

## PHYSICS III COMMITTEE

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DRAFT MINUTES OF THE MEETING OF THE  
PHYSICS III COMMITTEE

HELD ON

20 JANUARY 1971 AT 2.30 P.M.

PRESENT

Baarli, J.	CERN	D'Ceallaigh, C.	I.A.S. Dublin
Bailey, J.	CERN	Pasinetti, A.	Milano
Barbier, M.	CERN	Pearce, R.M.	Triumpf, Darmst.
Boschitz, E.T.	Karlsruhe	Pepin, M.	SIN
Brandt, R.	Marburg	Picard, J.	CERN
Bressani, T.	Torino	Picasso, J.	CERN
Cernigoi, C.	Trieste	Placci, A.	CERN
Engfer, R.	SIN/CERN	Polacco, E.P.	CERN
Erdal, B.R.	CERN	Poskanzer, A.	Orsay
Favier, B.	Grenoble	Povh, B.	Heidelberg
Gabathuler, K.	ETH	Riley, K.F.	Cambridge
Gastaldi, U.G.	Pisa	Rohlin, J.	Göteborg
Haase, E.L.	Karlsruhe	Röschert, G.	HMI Berlin
Hansen, P.G.	CERN	Serre, C.	CERN
Herz, A.J. (Secretary)	CERN	Schellenberg, L.	Fribourg
Jenefsky, R.	Lausanne	Schmitt, H.	CERN/Munich
Jonson, B.	Göteborg	Schopper, H.	CERN
Joseph, C.	Lausanne	Schröder, W.-U.	Darmstadt
Kjelberg, A.	CERN	Steinberger, J.	CERN
Koch, H.	CERN/Karlsruhe	Stroot, J.P.	IISN Brussels
Kofoed-Hansen, D. (Chairman)	CERN	Ullrich, H.	Karlsruhe
Lazanski, M.	CERN	Venturello, G.V.	Torino
Le Dallic, G.	CERN	Walter, H.C.	CERN
Lynen, U.	CERN	D. Warren	University Genev
Michaelis, E.Š.	CERN	Westgaard, L.	CERN
		Zupančič, Č.	Munich

1. MINUTES OF THE MEETING OF 15 SEPTEMBER 1970

The Draft Minutes (PH III-70/45) were approved.

2. REPORT ON DECISIONS MADE BY THE NPRC

Kofoed-Hansen reported on the meetings of the Nuclear Physics Research Committee of 23 September 1970 and 28 October 1970 at which the Physics III recommendations had been discussed.

Of the recommended PS programme, the NPRC had approved the extension of experiments P6 and P7 as well as the Nuclear Chemistry programme and the new experiment P10.

For the SC, the programme had been approved as recommended including, in particular, experiments SC 32 and SC 33. The NPRC had recognized also that, as customary, small changes in machine-time allocations might have to be made by the SC Coordinator when necessary.

Kofoed-Hansen also transmitted the view of the NPRC that groups should not be involved simultaneously with PS and ISR experiments; they should concentrate, he said, on one job at a time.

3. REPORTS ON EXPERIMENTS AT THE PS

There were no reports.

4. LETTER OF INTENTION FOR EXPERIMENT AT THE PS

- PH III-71/4: "High-resolution spectroscopy of hypernuclei" (Heidelberg: Povh et al.).

Povh introduced the above Letter of Intention, emphasizing the need for much higher energy resolution than that planned to be provided by experiments previously proposed.

After some discussion, the Committee decided to establish a Sub-Committee on hypernuclear spectroscopy to recommend a programme direct to the March 1971 meeting of the NPRC. It was proposed to invite a few outside experts to join this Sub-Committee.

5. RECOMMENDATIONS CONCERNING THE PS PROGRAMME

There were no recommendations.

6. REPORTS ON EXPERIMENTS AT THE SC. MACHINE-TIME REQUESTS FOR EXPERIMENTS IN PROGRESS

Engfer reported on the status of the SC experiments and proposed allocations of machine time up to mid-1971 (see 8. below).

SC 9: Radiobiology (CERN DI/HP, Baarli et al.: PH III-69/12, 70/40, 70/53).

