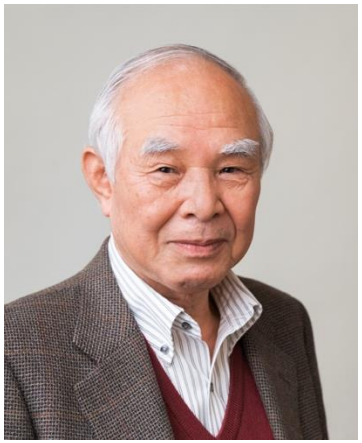
The story behind the launch of (Kavli) IPMU

16 Dec., 2024
Symposium Celebrating Hitoshi Murayama's 60th Birthday（還暦）



Sadanori Okamura

Executive Director, Todai Eecutive Management Program (Todai EMP)
Professor Emeritus, The University of Tokyo
Honorary Member, Astronomical Society of Japan

I am an astronomer, and when (Kavli) IPMU was born, I was an Executive Vice President (in charge of research) of the University of Tokyo

Whole the story is given in this IPMU interview.

IPMU Interview
with Sadanori Okamura
Interviewer: Hiroaki Aihara

How IPMU was born

Aihara: Thank you very much for making time for us. I would like to begin this interview by reflecting on the past. Could you tell us about the story of how IPMU was born? At that time you were a Managing Director for Research and an Executive Vice President of the University and overseeing initiatives such as WPI (World Premier International Research Center Initiative). What was your immediate reaction when you learned that the government was planning to call for application to WPI?

Sadanori Okamura is Professor at the School of Science, the University of Tokyo. In 2010, he was appointed as the founding Director of the Kavli Institutes for Advanced Study (KIAS), established on January 1, 2011. He graduated from the Department of Astronomy, UT in 1969. He received a Doctorate in Astronomy from UT in 1972. Since then he has been engaged in education and research on Astronomy at UT. He became Professor in 1991, was Dean of the School of Science from April 2003 through March 2005, Managing Director for Research and Executive Vice President from April 2006 through March 2009. While he was in the Directorate of UT, he endeavored to establish IPMU. His research field is Extragalactic Astronomy and Observational Cosmology.

Okamura: As far as I remember, before the invitation for applications was announced at the university, Professor Katsuhiko Sato had been coordinating submission of at least one proposal in physics. At first, I think the discussion started to adopt the neutrino as a central topic of the project, probably influenced by a strong image of Professor Masatoshi Koshiba. Then, someone pointed out that the neutrino is important, but the neutrino alone is a bit less appealing. In the meantime, a subject having something to do with astronomy was searched for. At that time, I think I was hearing the discussion with my personal feeling that it was a project more or less related to the astronomy group, without a clear consciousness of being Managing Director for Research, Executive Vice President. Meanwhile, the contents of the project further changed. I don't remember when it occurred, but Professor Hiroshi Ooguri came onstage and the inclusion of mathematics was decided. At around that time, I had the clear impression that the big change of the scenario was likely to make the project very appealing. Then, I met Ooguri-san, who happened to be staying in Japan. It may have been at the stage when I was coordinating the proposals as Managing Director. While I was talking with him, I clearly came to believe that it is a very good thing to combine mathematics with physics and astronomy. Upon the university-wide announcement of the formal invitation for application, a number of proposals were submitted from various other fields, and as Managing Director I had to coordinate among them. The Directorate created a selection committee which held hearings. After having gone through a lot of things, we came up with three proposals to submit. Even now I think that they were all very excellent proposals that deserved governmental selection. Actually, I thought that hopefully more than one proposal might be successful, given that these three excellent ones were submitted. However, the result was that only IPMU was selected. This is the story before the selection of IPMU.

Aihara: Right. Because Professor Sato was taking leadership in the Department of Physics back then, discussion on WPI naturally started with cosmology playing a central role. Simultaneously, though separately, Professor Yoichiro Suzuki, Director of the Institute for Cosmic Ray Research, started planning a WPI proposal targeting neutrino physics research. Since cosmology and neutrino are closely related, both groups came to discuss how we might integrate both ideas. Challenge remained, however, to design a program that is explicitly interdisciplinary, one of the mandatory requirements for a WPI proposal. We wanted something very concrete. It was the summer of 2006, I think. Coincidentally, Professor Ooguri was visiting the Department of Physics, and Professor Tsutomu Yanagida (now a PI of IPMU) talked to Professor Ooguri about the story of WPI planning. Professor Ooguri proposed integrating mathematics into the picture.

His main research interest is superstring theory, a formal theory of particle physics. It has a very close connection with mathematics. Professor Ooguri stressed the exciting possibility of integrating mathematics with physics and astronomy. I recall how it had all begun.

