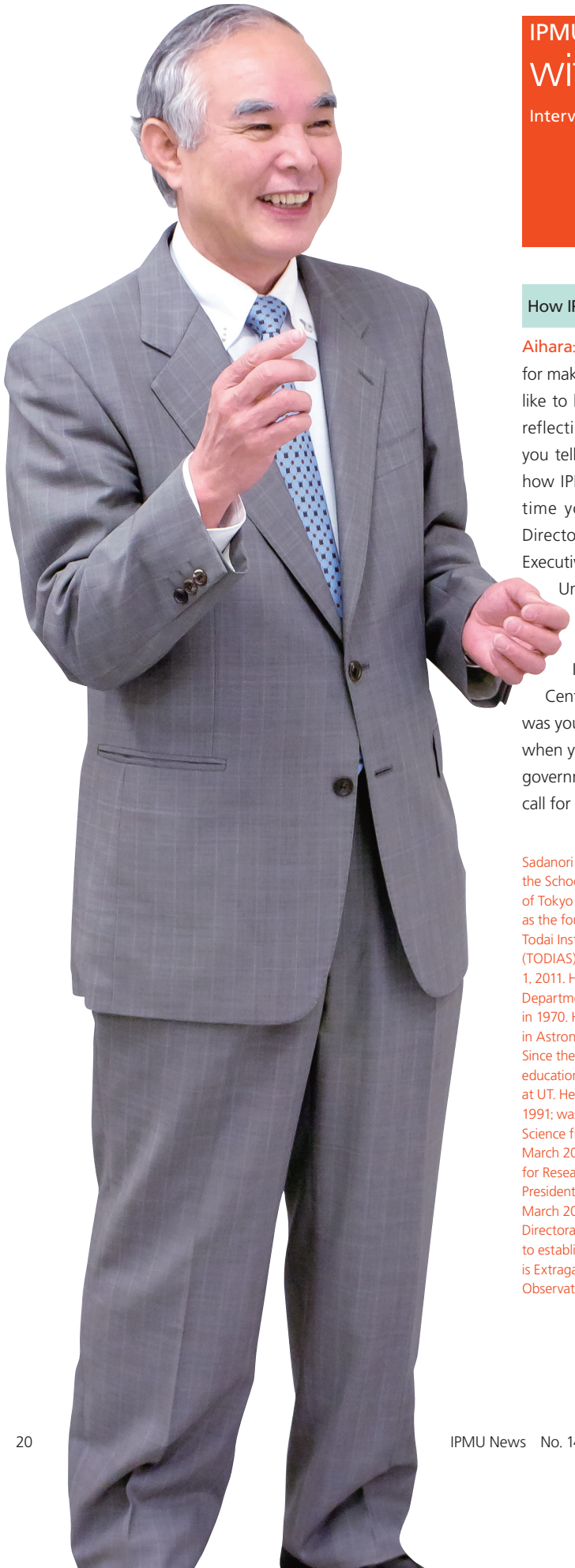

IPMU Interview

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 (UT). He was appointed as the founding Director of the Todai Institutes for Advanced Study (TODIAS), established on January 1, 2011. He graduated from the Department of Astronomy, UT in 1970. He received a Doctorate in Astronomy from UT in 1977. Since then he has been engaged in education and research in 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 Hirosi 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 at IPMU. He is also a Professor of Physics in the School of Science at The University of Tokyo.

equally crucial, was to come up with the leader of the project. Professor Suzuki and I extensively searched for candidates, and gradually narrowed down to a few who could cover elementary particle physics, cosmology, and astronomy, and could also bring mathematics on board. Eventually, we came up with Hitoshi Murayama, our founding director, who was a well known young, dynamic particle theorist at Berkeley.

