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Strasbourg
Charissa Installation at Vivitron

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Installation of CHARISSA and its beamline at the Vivitron
Report of the Meeting Held on 6th January 1994
at the C.R.N. Strasbourg.

Present:
B. Fulton, J. Lilley, N. Keeley
B. Bilwes, R. Ernwein, C. Gérardin, R. Rebmeister, J.P. Schwartz.

1. Beamline.

Early studies had concerned line D1. However, taking into consideration the thickness of the wall of the "poste avancé" (electronics area) (1 m), the length necessary for the beamline optics (11.75 m), the minimum distance necessary for the alignment measurements (2.40 m) and possible extensions of the apparatus [MEGHA], line D2 is much more suitable.

Therefore, line D2 has been adopted.

a) Optics.

It will therefore be necessary to repeat the beam optics calculations (T. Aitken). In particular, it is necessary to define the position of the cross-over where the "beam profiler" [diagnostic box] will be situated (we expect that, fortunately, this will be outside the wall of the "igloo", unlike the case of line D3).

It would be useful to have a drawing of the beamline available at Strasbourg.

b) Limits of ion deflection.

Line D2 corresponds to the 25° exit of the switching magnet, i.e. $\rho = 233.534$ m. The maximum value of the switching magnet field is 1.4 T. (N.B. The MP analysing magnet had a radius of curvature identical to that of the 45° exit of the switching magnet, i.e. 132.083 m).

c) Beamline equipment to be provided by the U.K. group.

In particular:

- the quadrupole doublet will be brought over from the U.K. with its power supply adapted to the French standard (this will be cheaper than buying a new doublet [estimate from HVEC 58,920 FF inc. V.A.T.]).

- the diagnostics system (which is not to the Vivitron standard).
- pumps.
- reaction chamber.

d) Services.

These are detailed in the accompanying appendix.

Remarks:
- Item 3: the power supply of the doublet will be adapted to suit French specifications.
- Items 1 - 9: individual protection of the lines (circuit breakers) is required. The cost of this is estimated to be roughly 20,000 FF. Funding for this has to be found.
- Water: this service is only necessary while the line is in operation.
- Nitrogen: used when bringing the chamber (and when necessary certain parts of the beamline) up to atmospheric pressure in preference to the outside air which will contain water. This was achieved at Daresbury using a Dewar of liquid nitrogen. J. Lilley will try to recover the system used there in order to re-use it at the Vivitron.

e) Reaction chamber.

Diameter $\sim$ 1 m
- The U.K. group will provide plans.
- A crane is necessary to lift the lid. It will therefore be necessary to install one above line D2.
- From the point of view of safety, it is envisaged that some kind of neutron shielding will be placed in the region of the Faraday cup to reduce the risk at the level of the labyrinth.

f) Monitoring and control of the beamline.

The accelerator crew are responsible for the beamline as far as the "vanne chercheur" (i.e. the protection valve for the accelerator). This is usually placed between the switching magnet and the experimental apparatus. The beam diagnostics are included in the part controlled by the crew.

For the CHARISSA beamline the situation is different. Because of its non-standard characteristics, the beamline after the valve inside the switching magnet is monitored and controlled locally in the CHARISSA "poste avancé". The safety valve will be this one inside the switching magnet, and therefore upstream of the diagnostic box.

Thus we have the problem of communicating information concerning the beam, in particular the vacuum, between the local control and the Vivitron control area.

This point needs to be studied (Ernwein) and will perhaps be resolved by ethernet. The U.K. group should send details of the system used at Daresbury.

g) Installation of the beamline.

The installation of the ICARE line is to be carried out in January-February 1994. There are insufficient technical staff at the C.R.N. to carry out the installation of the CHARISSA line simultaneously. From March onwards, the help of a limited number of C.R.N. technicians can be envisaged, the others having to cover maintenance work. The participation of a few U.K. technicians will be necessary. Nevertheless, it seems essential that there be staff familiar with the line at the C.R.N. so that it can be used for experiments other than those of the CHARISSA group.

Installation by a mixed U.K./French team of technicians under the coordination of Robert Beck is the solution adopted. Installation will probably commence in April-May 1994.

2. Electronics Area ("poste avancé").

The protecting walls must be 1 m thick according to the calculations of J.P. Schwartz, taking the least favourable [from the point of view of safety] conditions (120 MeV Li beam, 3 μA (electrical) beam current) and must be taken up to ceiling level for the area where the terminal and electronics are situated. On the other hand, for the labyrinth a height of 2 m will suffice.

The proposed layout of the wall and labyrinth is shown on the enclosed diagram. The drawing of the labyrinth is preliminary and must be checked by the radiation protection service (a passage-way of 1.5 m minimum is required).

A study of the allowed load-bearing of the floor in the area where it is proposed to site the protection walls must be carried out (R. Hensgen).

When the wall is constructed it will be necessary to provide a passage for cables ($\sim 10 \times 30$ cm).

The estimate of the cost of the construction of these walls will be carried out by the C.R.N. (purchase of concrete blocks, possible reinforcing of the floor). Funding is to be found jointly by the U.K./French collaboration.

3. Detectors - information handling.

a) Cables.

These will be arranged in trays placed above the beamline. They will be linked to a patch-panel situated in the region of the reaction chamber; a second panel will be placed inside the "poste avancé". The trays, patch panels and cables will be provided by the U.K. group.

b) Gas detectors and their isobutane supply.

It is necessary to study the safety problems posed by their use and to define a solution.

c) Electronics.

This will be provided by the U.K. group. The reaction chamber must be electrically isolated from the rest of the beamline in order that the electronics and the chamber can be linked to the same earth.

d) Data acquisition - programming.

A SUN work station will be brought over by the U.K. group. The C.R.N. will provide cabling to the "poste avancé" for the Ethernet connection (possible connection with the ICARE data acquisition in the case of using the two types of detectors).

e) Monitoring and control of the beamline and connection with the Vivitron control room.

See point f) under "beamline".

4. Summary - to do.

At Strasbourg.

1) Feasibility study for the wall and labyrinth. Cost... (J.P. Schwartz + R. Hensgen).
2) Estimation of the cost of electrical supply to the beamline. (R. Ernwein)
3) Search for funding for the construction of the "poste avancé". B. Bilwes)
4) Cabling to the "poste avancé". (J.D. Michaud).
5) Installation of a crane above line D2. (R. Ernwein).
6) Safety for gas detector users. (J.P. Schwartz).

In the U.K.

1) Tests at Daresbury: delivery of the beamline (Daresbury group, ~ March).
2) Installation (~ April-May) 1 or 2 U.K. technicians, 1 or 2 French technicians, coordination by R. Beck.)
3) Send to Strasbourg (J. Lilley or B. Fulton?) drawing of the reaction chamber, control and monitoring system of the beamline and of the beam optics.
4) Recovery of the nitrogen system used at Daresbury (J. Lilley).
5) Search for funding for the electrical services to the beamline. (J. Lilley).
6) Calculation of beam optics for line D2 (T. Aitken).

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* most likely to help in the installation at Strasbourg.