Okamura: I didn't know that Yanagida-san first talked to Ooguri-san.

Aihara: It was Professor Ooguri's idea that made integration of physics and mathematics as a key element of this program. Integrating mathematics into physics and astronomy significantly widened the scope of the proposal, I must say. The next challenge, which was

Hiroaki Aihara is Deputy Director and a principal investigator of IPMU. He is also a Professor of Physics in the School of Science at the University of Tokyo.

IPMU Interview, IPMU News, Vol. 14, June 2011

WPI Program, MEXT (2007-)

Ministry of Education, Culture, Sports, Science and Technology

世界トップレベル研究拠点プログラム（WPI）

wpi World Premier International Research Center Initiative

Unprecedentedly generous supporting program in order to create world premier international research centers in Japan

> 10 M$ (10^9 yen)/year for 10 years (+ 5 years)

University's self-supporting Institute (WPI Academy)

WPI Centers

※令和６年10月時点　18 Centers as of October, 2024

Academy

Being Supported

Initial 5 centers

9 Academy Centers

【2007年度採択　5拠点】 2007

- 東北大学 材料科学高等研究所(AIMR)
- 物質・材料研究機構 ナノアーキテクトニクス材料研究センター (MANA)
- 京都大学 物質－細胞統合システム拠点(iCeMS)
- 大阪大学 免疫学フロンティア研究センター(IFReC)
- 東京大学 カブリ数物連携宇宙研究機構 (Kavli IPMU) Kavli IPMU

【2010年度採択　1拠点】 2010

- 九州大学 カーボンニュートラル・エネルギー国際研究所 (I^2CNER)

【2012年度採択　3拠点】 2012

- 筑波大学 国際統合睡眠医科学研究機構 (IIIS)
- 東京科学大学 地球生命研究所（ELSI）
- 名古屋大学 トランスフォーマティブ生命分子研究所 (ITbM)

【2017年度採択　2拠点】 2017

- 東京大学 ニューロインテリジェンス国際研究機構 (IRCN)
- 金沢大学 ナノ生命科学研究所(NanoLSI)

【2018年度採択　2拠点】

- 北海道大学 化学反応創成研究拠点(ICReDD)
- 京都大学 ヒト生物学高等研究拠点(ASHBi)

【2021年度採択　1拠点】 2021

- 高エネルギー加速器研究機構 量子場計測システム国際拠点(QUP)

【2022年度採択　3拠点】 2022

- 大阪大学 ヒューマン・メタバース疾患研究拠点 (PRIMe)
- 広島大学 持続可能性に寄与するトポロジー超物質拠点 ($SKCM^2$)
- 慶應義塾大学 ヒト生物学－微生物叢－量子計算研究センター (Bio2Q)

【2023年度採択　1拠点】 2023

- 東北大学・海洋研究開発機構 変動海洋エコシステム高等研究機構 (AIMEC)

https://www.mext.go.jp/content/20241003-mxt_kiso-100000476_1.pdf

WPI Program, MEXT (2007-)

世界トップレベル研究拠点プログラム（WPI）

wpi World Premier International Research Center Initiative

Among the first 5 WPI Research Centers, (Kavli) IPMU was unique in that,

- built from scratch (others based on an existing Institute)
- met most requirements by MEXT in the very early stage
- highest rating of S (among S, A, B, C) in the final evaluation → got extended 5-year support (Kavli IPMU only)
- became a University's permanent Institute from scratch
- now often regarded as the best success in the WPI program

WPI Program, MEXT (2007-)

Program first discussed at CSTP (Council for Science and Technology Policy) in 2006.9

- 10 months for preparation
- Informal communications with CSTP+MEXT officers

- public announcement 2007.3
- proposal deadline: 2007.5.29
- selection: 2007.6-2007.8 → 5 centers
- WPI activities started: 2007.10.1

Official time schedule

WPI imposed many requirements (extracts only)

1. Purpose of Program

This program provides priority support for proposals aimed at creating world premier international research centers staffed at their core with the world's most leading researchers. By achieving a very high research standard and providing an excellent research environment, the centers should be "globally visible research centers" being able to attract top-level researchers from around the world.

2. Eligible Applicants

Host Instituions:
Universities, Inter-University research Institutes, Independent administarative institutions (IAIs),Public interest cooperations (PICs)

3. Number of awards

Approximately 5

4. Implementation period

10 years with possible 5-year extension for projects with outstanding results.

5. Concepts and requirements of eligible projects

(1) Research field

A field of basic research, including one aiming at a transition from basic research to applied research, in which a world-class research group currently exists in Japan. In principle, the field should be interdiciplinary, spanning or combining two or more of research areas such as Biosciences, Chemistry, Material Sciences, Electronics Engineering and Information Sciences, Precision and Mechanical Engineering, Physics, Mathematics.

