in inhomogeneous density profile”**

16:30~16:45 Ando Rika **“Constraints on dark energy using intensity mapping from SKA surveys”**

16:45~17:00 Jean-Baptiste Durrive **“Constraining scalar field Dark Energy models”**

17:00~ Free discussions