Okamura: I think it changed greatly. We proposed three projects, each deserved to be selected, but the most striking point of IPMU I think was the clear visibility of integrating mathematics with physics and astronomy; usually people think these fields are distinctly different. Another point was the scouting of a prospective Director. You found a bright new face, Murayama-san from outside the university. I feel these were the reasons that distinguished IPMU from other proposals.

Aihara: Indeed, we received a lot of advice from you. For instance, I recall your comments such as "Inclusion of mathematics gives a fresh impression" and "Recruiting Murayama as Director from outside the University of Tokyo is very positive." Your advice helped to sharpen our proposal. I think it might well be the case that the Program Committee, which down-selected WPI proposals, also had similar impressions when they received our proposal. The feedback you gave was very beneficial to us.

Okamura: I gave such pieces of advice as to make a proposal appealing not only to IPMU but also to other projects.

Aihara: President Komiyama and the university Directorate had been very supportive from the beginning. I recall that Directorate regarded all three proposals were strong and promising. We all believed all three of them would be selected (laugh), or at least two of them for sure.

A pilot program for the university-wide reform

Okamura: I naturally thought that if two or possibly more proposals were selected, it would be ideal because their competition as well as cooperation would go well. For the Directorate, however, the WPI Program was very demanding. The requisite for application was the reform of the university such as changing the current system and/or introducing a new system.

Aihara: It was exactly the reason why we had to work closely with the university Directorate from the beginning. Discussion with the Directorate was definitely needed when preparing a proposal. I don't know whose idea the *special zone* was, but that was an excellent invention. It meant that we were exempt from many administrative regulations that normal organizations within the university, such as Faculties and Schools, must abide by. Otherwise, it would have been almost impossible to change a system so quickly within a colossal organization like the University of Tokyo.

Okamura: That's true. It was requested to submit the host institute's commitment signed by the President. There, we had to write how the university would provide long-term support of the selected WPI center, how it would institute a system under which the center Director would be able to take leadership in recruiting excellent researchers and deciding their salaries, how it would provide research space and foreign researchers' residential facilities, and the like. To cope with these requirements, Mr. Eto, who was Leader of External Fundraising Group (it was in charge of this kind of administrative tasks), thought of various clever ideas. One of them was this idea of designating the selected WPI center as a *university's special zone*, and positioning it as a test case for the future university-wide reforms. We determined this idea to be the leading policy and got an approval of the Directorate.

Aihara: In particular, introducing a merit-base salary system was a big issue.

Okamura: Actually, that problem was already solved a bit prior to proposing IPMU. In April 2007, the university instituted a new employment system to recruit excellent researchers and capable supporting staff, and this system made it possible, at least in principle, to hire those people full-time with a higher annual salary than, for instance, that of President. In actuality, however, given the position and age, the salary of the faculty staff was almost automatically determined by applying the standard of the government employee. Without changing such a situation we could not recruit excellent researchers from overseas. A survey showed that professors of Harvard University in the US earned about twice as much salary as professors of the University of Tokyo did. In the meantime, someone said that we really had to offer higher salary than that of the President in order to recruit excellent researchers. I remember well that President Komiyama at that time said "It's no wonder. You feel it's odd because you are in the university, but nobody complains in professional baseball that Ichiro earns a much higher salary than the manager." It was very persuasive. At that time, the Directorate was also trying to reform the university-wide systems, and this I think was the reason why the idea of the special zone was approved relatively smoothly. The most impressive thing was that the Directorate of the University of Tokyo, led by President Komiyama, was very cooperative, and I was thankful for it.

Also, we somehow

managed to get approval by the Directorate of some special exceptions from the university-wide employment rule for IPMU as a special zone to employ project faculty members and support staff. For deciding on the detailed rules related to employment and personnel systems, Mr. Takeshita, Leader of the Personnel Management Team worked very hard. I think it would not have been possible to make the system design of the present rules which are applied to IPMU, if Mr. Eto, whom I mentioned previously, and Mr. Takeshita had not been involved in this attempt.