(2) Research objectives

What new domains are expected to be pioneered by fusing the target fields. In the precess, what world-level scientific issues are sought to be resolved.

(3) Project management

As the center's "face" and the person who gives the center an attractive persona within the international community, the director should be a distinguished researcher in the subject field, one capable of exercising highly effective leadership and inviting outstanding researchers to the center from around the world. To provide the director with strong administarative and managerial support, an administrative director is to be appointed to perform such tasks as maintaining an evironment in which researchers can devote themselves fully to their work.

(4) Researchers and other center staff

To be "globally visible", the research center will need to have a physical concentration (or core) of researchers of a certain scale, one that poseses a high research level. This core should be established within the host institution.
At all times, at least 30% of the researchers should be from overseas, including on short stays.

(5) Research environment

To ensure that top-caliber researchers from around the world can comfortably devote themselves to their research in a competitive international environment, mesures such as following should be taken:
- exemption from other duties than their research
- providing adequate staff support
- fill postdoc positions through open international solicitations
- rigorous evaluation of research and merit-based annual salary system
- holding regular international conferences/symposia

(6) Indicators for evaluating a center's global standing

(7) Securing research funding

6. Host institution's commitment

For the center to achieve truly top world status, the host institution must clearly define the center's role within its mid-to-long-term strategy and provide it comprehensive support accordingly.

- support for the center to secure necessary resources exceeding WPI funds
- allow the director autonomy regarding the center's operation
- support the center director in coordinating with other departments
- be flexible for the center to effectively implement new management methods (e.g., English-langage environment, merit-based pay, top-down decision making)- accommodate center's infrastructure (facilities, lab space, equipment, land)
- other types of assistance fo the center to become a world premier international research center in both name and deed

The WPI application was not a free-will application by the researchers, but a University project.

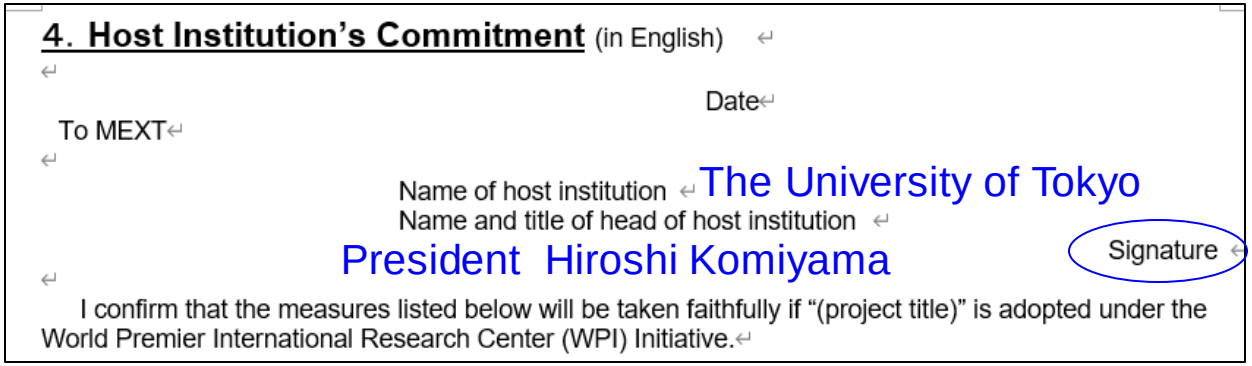
In summary, the requirements for eligible applications are

(1) very high world top-level research standard
(2) fusion of two or more conventional research areas
(3) international research environments
(4) reform of the conventional system of Japanese universities

and

(5) Host institution should provide every possible assistance for the director to achieve the above goals.

The WPI project was a university project



4. Host Institution's Commitment (in English)

Date

To MEXT

Name of host institution The University of Tokyo
Name and title of head of host institution
President Hiroshi Komiyama

Signature

I confirm that the measures listed below will be taken faithfully if "(project title)" is adopted under the World Premier International Research Center (WPI) Initiative.

Confirmation by the President was required in the application form

WPI: MEXT Program (2007-)

世界トップレベル研究拠点プログラム（WPI）

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Official time schedule

I had to act as a dual personality for the ten months.

