5 Acquisition of Synchrotron Beamtime

Regular beamtime at a synchrotron radiation source is allocated by a review panel on the basis of a written proposal. The main part of this short chapter is a guide to the novice with hints to the writing of a regular proposal. Besides this regular access there are, in general less laborious ways to put a sample in the synchrotron beam.

5.1 Test Measurements

The advantage of test measurements is easy access. The disadvantage is the fact that there is no funding of travel expenses and accommodation.

At some synchrotrons the novice can *officially ask for test-measurement beamtime*. Such beamtime will not be longer than one day and will be appended to beamtime that uses the same setup as the one required for the test.

Another possibility is to *ask an experienced colleague with a granted proposal* to join his beamtime with some samples that fit into his project. In this case there may even be a chance to be funded within the frame of this collaboration.

The beamline scientist at a synchrotron beamline has some *in-house beamtime* of his own. The test-user may convince the staff scientist to study a test sample during this beamtime. It is possible that the user simply sends the sample, but it is better to join in the measurement.

After having performed such tests the new user should be able to assess whether it appears reasonable to study the scientific problem at a synchrotron beamline. Sometimes one will simply be able to use devices (furnace, extensometer, sample recipient) provided at the beamline. Sometimes the researcher will have to adapt some own devices to fit in the beamline, to control it remotely and to record its output signals together with the scattering patterns. Sometimes special equipment will have to be constructed.

5.2 Support or Collaboration

Early decision should be made whether the user only requests support from the beamline staff, or whether a scientific collaboration is offered.

Supported Beamtime. In a supported beamtime, the beamline scientists and their engineers will adjust the beam and help with the setup of provided devices. They

will instruct the user. Thereafter they will be on stand-by for the case of problems. Finally the staff will provide means to transfer the scattering data. It is the user's duty to report the results of the study to the synchrotron radiation facility (forms are available for that purpose). Publications based on such study must give proper reference to the synchrotron radiation facility.

Acknowledgments. Regrettably it must be said that only a minority of the scientific users pays tribute to the beamline staff. Even if the staff is not collaborating in the project, an acknowledgment should be the minimum courtesy in any publication. An example for such an acknowledgment is *"We acknowledge <facility>, <place>, for provision of the synchrotron radiation facilities at beamline <name> in the frame of project <number>. In particular the support of <scientist> and the beamline engineer <name> is greatly appreciated."*. Variants can be found on the web-pages of synchrotron radiation facilities that deal with this problem.

Collaboration with Beamline Staff. If the beamline staff accepts scientific collaboration with the user, the beamline scientists will actively participate in the experiment and the engineers will help with the adaption of special devices. Such active cooperation should be awarded co-authoring the resulting papers, in particular if the colleagues have participated in the data evaluation and in the discussion of the manuscripts.

Disrespect of etiquette has little impact on the review panel. For the panel it is important that the results are properly reported and published. Users who do not report will not receive a follow-up beamtime in a similar project. Users who do not publish for years will only receive beamtime if no productive user is competing.

5.3 A Guide to Proposal Writing

This section describes the situation at the ESRF up to the year 2003.

How a Review Panel Works. Be aware of the fact that the members of the review panel have to decide on 120 proposals every 6 months during one week. The panel has 7 members. After the members have received the proposals they read every proposal and rank it individually during three days. For every proposal two members are elected speakers. When the panel meets for two days, the individual rankings have been collected, and the secretary has prepared a list giving the average ranking and the standard deviation. Promising but poorly written proposals are characterized by a wide standard deviation. Every proposal is introduced by the speakers, who try to give information that might be missing in the paperwork. In this way the panel tries to find a fair ranking for those proposals with a wide standard deviation, whereas the proposals with a narrow error bar are not discussed in detail. Finally, beamtime is allocated in the order of the ranking.

What the Panel Member Does not Need to Know. It is generally conceded that your scientific project is very important. A lengthy introduction intended to convince the panel by giving information that is not closely related to the experiment is exhausting, in particular if it fills half of the proposal form. The panel member gets annoyed, if by this procedure important information has been squeezed out. The panel member who is the speaker will probably have to retrieve the missing information from the Internet. The panel member becomes more annoyed if this happens for several proposals in succession. The panel member is happy if he reads a clear and concise proposal.

What the Panel Member Must Know. Do not write more than 10 lines on the *impact* of the expected results. Only one of the speakers is an expert in your field. Address the interested lay-person! Are the expected results of general public interest so that they can advertise the research facility in the public press? This is a strong argument to the panel.

Document or explain the *feasibility* of your experiment. Explain, why the experiment must be carried out at a special beamline. For overbooked facilities explain, why the experiment must be performed there and cannot performed at a low power synchrotron[1]. If there are several alternative beamlines where the experiment can be performed: show the alternatives. The resulting flexibility for the panel increases the chance to become allocated.

Sketch the *setup* of your experiment (sample-to-detector distance[2], requested detector(s), special sample environment requested from the facility or brought with you), and your *experiment plan* (how many samples? What parameters are varied?) and deduce from it the number of *requested shifts or days*.[3]

Show your *expertise* or document that you are collaborating with an expert. In particular, indicate how you intend to evaluate the collected data and reference relevant literature.

[1] Present results from laboratory sources, low power sources or previous experiments (also from others). Such data are strong arguments.

[2] The choice of the sample-to-detector distance, R, is a problem of SAXS. Let L be the expected long period the material to be studied and D be the diameter of the 2D detector, then $R \approx LD/(9\lambda)$ is a good first guess.

[3] On an overbooked beamline try to devise an experiment plan that requires 3 to 4 days. In this case the beamtime is long enough for the staff: they do not have to change the setup more than twice in a week. On the other hand, the request is flexible enough for allocation by the review panel.