IPMU built from scratch

Aihara: Securing research space was another challenge.
Okamura: Yes, it was. Two other proposals submitted from the University of Tokyo had plans of securing the research space, if selected, in the existing buildings, but there was no existing building to accommodate IPMU. However, it was necessary to write in the proposal about how to secure the space to accommodate the proposed project.
Aihara: Well, one of the university's commitments was to build a new lab building for us…
Okamura: Was it already written in the proposal?
Aihara: Yes. It was a Directorate's initiative, a great support, indeed.
Okamura: It may well be that it was also telling for successful selection. But, there was a story which if you hear now you may feel is incredible. Just after the launch, IPMU was not very well spoken of by, for instance, MEXT (Ministry of Education, Culture, Sports, Science & Technology), though it was doing well. It was pointed out that the university's support to IPMU was insufficient. All the four selected WPI centers other than IPMU were based on the existing organizations. So, the expenses spent for each of such organizations including the salary of researchers, which was the same after the launch as before, was counted as the host university's support to the new WPI center. In contrast, because IPMU launched from scratch, it looked as if the University of Tokyo did not support it at all. It was a very hard time.
Aihara: Right, but not any more. By a year or so after the inauguration, I believe, both the Follow-up Committee and MEXT came to understand creating IPMU is indeed building everything up from ground zero, a real big deal to the University.
Okamura: About a year was needed. Though this is not a long period of time, it was an embarrassment for us at first. Actually, the fact that IPMU was established from scratch gave a fresh feeling in various points. I think there is a clear difference at a glance between the two types of WPI centers; one was newly built up from scratch and the other was converted from the existing organization. Now we understand that it was the biggest, or rather essential difference. In that sense, it was very good to have built IPMU from scratch though we had a difficult time for the first half-year or so.
Aihara: It was good, yet difficult. Precisely because IPMU started from zero, it would fall back to zero unless we continue to make progress.
Okamura: Yes, you are right (laugh).
Aihara: We have no place to go back (laugh). Although having built it and assembled top-notch researchers successfully, there is no guarantee to keep IPMU operating for good. If those people recruited from overseas leave in ten years, it means that the efforts to establish WPI will have failed. Although IPMU is supported by the university Directorate, it turned out to be a big challenge to secure even a single tenured position for IPMU within the traditional university system, which comprises of a number of Units, i.e., Faculties, Graduate Schools, and Institutes.

Making IPMU a permanent Institute under TODIAS

Okamura: Before corporatization of national universities this might have been easier than now. If a budget request under the conventional scheme was granted to establish a new institute based on a large group of researchers who were doing extremely well, it immediately solved the demand you mentioned. In principle, this kind of budget request is still possible now, but the barrier is much higher. So, the problem is what we should do.

Viewing from a broader perspective, the University of Tokyo comprises a collection of Units, each having a clear discipline. There are 10 Faculties, 15 Graduate Schools, and 11 Institutes, all doing activities within their respective disciplines. In particular, each educational Unit independently makes course plans without any interaction with the outside. Nobody cares, for instance, if there are overlaps or not among the courses in the Faculty of Engineering, Faculty of Science, and Faculty of Economics; all run independently within the respective Departments. Research has been conducted more or less similarly. But, after corporatization, when Professor Komiyama became President, this situation changed to some extent. Turning our eyes to the world, there were many areas which span across the disciplines of the existing Units in the University of Tokyo. So, to find a way out of this situation, a new Unit called the Committee for Presidential Initiatives was established. It was different from the existing Units in that it can establish research organizations under the direct control of

the President. Then, various research organizations were launched; some had a definite term of 5-year or so, some were aiming at permanent activities by establishing a network, and some turned out not to be very successful after some activities.