One of the researchers preparing a proposal

⇕

Executive Vice President in charge of research of the host institution

How the idea of IPMU emerged

- Institute for Cosmic Ray Research (ICRR)

Y. Suzuki ← First to start reaction, led proposal preparation, became a first Deputy Director

Neutrino Physics

- School of Science

(Dept. of Physics, and Dept. of Astronomy, RESCEU)

- International Center for Elementary Particle Physics (ICEPP)

K. Sato, T. Yanagida, Y. Suto,
H. Aihara, S. Komamiya, K. Makishima,
K. Nomoto, S. O., and others

Cosmology+Astronomy

Hiroshi Ooguri, at Yanagida Lab on sabbatical leave from CalTech

2006.9-
2007.5

Combination of >2 fields

Neutrino,
Cosmology,
Astromomy,
+
Mathematics

Combination of 3 fields
Physics, Astronomy, Mathematics

Nobel Prize

2002

(2015)

In neutrino physics, world-class research group exists here in University of Tokyo

↓

'We must submit a successful proposal'

→ More appealing to wider community

● Director Search: Y.Suzuki, H.Aihara, +

Director:
Hitoshi Murayama
(UC Berkeley)
Highly appreciated

Administrative Director:
Kenzo Nakamura
(KEK)
Highly appreciated

中村前事務部門長

Active researcher at KEK (neutrino experiment: K2K). Moved to IPMU before retirement

Tremendous efforts resulted in a very appealing proposal!

University-Wide Preparation

Call for proposal inside the University of Tokyo (2007.2.27)

Set up a review committee for internal selection

……..

… (hearing) ……..

2007.5.16 Murayama-san's hearing

(I met him for the first time)

……..

……..

……..

Three very strong proposals emerged:

Advanced International Reserach Center for Integrative Life Sciences

Institute for Correlated Matter Science

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

University-Wide Preparation

These three are really very strong proposals.

Advanced International Reserach Center for Integrative Life Sciences
Institute for Correlated Matter Science
Institute for the Physics and Mathematics of the Universe (IPMU)

We decided to submit all the three!, wishing for multiple successes.

4. Host Institution's Commitment (in English)

Date

To MEXT

Name of host institution: The University of Tokyo
Name and title of head of host institution: President Hiroshi Komiyama
Signature

I confirm that the measures listed below will be taken faithfully if "(project title)" is adopted under the World Premier International Research Center (WPI) Initiative.

We had to prepare three independent support plans to place each as a University project.

Lots of negotiations

(Aug. 2007)

Directors-to-be met with President Komiyama for the preparation for the hearing by the WPI Program Committee

2007.8.6 Murayama-san came from US to meet President Komiyama

(In order to express my thanks, I arranged a U.Tokyo official vehicle to Narita Airport for Murayama-san only who was going back to the US immediately after the meeting)

30-31Aug., 2007 Hearing by the WPI Committee (Director-to-be + President)

by S.Okamura

Fusion of two major basic sciences

Mathematics and Physics promote each other

quantitative foundation

Mathematics
includ. statistics

new invariants in topology
vertex algebra
C*-algebra, q-groups
Monte Carlo method

inspiration
prediction

Physics
theory & expts

gauge theory
general relativity
string theory
quantum physics

7 out of 18 Fields Medals since 1990 were inspired by particle physics

Top-level research standard

by S.Okamura

Research objectives

Importance of this research field

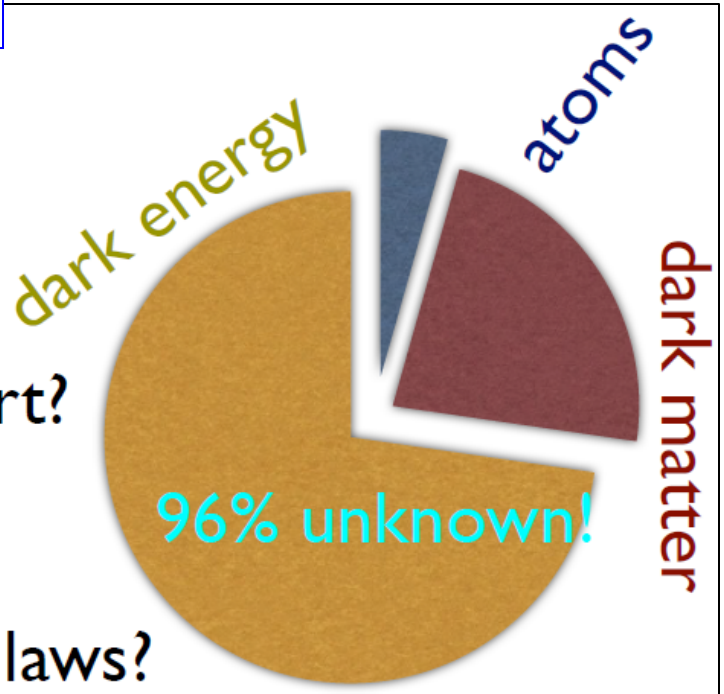
growing field!

Nobel prizes in 1999, 2002, 2004, 2006

2008, 2011, 2013, 2015, 2017, 2019, 2020

The Science

- How did the Universe start?
- What is it made of?
- What is its fate?
- What are its fundamental laws?
- Why do we exist?



