

The March-11 disaster report from Sendai

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A month and a half have passed since the earthquake, called Tohoku-Pacific Ocean Earthquake, occurred at 2:46 pm in the mid-afternoon on Friday, March 11, 2011. The National Police Agency announced the disaster toll to date; 14,300 killed, 11,999 missing and 130,875 evacuated [1]. More than 90 % victims were struck and drowned (or believed so) by the huge tsunami that attacked coastal towns including a lot of fisherman's villages of Iwate, Miyagi, Fukushima prefectures. Unfortunately, this disaster induced reactor accidents at the Fukushima No.1 nuclear plant, which has been a serious concern all over the world. [2, 3]

This unofficial report aims at informing our colleagues of the damages which we, living in Sendai, have sustained from the March-11 disaster, then delineating some shapes in which the condensed-matter physics groups and their research facilities have been.

1. Sendai

The utility networks for water, electricity and gas are now back to normal almost in our city except the coastal area. [4] To be thankful, for example, more than 3,000 repairing technicians for gas supplying line gathered from different areas in Japan worked very hard to restore the network as safely and quickly as possible,

The transportation and materials-supplying routes were restored completely for the highways and other main roads, and partially for airways and railways (JR).

Two examples are shown here. Firstly, the Sendai airport located just near swimming beaches had been standing alone, during a couple of weeks, in a seawater lake newly made by tsunami. However great collaborations, called Operation Tomodachi (Friendship), between the US military and our Self-Defense Forces rehabilitated the airport very quickly. Firstly the airport was used as a base for transporting goods, and now available also for civilian flights though not in a routine schedule yet. Secondly, the Tohoku Shin-kansen of bullet trains will be reopened this week for all the way between terminals at Tokyo and Aomori through Sendai. (Just from today the Tokyo-Sendai line is available.) To note, all the bullet trains running at full speed just at that time detected the pre-signal from the quake, automatically slowing down, eventually stopped safely without any passengers killed and injured.

Now, Sendai, in a very good shape again as usual, is playing great roles as the most powerful and responsible bases to do everything for recovering the devastated area.

2. Tohoku University

The safety search for all the students and staffs of Tohoku University is completed on April 13. Two undergraduate students were killed, while all the university staffs have been confirmed to be safe. [5]

For the infrastructures, all the buildings distributed in several campuses have been damaged more or less by the highest-level quake of 6-7 (corresponding to “severe”-“disastrous”) in Japanese scale for a seismic intensity. In the Richter scale the magnitude M was 9.0, which is extremely large but not so rare. In fact the quake of $M = 9.3$ occurred in Chilly, in February, last year. Post-quake observations and preliminary measurements on the resistance to a seismic shock assured almost all the buildings reusable after reforming and reinforcing if necessary. However a few buildings in Aobayama campus for the faculty of engineering have been given a red card judged to be highly dangerous, probably no use anymore. It is unfortunate that our colleagues of the applied physics and material science departments are now homeless, strictly inhibited to enter their home buildings so injured that their belongings, research equipments etc have been remained inside since that afternoon, hard to be taken out. According to Professor Yoji Koike, they are forced to project a plan for building urgent, temporary housing before they could have a new building. At present it cannot be forecast when a new building would be complete, hopefully within a few years to come. Furthermore, the experimental groups, in particular, are seriously anxious about finding out a roadmap to continue their on-going research.

Quite a preliminary, rough estimation for the damage in our university indicated that the total would be equivalent to eighty billion yens or more at least (would be increasing more with time), almost comparable to the annual budget directly paid by tax to our university.

3. Physics department and some other institutes

3.1 Buildings

Our physics department of the faculty of science [6] has two big buildings in another campus neighboring to the faculty of engineering mentioned above. Though there have been found many cracks or breakages on walls not only in rooms and corridors but also in stairways, they were judged safe for living. So we physics group could be at work again since April 4. The neighboring chemistry building is also OK, but it will take a longer time, probably half a year or more before our chemistry colleagues get back to their routine again. Because the terribly damage occurred at higher floors (probably vibrated in a larger amplitude). Really two rooms of the synthetic groups were fired just after the quake. According to a local newspaper, some chemistry professor then working in another room at the top 8th floor said that all he could do just after the quake occurred were only to evacuate from there but he could not do anything even though he surely heard the sound of gas leaking probably from a hydrogen-containing high-pressure tank. To be luck, no explosion was induced.