The Committee agreed to the time request PH III-70/53.

SC 16: Partial capture rates for  $\mu$  and  $\pi$  in light nuclei;  $\nu$ - $\gamma$  directional correlation in  $\mu$  capture (Louvain, Deutsch, Macq et al.: PH III-67/40, 67/41, 68/43, 68/44, 68/61, 70/9, 71/9).

The Committee noted the status report and machine-time request (PH III-71/9) and agreed to recommend the allocation of machine time requested.

Michaelis announced that Mr Lazanski was leaving the MSC Division and spoke about the gratitude physicists working at the SC owed to Mr Lazanski who had brought the machine to a very high level of reliability. He then introduced Mr Le Dallic who was taking over from Mr Lazanski as Leader of the Operations Group.

7. PROPOSALS AND LETTER OF INTENTION FOR EXPERIMENTS AT THE SC

- PH III-70/47: "Measurement of the energy separation between 2S and 2P levels (Lamb shift) in the  $(\mu\text{He})^+$  ion" (CERN-Pisa: Polacco, Zavattini et al.).

Polacco introduced the proposal. In a brief discussion it was noted that it was difficult to estimate the amount of machine time needed to obtain a good result. Koford-Hansen proposed that the experiment be recommended for an allocation of 150 main-user shifts, but that it should be noted that a further allocation might be needed later.

- PH III-70/48: "The ISOLDE Collaboration- Experimental programme for the period January 1971 to the SC shutdown".

G. Hansen gave a brief summary of the programme. Kofoed-Hansen commented that he believed the ISOLDE project should be supported as long as it produced new and fundamental results, and he proposed that it be recommended for acceptance.

- PH III-70/49: "Study of the production of  $\alpha$ -emitting nuclides in the interactions of 600-MeV protons with heavy elements" (Marburg: Brandt et al.).

Brandt introduced the memorandum. There were no objections; it was decided to recommend acceptance.

- PH III-70/50: "Memorandum to the Physics III Committee from Bichara, University of Geneva, concerning tests of spark chambers parasitically at the SC".

The Committee noted the request and decided that it should be dealt with by the SC Coordinator at his discretion. It was emphasized that Experiment SC 28 should have priority in case of conflict.

- PH III-70/51: "Fragmentation nucléaire et émission de fragments légers dans les tissus irradiés avec protons de 600 MeV" (Milano: Pasinetti).

Pasinetti introduced his proposal. Kofoed-Hansen said that the expert referee who had been consulted had expressed the opinion that there was a reasonable case for seeking the data the proposer wished to obtain, but that it would be important to extend the investigation to particles with energies below 10 MeV in order to include most of the evaporation spectrum. In the discussion the question was raised whether it would not be preferable to compute the spectra to be expected in tissues of various compositions from data on fragmentation and evaporation of pure nuclear species. The Committee decided to ask the proposer to provide detailed information on these problems. (see recommendations below)

- PH III-70/52: "Search for the decay  $\mu \rightarrow e + \gamma$ " (SIN/CERN-Cambridge: Engfer et al.).

Riley presented the proposal. In the discussion Kofoed-Hansen pointed out that if the test requested were approved and successful this would imply the commitment of a very large number of shifts after the completion of the SC improvement programme. Zupančič suggested, and the proposers agreed, that the Committee should not recommend the allocation of the full requested number of shifts even after a successful test until an effect has been seen. The Committee accepted this suggestion (see Recommendations below).

- PH III-71/1: "Production rates of radionuclides produced by  $\mu^-$  capture (Max-Planck-Inst. Heidelberg: Heusser et al.).

In the absence of the proposers, Lynen presented an outline of the intended work. Kofoed-Hansen reported that the proposal had been commended by the referee. The Committee agreed to recommend it.

- PH III-71/3: "Extension of the  $\pi^-p \rightarrow \pi^0n$  cross-section measurements in the region of the (3,3) resonance (Lausanne-Munich: Joseph et al.).

Joseph and Zupančič presented the proposal. After detailed discussion, Kofoed-Hansen proposed that the experiment be recommended with an allocation of 50 shifts; this was agreed to.