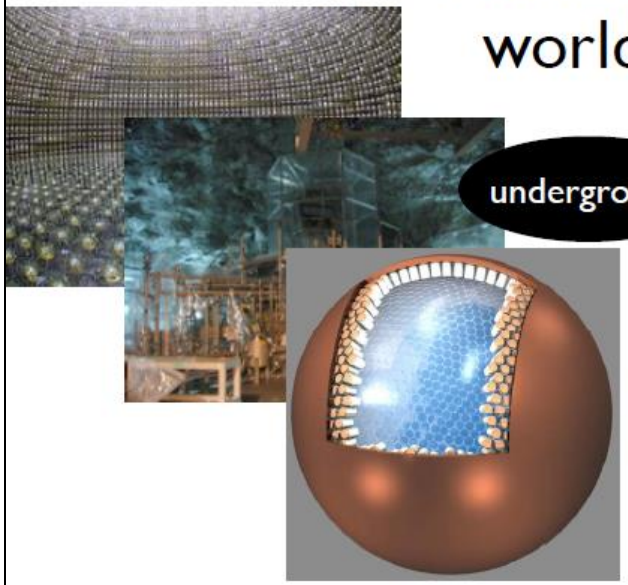
Fundamental questions on the Universe

We need new data to address them

We need both new mathematics and new physics to describe them

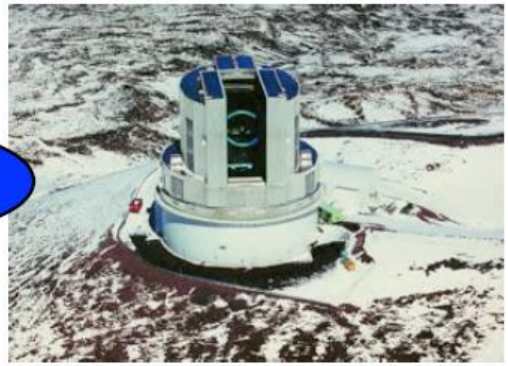
Multi-faceted attack on the universe

Together with math and theory, *unique* combination in the world!

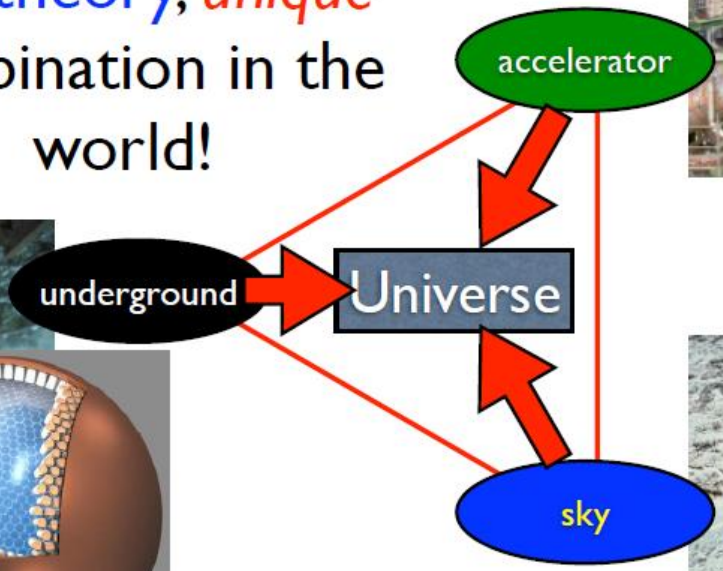


ICRR/Tohoku

LHC (CERN)



Subaru (NAOJ)



Results announced: 2007.9.4

(Only) IPMU was successful.

2007.10.1 Press conference: Establishment of IPMU

IPMU News, No.1, Mar. 2008

WPI Center IPMU at the Kashiwa International Campus

- Outline of Support and Special Measures -

(Top-down management by the IPMU Director)
IPMU is positioned as an interdepartmental and interdisciplinary organization under the direct control of the U.Tokyo President, and important matters such as faculty selection, can be implemented **under the top management of the IPMU Director.**

(Flexible personnel and salary system)
- **merit-based salaries** to specially-appointed faculty members invited from abroad in line with their abilities
- **Flexible contract terms**
- Special exceptions for employment of faculty members and support **staff who are over the retirement age**
- The director can give a salary incentiveIf to researchers who achieve outstanding results,
- **Support staff members** are assigned through internal recruitment.