It turned out that with such a system alone, however, interdisciplinary or multidisciplinary fields did not always perform as expected. Therefore, the Directorate had a plan, prior to the launch of IPMU, to establish a higher-level permanent entity by selecting a few from such organizations. It was a plan for the "Institute for Advanced Study," though "international" did not appear in the title. Actually an invitation for applications was announced inside the university to realize this idea.

Aihara: Was that originally planned for the Arts?

Okamura: Yes. So the invitation was limited to researchers in the Arts. Even though hearings were held, no promising project was identified. So, that attempt faded away. In my understanding, TODIAS has been established because the present Directorate thought it very important how to deal with IPMU in future, as you pointed out, and this caused a revival of the idea of Institute for Advanced Study, based on IPMU for this time.

Aihara: How can we develop TODIAS, appropriately positioning it within the University of Tokyo? We have no answer yet; we need experience to answer this question. What IPMU is aiming at is to become an excellent organization that lasts much longer than 10 years, with prospects over several decades. Becoming a member of TODIAS is just the first step toward these ends. We will be asking for even more advice from you and the Directorate.

Okamura: There is no doubt that TODIAS is a permanent institute established within the framework of the University of Tokyo. Its management goes by the prescribed rules, and research organizations are admitted into TODIAS if they satisfy the pro forma requirements specified by the rules. I think, however, that admission of organizations into TODIAS does not mean that these organizations automatically last forever without any efforts. The three pro forma requirements are found in the previous issue of IPMU NEWS (No. 13, page 11). One of them is "Acquiring sufficient external funds for operations." Regarding this condition, I think no organization can promise "We can satisfy this requirement forever" from the beginning. But, on the other hand, once the university established TODIAS, it does not make sense if the university merely says to organizations admitted in TODIAS "Please do it yourself," without giving any support to them. This is my feeling, though I do not know exactly what the university Directorate is going to do with TODIAS. Since TODIAS launched with its first organization nominated, it may be that its rule and management method would make some kind of evolution by looking at how it is going to be operated. Conversely, it may be that IPMU has great bearing on determining how TODIAS should evolve.

Aihara: Because I also belong to School of Science, a typical university Unit, I see the issue from both sides. The issue is to establish a new organization such as IPMU without taking a toll on the existing units. There is no guarantee of sufficient external funds to sustain IPMU. Moreover, we do not have traditional tenured positions. Yet, the university resources are limited.

Okamura: I think it is probably the problem of the University of Tokyo as a whole, rather than the problem between some of its Units, like between TODIAS and IPMU or IPMU and the Graduate School of Science. The existing Units have been guaranteed an allocation of University Operating Grants, but as you know, these university base budgets have been decreasing every year. Accordingly, personnel expenses must decrease. Unless you take measures to counteract this situation, the numbers of faculty members and administrative staff continue to decrease. I think it is necessary to reconsider what a university's faculty member ought to be, and to establish a system which allows the university to find, with all means possible, new permanent sources of revenue which can be spent for the whole or part of the salary of faculty members. Otherwise, basically the number of faculty members keeps decreasing. It won't be zero, but already at this moment it has significantly decreased compared to that at the time of corporatization. Therefore, if almost the same number of faculty staff as that at the time of corporatization is needed to keep the level of research and education, the university has to be prepared to take different measures. This is a problem not only for IPMU, but also for the university as a whole, I think.

Aihara: Am I right that the significance of admitting IPMU into TODIAS lies in that the university Directorate has shown its commitment to address the problem as a university-wide problem?

Okamura: Yes you are right. The various rules for the admission of organizations into TODIAS will probably evolve. I cannot say at this moment how this will take place, but one thing I am sure of is that for an organization with excellent achievements, people would say "If it should disappear, it would be a major issue for the University of Tokyo." So, this is a necessary condition for IPMU to fulfill by doing its best. At least for now, it seems that

your efforts are taking IPMU toward that direction.

