

RIKEN Special RAC Working Group report

The Special RAC Working Group was held from November 9 to 10, 2014, at the Hotel InterContinental Tokyo Bay, Japan. The working group was addressed the following Terms of Reference:

- #1 Do the research activities carried out within the Chief Scientist System meet international research standards? Do those research activities result in creating new research fields?
- #2 Does the Chief Scientist System function efficiently to promote cross-disciplinary research in RIKEN?
- #3 Does the Chief Scientist position, and the research environment of the Chief Scientist laboratory, offer enough of an appeal to attract outstanding scientists from around the world, as well as from within Japan? What should be done to make the position more appealing?

As a result of deliberation, the working group reports its findings as follows:

General Considerations:

The Chief Scientist System is an essential ingredient of RIKEN, in fact, it is the heart of RIKEN, and should be strengthened under all circumstances. Scientific progress is associated with individual scientists, who work independently, and the most unexpected and valuable aspects of scientific progress usually rely on the bottom-up perspective brought by independent individual researchers. This is not to say that program driven research is not valuable, but it is very important that in an organization such as RIKEN there is a considerable fraction of bottom-up, discovery driven research. It is not clear to the working group that this has properly been taken into account by policy makers when discussing the future of RIKEN.

- 1. Do the research activities carried out by the Chief Scientist System meet international research standards? Do those activities result in creating new research fields?**

We have evaluated all laboratories separately (see appendix) with respect to term of reference #1. This was done with the help of Klaus Blaum (MPI for Nuclear Physics, Heidelberg) and Stuart Ryder (Australian Astronomical Observatory, North Ryde) to complement the expertise, in addition to the members of the working group. The quality has been categorized according to **A** (top 5%), **A⁻** (top 10%), **B** all others, using international standards. According to our discussions, it is fair to say that around 70% are within the categories **A** and **A⁻**, i.e. at the forefront of basic research

in the respective fields at an international level. Those activities have opened new research directions in physics, chemistry, biology, and medicine, some of which are:

- Precision clock project with potential use in geodesy and telecommunication.
- The micro-beams project with potential application in biology to target organelles in living cells.
- The project on development of new chemical methodologies in synthesizing bioactive molecules.
- Redox-switchable porphyrins with strong near infra-red absorptions open new perspectives for optoelectronic applications.
- The project on development of new methods in high throughput screening with potential in modified protein screening.
- Exploration of the molecular quantum spin liquid.
- Exploring the nucleation of a skyrmion and the properties of a skyrmion crystal.

Based on the document provided, the group noticed that scientific exploration of the newly built Free-Electron Laser by RIKEN researchers could be developed further, given the excellent performance of Spring-8.

2. Does the Chief Scientist System function efficiently to promote cross-disciplinary research in RIKEN?

We were given five excellent examples for competitive interdisciplinary projects, which clearly demonstrate that in RIKEN high quality interdisciplinary research is carried out. Those examples were:

- Chemical Biology in Plant Immunity.
- Alkyne-Tag Raman Imaging for Visualizing Small Molecules.
- How bioengineered materials, devices and analytical methods have contributed to physics, chemistry and biology.
- Glycoconjugates: Diagnostic, Therapeutic and in-vivo Synthesis.
- Interdisciplinary Theoretical Science Research Group.

Interdisciplinary research could become wider practice and would be more efficient if significant competitive funding and other incentives were made available. The panel, for example, felt that more effort should be made to connect the excellent activities in quantum chemistry and theoretical condensed matter physics with experiments, such as in the field of biomaterials.

3. Does the Chief Scientist position, and the research environment of the Chief Scientist laboratory, offer enough of an appeal to attract outstanding scientists from around the world as well as from within Japan? What should be done to make the position more appealing?

In order to attract the best researchers a prime requirement is that the person occupies a tenured position. This should allow the scientist to carry out independent research, provided that stable and significant funding is available to follow their individual ideas. The latter would form the backbone of the Chief Scientist System and would be augmented by funds available for interdisciplinary work and interaction with centers.

Researchers in other world-leading institutions enjoy considerably more stable funding as well as competitive funding instruments. To be competitive, RIKEN should increase its investment in these areas significantly, by at least a factor of 2.

Among the most selective research organizations, we have noted a dramatic rise in the value the most promising young researchers put on organizational issues separate from lab space and facilities. Thus, we have seen what appear to be “better” positions declined from institutions that have not considered these important “quality of life” issues. These include helping to arrange family-friendly housing, day care for children, and assistance in the employment of spouses. Of additional importance are gender balance of the senior researchers and the career benefit that is offered by making the institution primarily English-speaking.