Next slide

(Reinforcement of the system for accepting foreign researchers)
- Kashiwa International Office provides **support for the daily lives of foreign researchers.**
- **Visa Consulting Service** to handle immigration and visa status procedures on behalf of IPMU foreign researchers.
- Flexible handling of rental of U.Tokyo accommodations for IPMU foreign researchers, and development of the **Kashiwa International Lodge.**
- **Trial implementation of various forms and procedures in English.**

(Financial Support)
- **Construction of IPMU research building**
- Compensate the expenses for student guidance, etc. to the departments for faculty members who devote themselves to IPMU research activities

Personnel support system for IPMU

Privileges will be given to the center as a Special District in the University of Tokyo. (partly free from internal rules)

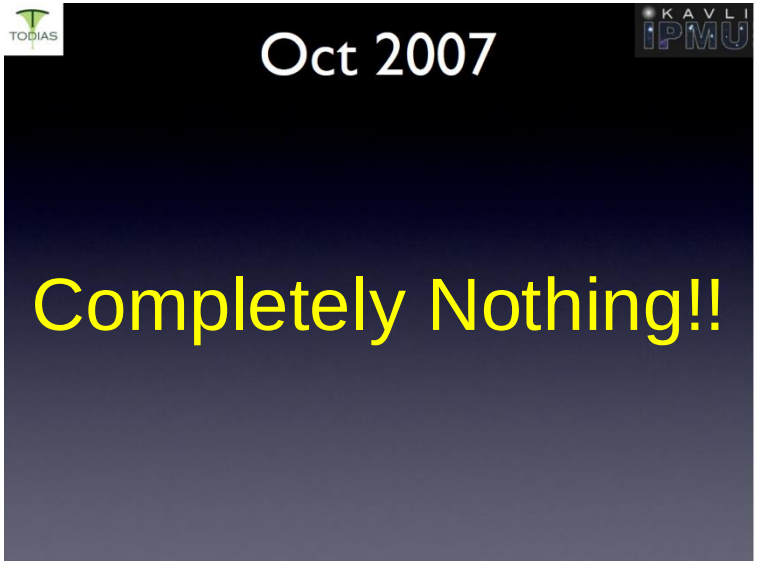
—New Appointments from outside U. Tokyo
- Flexible annual salary commensurate with ability and competition world wide (since 2007; little flexibility with "the former system")
- Term not restricted by the current 5-year rule

—Re-Appointments from inside U. Tokyo
- Resignation from the current position without financial disadvantage
- Flexible annual salary commensurate with ability and competition world wide (since 2007; little flexibility with "the former system")
- Extension of retirement age

—Continuous Appointments from inside U. Tokyo
- Incentive payment (merit-based bonus)
- Exemption from management and teaching duties (substitute lecturers for WPI faculties)
- Recruitment of excellent staff through internal competition

I wish to thank, among others, Motoi Eto (competitive grant section) and Kazuhiro Takeshita (personnel section) for their large contributions towards successful launch.

Rapid Growth



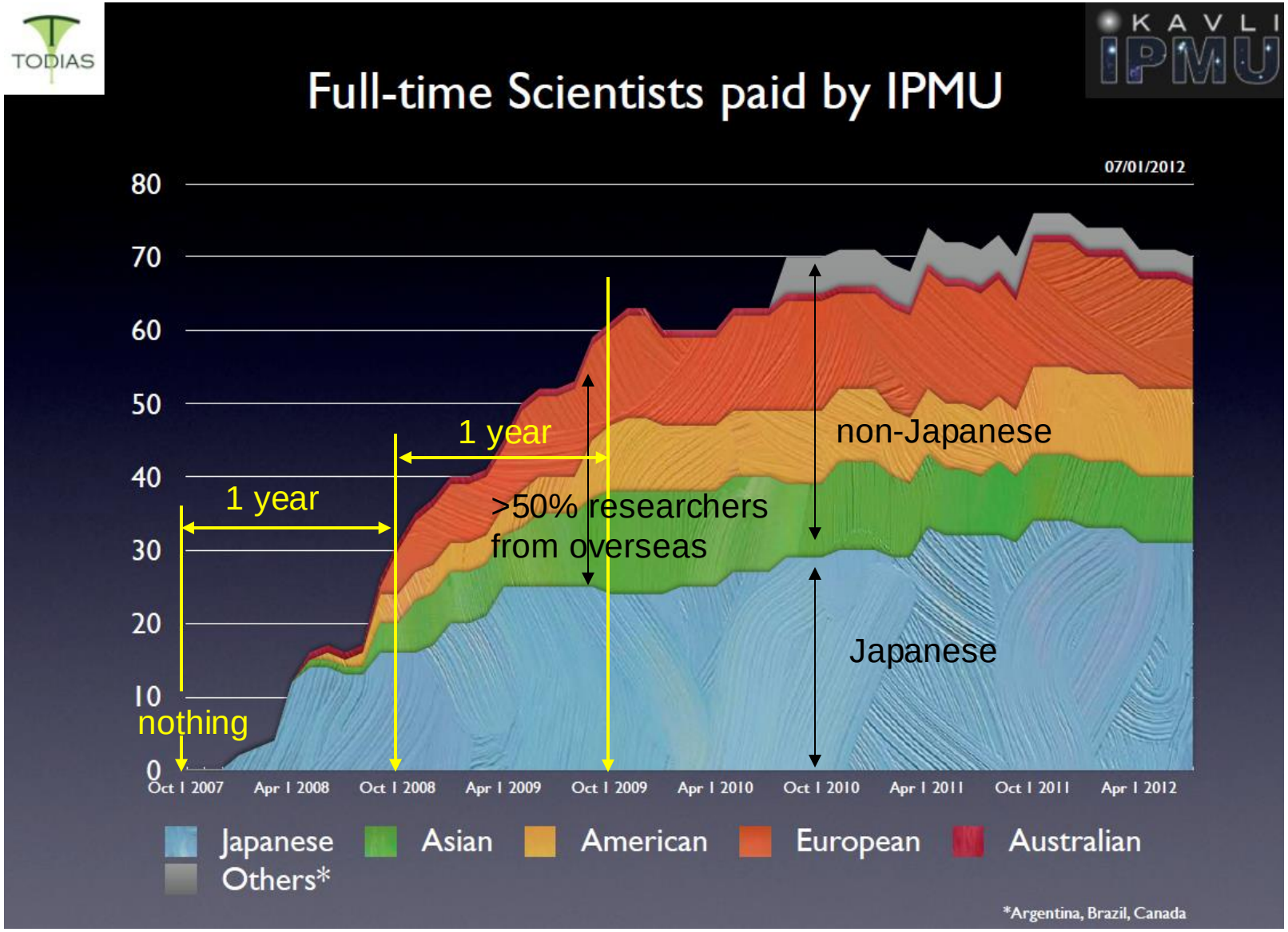
2009.12 Research Building Completed!

