

NEUTRINO BUBBLE-CHAMBER PHYSICS GROUP REPORT

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ABSTRACT

A short summary of the neutrino bubble-chamber group work during the 1970 NAL Summer Study is given. A few statements relevant to the layout of Experimental-Area I and neutrino bubble-chamber physics in the NAL 15-ft bubble chamber are made. Details of equipment, flux calculation, physics, measurements, etc. are given in individual reports.

I. GROUP WORK

A large portion of the work consisted in discussing the NAL proposals for  $\nu$  experiments (until July 1970), in reviewing the various bubble-chamber (BC) configurations, and comparing them with the counter proposals. Detailed questions of additional equipment to the BC, layout of Experimental-Area I,  $\nu$  flux, etc. were discussed. A series of individual reports is the output of this work (see SS-174, 180, 185, 186, and 198 to 203).

The authors of these reports discussed their findings with the other group members but are totally responsible for the written report. A few things, inevitably, are said more than once, but the reports might be helpful as source material for further

detailed study. The discussions of certain problems during the group's work, for example, yielded valuable information for members of groups who had proposed experiments themselves.

II. STATEMENT OF THE GROUP RELEVANT  
FOR PLANNING EXPERIMENTAL-AREA I

The members of the group feel that one should not exclude the 15-ft BC from  $\nu$  physics at the highest energies (400-500 GeV) since the bubble chamber is well suited to search for the "unexpected".

More recent calculations of the  $\mu$  shield show that the originally planned 300-m iron shield may have to be enlarged considerably in width. In any event, an iron shield for  $\geq 400$ -GeV operation is probably too costly, and a 1400-m earth shield (approximate length) seems more realistic.

A great deal of very interesting and important  $\nu$  physics is seriously affected by the reduction of the low-energy  $\nu$  flux (at least a factor 10 in the 5-15 GeV region, see SS-200).

The group, therefore, strongly recommends that there exist the option of installing a short  $\nu$  beam directed to the 15-ft BC. Such a beam would run with 100-GeV protons, have a 75-m iron shield, yielding about 70 times as much flux in the 5-15 GeV region as the "realistic" layout anticipated now for Area I and would not be too costly (see SS-180).