- PH III-71/5: "A  $(\pi^-, 2n)$  experiment on  $^{16}\text{O}$ " (Karlsruhe: Boschitz et al.).

The Committee took note of this Letter of Intention.

- PH III-71/7: "Mono-kinetic neutron beam" (CERN-ETH: Domingo et al.).

The Committee noted the intention of the MSC Division to develop a monokinetic neutron beam. After discussion it was agreed that this work should be done in technical-development time; an allocation of physics time might be discussed at a later stage should such a need arise.

- PH III-71/8: "Measurement of the differential cross-section for the reaction  $d + d = {}^4\text{He} + \gamma$  and the upper limit of the cross-section of  $d + d = {}^4\text{He} + \pi^0$ " (Frascati-Trieste: Cernigoi et al.).

Cernigoi presented the proposal. Michaelis said that the SC would have to be modified to accelerate deuterons and that this could not be done until after the completion of the improvement programme, i.e. not before 1973. The Committee decided that it was premature to make a recommendation at this stage.

## 8. RECOMMENDATIONS CONCERNING THE SC PROGRAMME

### 8.1 New proposals

- PH III-70/47: "Measurement of the energy separation between 2S and 2P levels (Lamb shift) in the  $(\mu\text{He})^+$  ion" (CERN-Pisa: Polacco, Zavattini et al.)

The Committee recommends acceptance of this project with an allocation of 150 main-user shifts. The Committee noted that an additional allocation of machine time may have to be considered at a later date. The experiment code will be 5C21a.

- PH III-70/48: "The ISOLDE Collaboration - Experimental programme for the period January 1971 to the SC shutdown".

The Committee recommends acceptance of this programme which is expected to require a total of 120 shifts in 1971.

- PH III-70/49: "Study of the production of  $\alpha$ -emitting nuclides in the interactions of 600-MeV protons with heavy elements" (Marburg: Brandt et al.)

The Committee recommends acceptance of this proposal. The experiment is fully parasitic to ISOLDE and the ISOLDE Collaboration does not object. The experiment code will be 5C 34.

- PH III-70/50: "Memorandum to the Physics III Committee from Bichara, University of Geneva, concerning tests of spark chambers parasitically at the SC"

The Committee took note of this request and recommends that it be dealt with by the SC Coordinator in consultation with others concerned and at his discretion.

- PH III-70/51: "Fragmentation nucléaire et émission de fragments légers dans les tissus irradiés avec protons de 600 MeV" (Milano: Pasinetti)

The Committee decided to ask the proposer to provide detailed information on (a) the consequences of the fact that his proposed experiment will not provide data on fragments with energies below 10 MeV, (b) the possibility of obtaining his information by computation from fragmentation cross-sections for the constituents of the biological materials of interest, and (c) the fragmentation cross-sections that would have to be measured, if any, to allow adequate computations to be made.

- PH III-70/52: "Search for the decay  $\mu \rightarrow e + \gamma$ " (SIN/CERN-Cambridge: Engfer et al.)

The Committee recommends acceptance of this 20-shift test for an experiment to be carried out after conversion of the SC. The Committee accepts the commitment to support the full experiment if the test is successful, but it was felt that the initial allocation, to be recommended later, should be less than the 200 shifts requested in the proposal. The experiment code will be SC 36.

- PH III-71/1: "Production rates of radionuclides produced by  $\mu^-$  capture (Max-Planck Inst. Heidelberg: Heusser et al.)

The Committee recommends acceptance of this proposal with an allocation of 5 shifts. The experiment code will be SC 35.

- PH III-71/3: "Extension of the  $\pi^-p \rightarrow \gamma n$  and  $\pi^-p \rightarrow \pi^0 n$  cross-section measurements in the region of the (3,3) resonance (Lausanne-Munich; Joseph et al.)

The Committee recommends acceptance with an allocation of 50 shifts.  
The experiment code will be SC 19b.

- PH III-71/8: "Measurement of the differential cross-section for the reaction  $d + d = {}^4\text{He} + \gamma$  and the upper limit of the cross-section of  $d + d = {}^4\text{He} + \pi^0$ " (Frascati-Trieste; Cernigoi et al.)