IPMU News, Vol. 8, 2010

2012.4 Kavli IPMU started

https://www.ipmu.jp/ja/story/7795

https://www.ipmu.jp/sites/default/files/webfm/pdfs/press_3



H. Murayama, External Advisory Committee (EAC) Meeting, 2012.7.24

Personal recollections -Tea Time Story

東京大学 THE UNIVERSITY OF TOKYO　EMP Executive Management Program

Mainichi Shinbun 2018.11.6

Interview: Road to the 'globally visible' institute

(Recollections as the founding director)

System reforms that break conventional rules

常識破るシステム改革

(Next page)

オピニオン opinion

そこが聞きたい 国際研究所への道のり

東京大カブリ数物連携宇宙研究機構教授 村山 斉 氏

「世界トップレベル研究拠点」（WPI）の一つとして発足した東京大カブリ数物連携宇宙研究機構（Kavli IPMU）は、11年で世界をリードする研究所に成長した。斬新な大学組織の構築や、システム改革がある。近年指摘される日本の科学研究停滞を解決するカギもありそうだ。10月まで11年間、初代機構長を務めた村山斉教授（53）に道のりを聞いた。【聞き手・須田桃子、写真・手塚耕一郎】

――機構長就任の10月の記者会見で、自身の立場を「中小企業の社長」に例えたのが印象的でした。

米国で最先研究していて常々思っていたのは、日本人研究者が国内で遠慮ういい研究をしているのにどうも海外とツーカーの関係になっていないということでした。日本人の論文が話題になっても、「誰々の論文」ではなく「ジャパニーズペーパー（日本人の論文）」と呼ばれているのです。そのため、世界から目に見える研究拠点を作るという目標に興味を覚えました。自分のビジョンで研究所を設計、運営できるのはうれしいことですが、機構長の仕事は基本的にサービス業。世界と行脚して研究の存在を知ってもらい、優秀な人を連れて来て、彼らが何も心配せず活発に研究できる資金と環境を用意することです。しかし、政府の支援は補助金で、次年度に繰り越せません。言うなれば、約100人の従業員を抱え、貯金ゼロのうえに、約10年後には「破綻」が打ち切りになることも分かっている中小企業の社長のようなもので、非常に難しい状況でした。

――優秀な人を獲得するためにどんな

むらやま・ひとし
東京大大学院修了。素粒子物理学者。1993年から米国を拠点に、2000年から米カリフォルニア大バークリー校教授で現在も兼任。17年にフンボルト賞を受賞。

1 世界トップレベル研究拠点プログラム（WPI）

世界から「目に見える研究拠点」の形成を目指し、一定の要件を目指す機関に集中投資する文部科学省のプログラムで、2007年度に開始。これまでに13拠点が採択され、現在は9拠点が補助金の支援を受ける。18年度予算は約70億円。

