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# SYNCHROTRON RADIATION FACILITIES IN ASIA

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THAI PROJECT ON SYNCHROTRON RADIATION

BY

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## Abstract

This report traces the initial steps that were taken by Thai physicists to realize the goal of building a Synchrotron Radiation facility in Thailand. It starts from the very beginning when Prof. Virulh Sayakanit heard a lecture in the Philippines and ends with the current attempts to write a conceptual design report.

## Introduction

During the last ten years, Thailand has had an economic growth rate of about 10% per year in its GNP. However, an excellent growth rate such as this cannot last long because Thailand lacks a firm foundation in such basic science as Mathematics, Physics, Chemistry etc. which form a basis of the high technology developing in our modern world.

Recently, the Ministry of Science, Technology and the Environment has established three centers, the National Center for Genetic Engineering and Biotechnology, the National Metal and Material Technology Center and National Electronics and Computing Technology Center whose purposes are to support existing industries and to create new ones. Little research funds have been allocated to the basic sciences which serve as a foundation for the applied sciences. Since other countries, such as Vietnam, Cambodia, Laos, Myanmar etc., have cheaper labor than Thailand, Thailand cannot enjoy the advantage of cheap labor anymore. Thus, the only course open to Thailand is to direct the country into the high technology sphere as Korea, Taiwan, Hong Kong and Singapore have done.

At present, only four countries in Asia have Synchrotron Radiation (SR) facilities. These are : the People's Republic of China, Japan, Republic of Korea and Taiwan.. Given its size, population and level of economic development,

Thailand has the potential to be the next Asian country to have an SR facility. At present, there are 41 SR facilities distributed among 15 countries.

The National Research Council of Thailand (NRC) recognizes the importance of raising the level of the basic sciences to stay abreast of the developments in high technology throughout the world. As a result, on 4 August 1993, the Mathematics and Physical Science section of the NRC approved a proposal of carrying out a feasibility study for building on SR facility. Five members from various Thai organizations, head by Prof. Virulh Sayakanit, were chosen by the NRC to form a committee which would carry out the study. In order to get the total picture of Synchrotrons and all the latest information on them it was suggested at the meeting that Thai scientists visit the SR facilities in several countries. A short summary of the feasibility study was published in the AAPPS Bulletin Vol. 4 No 4, 25 December 1994.

A Synchrotron Radiation facility is one of the most important machines now available which can serve as a Thai National Laboratory. This is because in order to design, construct and operate the machine one needs many physicists, engineers, scientists as well as professional administrators to work together. SR facilities are a measure of the level of scientific and technological development of a country. SR facilities produce a light source that is 100,000 times more intense than ordinary light and it has many applications.

History

The idea of constructing a SR facility in Thailand originated when Prof. Virulh Sayakanit attended the lecture given by Prof. Dingchang Xian of the institute of High Energy Physics in Beijing on the applications of SR. The lecture was given in the Philippines in 1992. Prof. Sayakanit was very impressed with the presentation of the construction of the SR facility in the People's Republic of China and expressed an interest in carrying out a feasibility study of building one in Thailand.

On 4 August 1993 the committee approved a proposal for a feasibility study and appointed Prof. Virulh Sayakanit of Chulalongkorn University to lead a team of five members from various organizations to visit all the Asian countries which have SR facilities. The scientists who went were :

- |                                  |                                 |
|----------------------------------|---------------------------------|
| Prof. Virulh Sayakanit           | Chulalongkorn University, Head  |
| Asso. Prof. Jong-Orn Berananda   | Chulalongkorn University        |
| Asso. Prof. Thiraphat Vilaitong  | Chiang Mai University           |
| Asso. Prf. Dr. Wichit Sritrakool | Chulalongkorn University        |
| Mr. Kajornsak Jaiyawat           | National Research Council (NRC) |

Before leaving, the team learned from Prof. Xian that Prof. Wu Jianwu, a colleague of Prof. Xian, would be visiting Thailand for three months. During his stay in Bangkok Prof. Wu gave a talk on the SR facilities in China. In order to get a total picture of the state of SR facilities in the world the NRC recommended that the five member team should first visit the following four countries, the People's Republic of China, Japan, Republic of Korea and Taiwan.

Present Activity

After returning from the trip throughout Asia, the group had an extensive review of its visits. At the same time they started to recruit key physicists to join the second stage of planning the SR facility, namely the conceptual design proposal. They were able to get ten key physicists each committed to work on different sections of the SR facility such as injection, linear, RF, vacuum etc. The details of the meeting where each physicist committed himself to work on a specific section of the SR facility are worked out.

On 29 January 1994 a full day discussion on planning the conceptual design proposal was held. After an extensive introduction by Prof. Virulh Sayakanit on the groups Asian trip and a videotape of the Taiwan opening ceremony, the audience had a good idea of the situation. In the afternoon, a detailed discussion was held. At the conclusion of the meeting it was decided that we may be able to construct a Synchrotron, its energy should be approximately 1 to 1.3 GeV, it should be linear and its location was narrowed down to two sites. One possibility was the newly built Atomic Research for Peace Center at Nakhon Nayok which is about 70 km from Bangkok. The other possibility is about 40 km from Bangkok on land owned by the Thailand Institute of Science and Technology and is situated at Klong 10. The final decision taken was that the budget must be flexible, the project must be considered by the government as a national laboratory and the salaries paid to the staff should be of the same scale as those paid in the private sector.

Future Planning

The full report containing the conclusion and the suggestions has now been completed. Our next step is to submit the proposal for carrying out the conceptual design. This proposal will be submitted to the National Endowment Fund which was established recently and is under the administration of the Office of the Ministry. If this proposal is approved then we will begin to recruit young scientists, as many young scientists are waiting to join our program.

The first step is to select scientists to work on different sections of the machine and then send them to different laboratories around the world for training. A training period of 6-12 months should be sufficient. Within two years we should have enough trained physicists and scientists to work together with experts from abroad to work out a feasible conceptual design report. This report will then be submitted to the Ministry of Science, Technology and Environment to put to the government for approval. If the government approves, the budget for the project will allocated on a year by year basis as in the case of the budget for the Atomic Energy for Peace program.