IPMU takes the initiative of big projects at Subaru

Aihara: Thank you very much for your confidence in us. Now, let us talk about science. Currently IPMU is leading a big project that was selected by the government under "Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Program)." IPMU Director Hitoshi Murayama is leading this new initiative. The project is to build two instruments for the Japanese Subaru telescope, an ultra wide-field CCD camera called Hyper Suprime-Cam (HSC), and a wide-field multi-object spectrograph called Prime Focus Spectrograph (PFS). With these two new instruments we can conduct a novel cosmology research to unveil the nature of dark energy and dark matter. I am sure you know this project very well (laughs).

Okamura: Sure. I am impressed with that project. HSC is regarded as the successor of the prime-focus camera called Suprime-Cam which has attained great scientific achievements. Actually I am involved in building it as PI. Though I did not contribute very much to the engineering aspects of building the Suprime-Cam, I had been claiming from the beginning that Subaru should be equipped with a prime focus to secure capability of wide-field imaging and that we should build a prime-focus camera. Now, fewer and fewer people remember it, but whether the prime focus should be realized or not became a very big problem while the Subaru telescope had been designed. The reason was that it would require the rigidity of the entire telescope structure to have the prime focus where a heavy instrument could be loaded in the massive prime focus unit, and the telescope cost would be very expensive. At that time, not so many people of the Subaru construction group at the National Observatory expressed their strong wish to conduct imaging observations at prime focus. Therefore, at a certain point a leading opinion was something like "We may not need the prime focus which only Professor Okamura of the University of Tokyo wishes to have."

Aihara: I think the availability of the prime focus instrumentation most characterizes Subaru. We now know the Suprime-Cam has many users. Do you mean its merit was not obvious at all?

Okamura: No, it was not. It was around the end of the 1970's, a bit earlier than the discovery of the large-scale structure of the universe, that the discussion started to build a large telescope which would replace the 1.88-m diameter telescope, built in 1960, at the Okayama Observatory, which was an annex to the Tokyo Observatory operated by the University of Tokyo at that time. A long time has passed since then, and almost no one remembers the story. It is now incredible that the situation at that time was like "The future of astronomy should rely on spectroscopy. Taking pictures with imaging devices will be of no use." This stream also influenced people to ask "Should we really have the prime focus even though not so many people will use it?" At that time I kept saying "Yes, we should have it." The telescope tube of Subaru is very rigid because we decided to have the prime focus. You can understand, if you look at other 8-m class telescopes such as Keck and Gemini at Mauna Kea, that it is not possible for them to add a prime focus later because they do not have a rigid structure. In this sense, I think it was very good that Subaru was able to start its construction aiming at having a prime focus. As a result, the Suprime-Cam attained great achievements, and in turn this has led to further future possibilities, the HSC project and the SuMIRe project, the latter being a combination of HSC and a wide-field multi-object spectroscopy. I feel something destined in the fact that these projects are going to start by IPMU's initiative.

Aihara: I understand. I am interested in physical quantities derived from the statistical information obtained from a large number of galaxies, rather than the properties of individual objects. It was almost a miracle that a big IPMU project fortunately managed to have a connection with Subaru. At first, I was not sure how our participation would be received by the Subaru user community.

Okamura: When I first heard that IPMU was to conduct the HSC and SuMIRe projects supported by the FIRST Program, I was pretty astonished and said "Oh dear! It's unexpected (laughs)." It is this project that can address the most important problem in astronomy first in the world, I think. Because it is a competition, various other ideas are being considered in other places, and gradually some projects which can also address the same problem will be identified. The instruments of this project, however, are without a doubt the most powerful at this moment.

Aihara: I think HSC will have the first light by the end of the year. We are sure that HSC will produce excellent results once its galaxy survey starts. Furthermore, based on these results we can proceed to the next step, a multi-object spectroscopy. I am proud of the SuMIRe project, because it is a well programmed project that leads the research of observational cosmology for some ten years to come.

Okamura: Well, I am looking forward to hearing good news from HSC and SuMIRe.