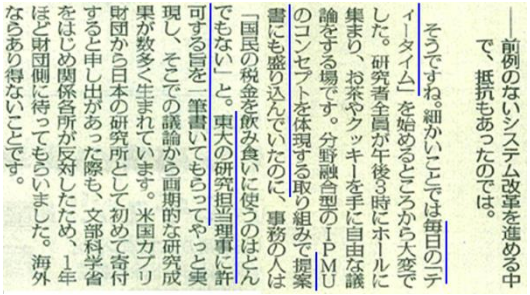
2 東京大カブリ数物連携宇宙研究機構

数学・物理学・天文学を融合し、宇宙の始まり方などの根源的な謎の解明に取り組む。07年10月、9年半の時限付きで発足。当初のWPI5拠点で唯一、5年の延長を認められ、支援が続く22年以降も東大の恒久的研究所として存続することが今年決まった。構成員は約170人で、10月に大栗博司・新機構長が就任。07～17年の発表論文のうち、個の論文で引用された回数が世界の上位10%に入った論文の割合は、英ケンブリッジ大（約23%）などを上回る約35%だった。

――前例のないシステム改革を進める中で、抵抗もあったのでは。

そうですね。細かいことでは毎日の「ティータイム」を始めるところから大変でした。研究者全員が午後3時にホールに集まり、お茶やクッキーを手に自由な議論をする場です。分野融合型のIPMUのコンセプトを体現する取り組みで提案書にも盛り込んでいたのに、事務の人は「国民の税金を飲み食いに使うのはとんでもない」と。東大の研究担当理事に許可する旨を一筆書いてもらってやっと実現し、そこでの議論から画期的な研究成果が数多く生まれています。米国カブリ財団から日本の研究所として初めて寄付すると申し出があった際も、文部科学省をはじめ関係各所が反対したため、1年ほど財団側に待ってもらいました。海外ならあり得ないことです。

Mainichi Shinbun 2018.11.6



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- (interviewer) There must have been some resistance as you proceeded with unprecedented system reforms.

(Murayama) Yes, there was. Even starting the daily “tea time” was very difficult. It was an initiative that embodies the concept of IPMU as an interdisciplinary institution, and we had written it clearly in our proposal.

But, the IPMU administration said, “It's outrageous to use the public's tax money for drinking and eating". We finally asked the Executive Vice-President in charge of research to write a letter of permission. Finally, tea time became a reality, and many groundbreaking research results have been produced from the discussions there.

Proposal (extract)

Institute

for the Physics and Mathematics

of the Universe

September 27, 2007

Vision by the Director, Hitoshi Murayama, University of California, Berkeley

In the Kashiwa Institute building, we will have daily tea at 3pm and everybody is *required* to attend if they are in town. Individual or groups of PIs organize seminar series that everybody is invited to attend. Long-duration workshops à la Kavli Institute for Theoretical Physics and Aspen Center for Physics bring in visitors to further stimulate the intellectual activities and keep the Institute at the forefront of worldwide science.

Personal recollections -Tea Time Story

Textbook of '*Science*' for Junior High School, Grade 3 (14-15 years old).

30,000 pupils read (～40% share)

Advanced topics

Astronomy connects the world

Mulit-messenger astronomy

③ Connecting observatories worldwide

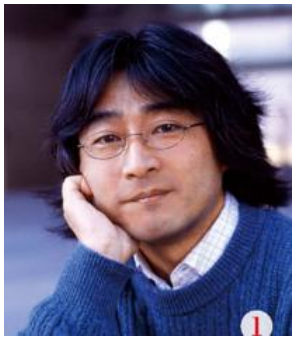
Tea Time at Kavli IPMU

17 years have passed

2007 2010 2015 2020 2025

Directors

Hitoshi Murayama
（2007.10-2018.10）



Hiroshi Ooguri
（2018.10-2023.10）

Jun’ichi Yokoyama
（2023.11- ）

Administrative Directors

Kenzo Nakamura
(2007.10-2013.3)

Tomiyoshi Haruyama
(2013.4-2024.9)

Saeko Hayashi
(2024.10 -)

Most of my talk has now become a history. Kavli IPMU is already a ‘globally visible’ international institute for many years, and it is one of the treasures of the U. Tokyo.

Murayama-san,
Thank you very much for your long-term tremendous efforts to make our dream come true.

Congratulations on 60th birthday（還暦）!!

Current Deputy Directors

Hiroaki Aihara
High Energy Physics

Tomiyoshi Haruyama
High Energy Physics

Masahiro Takada
Cosmology

Hiromi Yokoyama
Science and Society

H.Aihara T.Haruyama M.Takada H.Yokoyama

Thank you very much for your attention