As the programme of work of the MSC Division does not allow the modifications needed for the acceleration of deuterons to be made before the completion of the improvement programme, the Committee considers it premature to make a recommendation at this stage.

## 8.2 Requests for additional machine time

SC 9: Radiobiology (CERN DI/HP, Baarli et al.: PH III-69/12, 70/40, 70/53).

SC 16: Status report and machine-time request for experiment SC 16: Partial capture rates for  $\mu$  and  $\pi$  in light nuclei;  $\nu$ - $\gamma$  directional correlation in  $\mu$  capture (Louvain, Deutsch, Macq et al.: PH III-67/40, 67/41, 68/43, 68/44, 68/61, 70/9, 71/9)

The Committee recommends acceptance of the above two requests (PH III-70/53 and PH III-71/9).

## 8.3 Recommended experimental programme for the SC

In Table 1 the time allocations recommended by the Committee are listed together with information on the status of each experiment.

Note that the estimates of the numbers of shifts needed to finish experiments, of the dates on which experiments are expected to be finished, and the remarks on plans for the future are based on information supplied by the groups concerned. Except in cases in which this specifically stated they have not been discussed by the Committee and the Committee has not made any recommendations concerning them.



9. DATE OF NEXT MEETING

It was agreed to hold the next meeting in late April or early May.

10. ANY OTHER BUSINESS

Kofoed-Hansen announced that the Director-General was arranging a meeting at which there would be a review of the present and planned physics programme at CERN. Special invitations would be issued for this meeting which was to take place in March.

A.J. Herz.

Code	Group	Description of experiment	NPRC approval	Status as of 20.1.71	Main user	Paras.	Main-user shifts recommended		Estimated no. of sh. needed after 30.6.71 to complete expt. (3)	Expected date of completion (3)	Remarks
							for period 4.1.71 to 9.4.71 (4)	Tentatively for period 13.4.71 to 30.6.71			
SC 2a	Darmstadt (Engfer, Kankeleit et al.)	Nuclear excitation and isomer shifts in muonic atoms (67/1, 67/43, 68/13, 68/30, 68/59, 70/16).	8.11.67	In progress	361	171	30(N)	25(N)	60	Shutdown 1971	
SC 4a	Orsay (Bernas et al.)	Nuclear reaction cross-sections for cosmic-ray problems (68/6, 68/54, 70/27).	7. 2.68	In progress	22	-	13(P)	15(P)	-	-	Continuing project
SC 9	CERN/DI-HP Baarli et al.)	Radiobiology (69/12, 70/40, 70/53).	17. 3.65	In progress	56	-	10(P)	-	~20 sh/y	-	Continuing project
SC 11	CERN-Karlsruhe-Heidelberg (Beckenstoss et al.)	Magic X rays (NSC 65/12, 67/33, 68/24, 68/39, 68/55).	17.11.65 5. 7.67	In progress	336	181	20(N)	25(N)	60	Shutdown 1971	
SC 16	Louvain (Deutsch, Macq et al.)	Partial capture rates for $\mu$ and $\pi$ in light nuclei (67/40, 67/41, 68/43, 68/44, 68/61, 70/9, 71/9).	8.11.67	In progress	149	86	-	25(N)	-	-	Further plans will depend on results obtained (see PH III-71/9).
SC 19a	Lausanne-Munich-Torino (Bressani, Joseph et al.)	$\pi^+ + p \rightarrow \pi^0 + n$ backward differential cross-section (70/7, 70/24).	3. 6.70	In progress	24	-	50	-	-	Easter 1971	
SC 19b	Lausanne-Munich (Joseph et al.)	$\pi^+ p \rightarrow \gamma + n$ and $\pi^+ p \rightarrow \pi^0 + n$ near (3,3) resonance (71/3)	Pending	Preparation	-	-	-	-	50	Shutdown 1971	
SC 21a	CERN-Pisa (Polacco, Zavattini et al.)	2S-2P energy differences in ( $\mu$ He) $^{2+}$ (70/47)	Pending	Preparation	-	-	-	20(N)	130	Shutdown 1971	
SC 22	CERN-ETH-Geneva-Grenoble (Pepin et al.)	Nucleon-nucleus cross-sections (68/4, 68/26, 68/67, 70/6, 70/42)	8. 5.68	In progress	77	237	-	20(P)	20	Shutdown 1971	Does not include machine time for development of muonkinetic neutrino beam (see PH III-1/7) which should be done as much as poss. in 10 time

