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MM Int. 29

PS/Int. MM 59-7
6th August 1959

(Confidential)

# ESTIMATED SITUATION IN THE PROPANE BUBBLE CHAMBER PROJECT DURING 1960

## 1. INTRODUCTION.

It is the aim of this project to put into operation a propane bubble chamber of 1 metre diameter. Since no auxiliary experimental apparatus is yet available for use with the P.S. it has been an essential part of the work, in addition to the construction and utilisation of the bubble chamber itself, to undertake the design and construction of auxiliary apparatus such as beam transport channels, a particle separator and ejection systems. Obviously such equipment is of interest to other experimental teams.

The first operation of the propane chamber will be possible next summer. However it is expected that a further year of research and development will be necessary before efficient and systematic nuclear physics experiments are being performed with the P.S. A serious study is foreseen in order to obtain the best utilisation of this chamber in conjunction with other chambers at the P.S.

## 2. PRESENT SITUATION.

The general activities and much of the detailed plans of the project are already well defined. The chamber body has been ordered and will be delivered on Oct. 15th. A complete design for the magnet has been made, tenders have been received and the contract will be placed within a month. The window problem has been studied and offers are under consideration. Tenders for the compressor installation are due back on Sept. 7th.

Good progress has been made with the preliminary studies of the expansion mechanisms and a full scale trial assembly is under construction. The system of illumination is designed and components are being tested for suitability.

Since the first phase of designing and ordering the major large components of the chamber is well advanced, pressure is now being put on the elaboration of the control systems and on the detailed studies of the photographic problems, cameras and spatial reconstruction apparatus. Design work is being continued on the details of smaller parts of the chamber and on major accessories like tanks, valves and handling equipment.

Regular inspection and testing will take place at the factories during manufacture of large items under contract, and all equipment will be systematically tested on delivery to CERN. Before the end of the year the assembly work will begin. This work will extend over a long period and will require considerable effort on account of the size and number of components, and of the great care which must be taken to minimise the potential danger of the apparatus. Besides the erection of the chamber itself, the installation and testing of the circuits for nitrogen and propane, (with large compressors, tanks, regulators and safety devices) of the temperature regulating sets, and of the control power system, will be major occupations.

After all systems have been proved to work satisfactorily, the chamber will undergo preliminary operating tests. Meanwhile the magnet will be erected and tested and a complete field mapping will be done by means of measuring devices prepared in advance. This should take place in summer 1960.

After the final fitting of the chamber in the magnet and mounting of the photographic system, all work will converge to the study of the optimum operating conditions and the nuclear physics experiments.

It has been possible to keep the programmes for the other apparatus under construction in step with the work on the propane chamber. The beam transport magnets and lenses, which were designed in connection with this project, but which are also suitable for other nuclear physics activities, are already under contract. Work in the factory is progressing well and the delivery schedule in 1960 is as follows:

| Items to be delivered | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct |
|---|---|---|---|---|---|---|---|---|---|---|
| Magnet A | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 10 | 11 | 13 |
| Magnet B | | 1 | | 2 | | 3 | | 4 | | 5 |
| Quadrupole A | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Quadrupole B | | 1 | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 18 |

Each item will be measured magnetically immediately after delivery to the site. A thorough programme of inspection at the factory is foreseen during the manufacturing period, and will involve some staff in periods of duty away from CERN. (A similar inspection programme for the bubble chamber magnet is essential).

Various pieces of apparatus from the P.S. magnet measuring programme, together with some additions, are now being collected into a magnetic measurements laboratory so that all the future magnetic work of the group can be done with the minimum effort.

Designs and preliminary experiments for the fast ejection equipment have been made. This work will keep in step with the bubble chamber progress. The principles of the more complex slow ejection equipment have been thoroughly studied and experimental deflecting magnets have been constructed and tested.

It is now possible to survey the preliminary results of the experimental studies connected with the design of a high voltage electrostatic separator. The results are very encouraging and it is believed that the original hopes to construct separator tanks with 50 kV/cm over a 20 cm gap will be realised. The mechanical design of these tanks is in progress in the drawing office.

## 3. STAFF.

During the rest of this year, and for the greater part of 1960 the members of the group will be working in the following manner:

Group Leader: C. A. Ramm

Propane Chamber

| Staff | Duties |
|---|---|
| L. Resegotti | Detailed coordination of the work in association with B. de Raad. Directly responsible for the chamber body and magnet. |
| B. de Raad | Detailed coordination of the work in association with L. Resegotti. Directly responsible for magnetic measurements, expansion system, compressors and propane circuit. |
| G. Innocenti | Expansion system, compressors and propane circuit. |

| | |
|---|---|
| J. Bleeker | Illumination system and window. |
| R. Voss | Lenses and film choice. Photographic processing. |
| G. Muratori | Cameras and reprojection apparatus. |
| G. Kuhn | Timing and control circuits. |
| D. Neet | Temperature control equipment. |
| R. Tinguely | Magnet measuring equipment. |
| R. Salmeron | Nuclear physics. Also optical problems. |
| BC/259 | Engineer 8/9. To take part in erection of chamber and compressors. |
| BT/264 | Engineer 8/9. Special electrical and magnetic problems in connection with bubble chamber injection. |
| BT/265 | Reprojection apparatus. |
| M. Niklaus<br>A. Schmidt<br>R. Gerst | Electrical installations. |
| S. Minor<br>H. Lenique | Gas systems. |
| L. Vuffray | Factory inspection of components. |
| J. Mann | Optics |
| H. Dijkhuizen<br>M. Grutter<br>G. Paillard<br>J.P. Marcelin | Electronics |
| Mme V. Donat | Photographic laboratory assistant, plotting and filing of experimental results. |

