4. New Instrumentation

4-1. P_c monitor at AR-NE1A1

One of the activities conducted at AR-NE1A1 is a magnetic Compton-scattering experiment, where elliptically polarized high-energy X-rays are used. The experiment provides information about the size and/or the momentum-space distribution of the spin polarization in magnetic materials. To interpret the result quantitatively, the degree of circular polarization (P_c) of an incident beam is required. The estimation of P_c has been so far made by a separate measurement on a standard sample of Fe. However, this method is not useful in case of an unexpected change in the ring condition during long-term measurements. Thus, a real-time P_c monitor was designed and a practical test was performed.

The layout of this system is schematically shown in Fig. 1. The system measures the magnetic Compton scattering from an Fe foil placed on the upstream side of a sample, from which P_c is calculated. With a penetrating beam through the Fe thin foil, which is little attenuated, the experiment on a sample is simultaneously conducted. The scattered beam from the Fe foil is measured by a Ge solid-state detector with a large active diameter (ϕ30 mm), and the integrated intensity of the Compton signal is counted through a single-channel analyzer. Thereby, statistically meaningful estimates for a magnetic effect of around 1% can be obtained within, say, a few minutes.

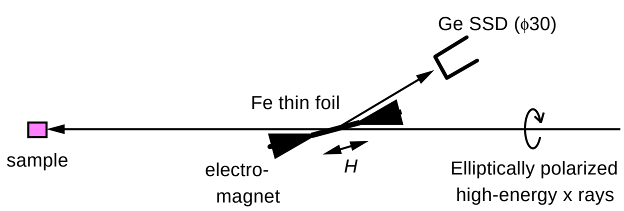

Figure 1.
Layout of P_c monitor.

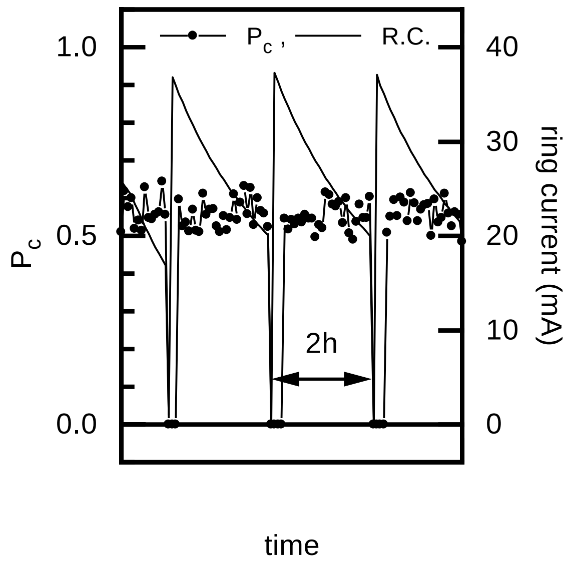

Figure 2.
A test result of the P_c monitor.

Figure 2 shows an example of the test result, where the energy of the incident beam is 60 keV and the light-source parameter (K_x) is 1. The Fe foil was fastened between the pole pieces of a C-type electromagnet, and the applied field direction was switched every one minute in a sequence of +, −, −, +. The total counting rate was adjusted to be about 50,000 cps. As shown in Fig. 2, P_c, output once in 4 min., was estimated with sufficient statistical accuracy. Note that the I_0 (storage-ring current) weighted average will be practically used for the data analysis. It was also confirmed that this system worked for 135-keV incident X-rays. This system will be applied to research measurements in the near future.

4-2. Structural Biology Building

The new Structural Biology Building (Fig. 3) was completed in March, 2001. The one-story (438-m^2) building houses two main biology laboratories for biochemistry and genetic engineering with ancillary laboratories for protein expression, purification and crystallization.

A Recombinant DNA Safety Committee is being established for ensuring the safety of recombinant DNA experiments on the KEK campus, particularly in the new Structural Biology Building, where only up to P2-level experiments will be conducted. Once the committee has approved the proposed experiments, the DNA manipulation laboratory of the new building will be used to prepare expression vectors for over-production of the desired proteins. Another safety committee to cover biohazard materials will be established as well. The crystallization preparation laboratory is used for crystallization set-ups under ambient temperature. It is envisaged that in the future it will be possible to verify SeMet contents of SeMet-substituted proteins in the crystallization preparation laboratory. Currently, the protein expression room contains several shakers and autoclaves. There is also a large cold room kept at 4°C. Next to the cold room is a crystallization room kept at 16°C. In the 4°C cold room, there are two FPLCs for protein purification. The computer-graphics room has several workstations for solving and analyzing protein structures. The building also houses several offices, including a meeting room.

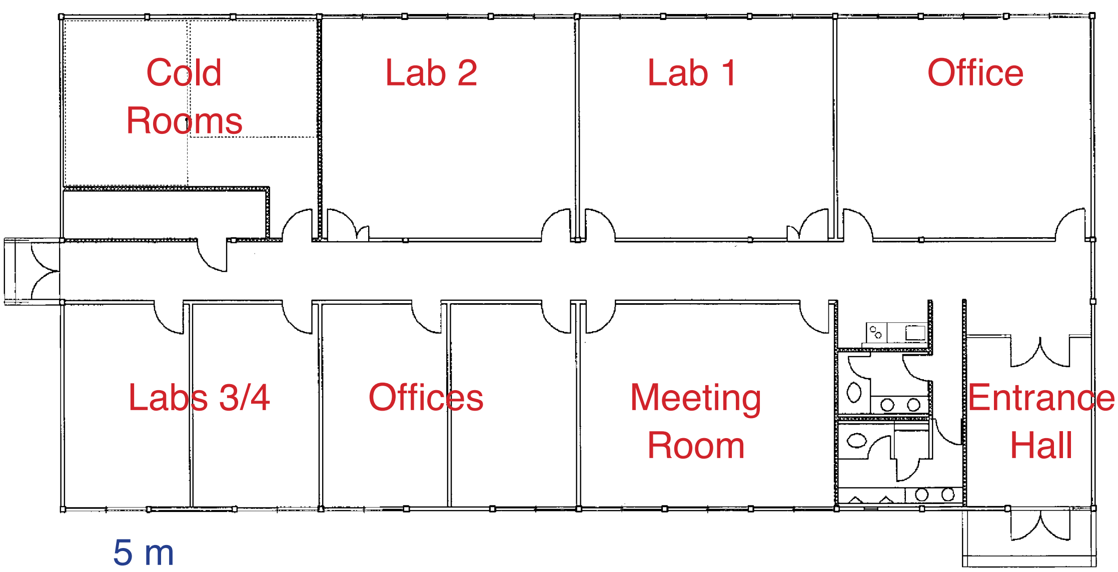

Figure 3.
Layout of the new Structural Biology Building. Location of the building can be found in the campus map of p.123.