continued

Table 1 continued

Code	Group	Description of experiment	NPRC Approval	Status as of 20.1.71	Main user	Paras.	Shifts used (1)		Main-user shifts recommended		Estimated no. of sh. needed after 30.6.71 to complete expt. (3)	Expected date of completion (3)	Remarks
							1.1.68-24.12.70		for period 4.1.71 to 9.4.71 (4)	tentatively for period 13.4.71 to 30.6.71			
SC 26	Clermont Ferrand-Strasbourg (Aven, Querrou et al.)	$p + {}^3\text{H}, p + {}^3\text{He}$ scattering (68/32, 68/47, 68/66, 69/21, 69/21 Add. 1)	3.12.69	In progress	U2	25	-	-	-	-	Shutdown 1971	$p + {}^3\text{H}$ scattering not yet measured. Time for this included in request for 5C 32.	
5C 28	CERN (Charpak et al.)	Development of multiwire proportional chambers for ISR experiments (69/31)	4. 2. 70	In progress	9	85	-	5	5	-	-	Requires about 200 sh., 10 of which main user; details at description of 5C Courringtur	
5C 30	IISN Belgique-Drsay (Spiguel, Strout et al.)	$\pi^-$ He scattering around the (3/2, 3/2) resonance (69/27, 70/25)	3. 6. 70	In progress	-	-	-	35	50	50	Shutdown 1971		
5C 31	Oxford-Göteborg (Domingo, Tanner et al.)	$D^0$ cross-section of the reaction ${}^3\text{He}(p, \pi^+){}^4\text{He}$ at 600 MeV (70/17)	3. 6. 70	In preparation	11	-	-	25(P)	10(P)	-	June 1971		
5C 32	Clermont-Ferrand, Lyon, Strasbourg (Combe, Querrou et al.)	Small-angle $pp, pd$ ${}^4\text{He}$ scattering at 600 MeV (70/34)	28.10.70	In progress	48	-	-	10(P)	20(P)	40	Shutdown 1971	Includes machine time for $p + {}^3\text{H}$ part of 5C 26	
5C 33	Clermont-Ferrand, Bordeaux (Alard et al.)	Emission of protons and light fragments from $p$ -nucleus collisions (70/41)	28.10.70	In progress	4	11	-	10(P)	10(P)	-	Autumn 1971		
5C 34	Marburg (Brandt et al.)	Alpha emitters produced by 600 MeV protons (70/49)	Pending	In preparation	-	-	-	-	-	-	Shutdown 1971	Fully parasitic (ISOLDE)	
5C 35	Heidelberg (Heusser et al.)	Production of radio-nuclides by $\mu^-$ capture (71/1)	Pending	In preparation	-	-	-	5(N)	-	-	Easter 1971		
5C 36	SIM/CERN-Lambriqge (Ingber et al.)	Tests for experiment on $\mu^- \text{-e}^+ \gamma$ (70/52)	Pending	In preparation	-	-	-	-	5(N)	15(N)	Shutdown 1971	Main experiment planned for improved 5C	
I	ISOLDE Collaboration	ISOLDE programme (69/1, 70/4, 70/4B)	12. 2. 69	In progress	216	-	-	30	25	-	-	Continuing project; ~65 more sh. requested for second half 1971	
K	Nuclear Chemistry (Bordeaux, CERN, Ilarms, Led, DsIo)	Nuclear chemistry (70/33, 70/36, 70/37, 70/38)	23. 9. 70	In preparation	-	-	-	$\frac{1}{2}$ sh. p. week	$\frac{1}{2}$ sh./w.	-	-	Continuing project. Coordinator: B. Erdal.	

(1) Data supplied by MSC Division.

(2) Parallel running possible for experiments marked N (neutron side) with experiments marked P (proton side).

(3) This information, supplied by the groups, is given for orientation only; it is not a recommendation.

(4) Revised recommendation.