Cooperation in the drawing office with H. Horisberger, J. Hirschbrunner, Reiss - R. Ruedi and C.E. Rasmussen.

Total number of staff and vacancies 25

Of the above listed staff the following 12 members are in fact part-time with committments as listed.

| Staff | Duties |
|---|---|
| B. de Raad | Supervision of the beam transport magnets, contracts and appropriate measuring equipment. |
| R. Voss | Nuclear physics commitments with SC experiments. |
| G. Kuhn<br>D. Neet | Electronic equipment for lens control circuits, field display ejection, separator and beam transport. |
| R. Tinguely | Magnetic measurement of beam transport magnets. |
| R. Salmeron | Nuclear physics consulations with other sections. |
| BT/264 | Special and electrical magnetic problems in connection with beam transport ejection. |
| M. Niklaus<br>A. Schmidt<br>R. Gerst | PS magnet installation until end of 1959, and general help with other group activities. |
| M. Grutter<br>G. Paillard | Electronic instrumentation for the whole group. |

At least two nuclear physicist scanners will be needed in the latter half of 1960

## Beam Transport

| Staff | Duties |
|---|---|
| B. de Raad | Detailed supervision of the existing contracts for magnets and lenses. Otherwise in Bubble chamber section. |
| G. Pluym | Inspection at factory and magnetic tests. |
| S. van der Meer | Will still be heavily engaged in the I.S. magnet programme during 1959. Otherwise will assist with B.T. optical problems and system design. |
| P. Collet | Factory inspection. |
| BT/269 (6/7) | Electrical work and magnetic tests. |

Cooperation in the drawing office is with A. Achermann, E. Bohnenblust

Total number of staff 4 (B.de R. counted in BC staff)

Number of vacancies required for 1960 none

## Electrostatic Separator

| Staff | Duties |
|---|---|
| C. Germain<br>J. Nilsson | Design studies and experimental work for separator. (J.N. will still be heavily engaged in the P.S. magnet programme during 1959). |
| R. Bertolotto | Electrical work. |

Cooperation in the drawing office with A. Achermann - A. Dind - M. Ormond

Total number 3

Vacancies required for 1960 2 technicians 6/7

## Fast Ejection

| Staff | Duties |
|---|---|
| B. Kuiper<br>G. Plass | Design and construction of the fast ejection magnets. |
| G. Zanolin | Laboratory technician |
| P. Actis | Electronic technician |

Total number of staff 4

Vacancies required for 1960 1 technician 6/7

## Slow Ejection

| Staff | Duties |
|---|---|
| F. Krienen | Design and construction of the system. Will also take part in beam optics work. |
| R. Salmeron | Part time nuclear physics consultation. |
| H. Warren | Laboratory technician |
| E.J. 271 | Laboratory technician |

Total number of staff and auth. vacancies 3

Vacancies required for 1960 Junior engineer

Drawing office cooperation with H. Horisberger , J. Gallay.

Group secretary Mlle F. Vermeille

Total staff and vacancies for 1959 39

Total vacancies required for 1960 6

## 4. SPACE REQUIREMENTS.

Staff and work connected with this project at present occupies space in the magnet group office and laboratory area and experimental work is in progress in the south experimental hall in the areas shown.

As further large pieces of the bubble chamber are constructed trials and tests will be made in the south experimental hall, and the assembly of the final chamber will take place in the region marked.

Tests on the beam transport magnets after delivery will require the space indicated. The separator experimental work will take place in the north hall.

C.A. Ramm

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Distribution: (closed)
Parameter Committee
Magnet Group

Barr

Chamber assembling area

temporary experiments

Unloading and access for large items

Beam

UMG

field measurements for ejection

UNIT 102

BMG

B M M

Beam transport measur.

Generators room

batteries

slow ejection

M

Optics and Window test

Possible retreat of batteries and small generators

Electronics and controls

Calibration Reprojection

High Volt. { lights ejection

Kuiper Plass

Bleeker Reich

Dark room

Innocent voss

Neet Tinguely

De Raad Resegotti

Germain C. Kuhn

Krienen Salmeron

Nilsson Van der Meer

Vermeille Donat

Ramm meetings

B.T. 264 Muratori
B.T. 265 Pluym

Dijkh. BC 259 | Technical design. work | Material testing

# *Propane Chamber Project*
# *Floor layout*

SIS. R59/576