3.2 Experimental facilities

It would be too early to simply say anything about how the experimental facilities in our department are damaged, since damage should be largely dependent on each group. As far as my group of low-dimensional quantum physics concerned, an e-mail server, some

microwave parts, a glass dewar and more were broken. Therefore, any e-mails transmitted to our server had not been received at all after that afternoon until early in April when a new email server became available. Most problematic may be some optical spectrometers including a Nikon's terahertz-light spectrometer. They will be best carefully checked, finely tuned up, and tested using some standard samples. Similar works in other groups toward rehabilitating their experimentation are already or will be soon put in action.

3.3 Cryogenic centers

Last week some good news came from Professor Haruyoshi Aoki in charge of helium liquefying for our faculty, that, though the cryogenic system is partly damaged, liquid helium can be available now but in a very limited quantity. Another liquefier of Cryogenic Center at Institute of Materials Research (IMR) in Katahira campus seems to be less damaged but has also troubles as well. All the groups of condensed matter physics in Sendai sincerely wish that, with enough supports, these cryogenic systems would be fully recovered as usual before March 11.

3.4 High magnetic field facilities

A great concern and anxiety may be on the damage on the facilities in The High Field Laboratory [7], which is a big institute for materials sciences installed at IMR. According to Professor Kazuo Watanabe in charge of this laboratory, the experiments using the hybrid magnets producing higher dc fields than 20 Tesla were scheduled on the day. It was quite lucky, however, that the operation was cancelled out by the user's reason. We cannot imagine what would have happened in the hybrid magnet system just after the quake-induced power breakdown if the magnet were in its full power. All the so many magnets including He-free superconducting ones of his invention are safe. However, the hybrid-magnet systems including the water and electricity lines etc are necessary to be checked and repaired, if necessary, in a step-by-step way. What he is anxious a bit concerns; whether or not the electric power of its peak (probably 8 MW) will be supplied from the our utility company, surely without any breakdown just as a scheduled power-break scheme that really applied to the area near Tokyo on the other days.

3.5 Neutron spectrometers at Tokai

At Tokai, a coastal town in Ibaragi prefecture, we have neutron spectrometers used for materials sciences to which three groups in our university are in charge. According to Prof. Kazuyoshi Yamada of IMR [8], the neutron facilities installed at J-PARC (Japan Proton Accelerator Research Complex) [9] might be not so seriously damaged. In parallel to collecting information as much as possible, a roadmap for recovering the facilities is now being drawn with some works already in action, refer to the URL [9]. And also an international collaboration network of the neutron community helps support Japanese users by sharing the machine time at oversea facilities.

Finally it is our great pleasure to tell you that, from today, our Physics Department just started new-term lectures for the graduate students, a few weeks behind the schedule. Furthermore an entrance ceremony of Tohoku University is to be opened on Friday, May 6, followed by undergraduate lectures starting on the next Monday of May 9.

I would like to thank very much Professor/Dr Frank Steglich, a director of Max Plank Institute, Dresden, and Professor/Dr Deny Jérôme, a member of French Academy of Science for their heart-warming offers to invite us to their institutes if their facilities would be helpful to us in continuing our ongoing studies. Also to be thankful, similar proposals are being made for us from ISSP, Tokyo University, Professor Yoshio Kuramoto says. My colleagues cited in this report are appreciated very much for their collaborations.

References

- [1] The Japanese newspaper, The Yomiuri shimbun (Mon. April 25, 2011). Its English version, The Daily Yomiuri, is available, refer to the URL; <http://www.yomiuri.co.jp/dy/>
- [2] See the official site of The Ministry of Foreign Affairs of Japan; http://www.mofa.go.jp/j_info/visit/incidents/index.html - announcements
- [3] For the information on radiation monitoring results obtained by Tohoku University Cyclotron and Radioisotope Center located in Aobayama campus, refer to <http://www.bureau.tohoku.ac.jp/anzen/monitoring/english.html>
- [4] The official site of Sendai city; <http://www.city.sendai.jp/language/english.html>
- [5] See the URL of Tohoku University for the disaster; <http://www.tohoku.ac.jp/english/>
- [6] The disaster information from the faculty of Science is now available; http://www.sci.tohoku.ac.jp/eng/index_e.html
- [7] See the URL; <http://www.imr.tohoku.ac.jp/eng/index.html>
- [8] For the neutron group, see the URL; <http://www.yamada-lab.imr.tohoku.ac.jp/en/index.html>
- [9] For J-PARC, see the URL; <http://j-parc.jp/index-e.html>