INTRODUCTORY REMARKS

BY

NORRIS E. BRADBURY, DIRECTOR
LOS ALAMOS SCIENTIFIC LABORATORY

It is a great pleasure for Los Alamos and the Los Alamos Scientific Laboratory to welcome all of you to this international conference on linear accelerators.

The Laboratory has a variety of responsibilities, as I am sure all of you know. Of course, the application of nuclear energy to national defense is one of our major tasks. In recent years, over the last decade actually, we have greatly broadened our scope of interests and our responsibilities to this country and to the world. We have a responsibility for exploring the possibilities of nuclear energy for propulsion in space. We have a number of reactor responsibilities for production of power. We have the responsibility to explore the possibilities of thermonuclear reactions for the production of power.

And, supporting all these efforts, and a major responsibility in itself, is the responsibility for the prosecution of basic research in the frontiers of physics, biophysics, mathematics, chemistry and metallurgy. This is no less one of our real tasks, and one to which we devote the same degree of seriousness, and the same intensity of effort, which we devote to those things which turn up in tangible pieces of hardware. The Laboratory is very proud of its various tasks in this world. We are no less proud of our activities in research than we are of our programs of specialized accomplishment.

One area in which we are now engaged, as I am sure many of you are aware, is that of a large proton linear accelerator. For that reason, it is particularly prophetic and inspiring to us to be able to be host to a conference of this sort. We hope to glean ideas from you which will help our program; and we also hope that from us you may get some ideas of the things which we are doing and that you may learn, not only from each other but also from what is going on here, something which you can take home with benefit and profit. Again, it is a very great pleasure to have you here and to wish you the greatest of success in this conference.

INTRODUCTORY REMARKS

BY

LOUIS ROSEN, MEDIUM ENERGY PHYSICS DIVISION LEADER

LOS ALAMOS SCIENTIFIC LABORATORY

AND

CONFERENCE CHAIRMAN

This is the fifth in a series of Linac Conferences. In 1961 and 1962 they were held at BNL, in 1963 at Yale, and in 1964 at MURA. All of the previous conferences have stressed proton linacs. This year, however, a very substantial part of the program is devoted to electron linacs in recognition of the emphasis which is now being placed on such accelerators. In the first linac conference there were about twenty participants. The number has increased in each of the succeeding conferences, indicating the vitality of interest in the field. The present conference is no exception, with more than one hundred and twenty participants from outside of Los Alamos, about forty of whom are from outside the U.S.A. This conference is being held at a particularly opportune time for us at LASL, since we are in the final stages of delineating the design of an 800 MeV, 1-mA average current proton linac.

Although the papers to be presented are concerned with the design and construction of linacs, we should not lose sight of the reasons underlying this activity. Linear accelerators have traditionally played a vital role in nuclear science and technology. They are used as injectors to the multi-BeV accelerators, but are also used in their own right, to extend our knowledge of the atomic nucleus, of subnuclear particles, and of the basic laws that govern all natural phenomenon. It is expected, for example, that the newly-commissioned SLAC accelerator will be at the forefront of high energy physics for many years to come. Perhaps less dramatic, but of great practical importance, has been the use of linacs as a means to generate intense sources of neutron and gamma rays for study of those processes which are crucial to the development of nuclear energy sources, to provide sources of X-rays for use in industry and in medicine, and for fundamental studies of the solid state of matter.

During the past decade electron linacs have seen rapid development towards higher energies and higher intensities - one to two orders of magnitude higher in each domain. Proton linacs have also had their intensities increased by several orders of magnitude, but not their energies. The highest energy proton linac in operation is still the Minnesota linac at 68 MeV. However, the injector to the 70 BeV machine being built in Russia will have an energy of 100 MeV.

We now see our way to the construction of proton linacs of energy 1 BeV and beyond, and also with very high intensities and large duty factors. Our colleagues at Chalk River have pointed out that it now appears feasible to construct a 1 BeV proton linac of such high intensity as to compete very favorably with reactors in the production of high-intensity beams of thermal neutrons. In fact, it seems clear that if much higher thermal neutron fluxes are to be produced, accelerators, and not reactors, represent the best way to do this because the amount of heat that one must remove from the neutron-producing volume can be much less for spallation than for fission reactions. Our Chalk River colleagues have been, until recently, dividing their design efforts between a linac and a circular machine. I am pleased to tell you that within recent weeks they have decided to take the linac route. They are now doubly welcome to this conference.

As the intensity and length of electron linacs have been pushed to larger and larger values, there has emerged a phenomenon which threatens to limit intensities to values lower than had been anticipated. The first inkling I had of this was when, as a member of a delegation, I visited the Kharkov Institute last February. They were putting into operation a 2 BeV electron linac and were experiencing beam blowup problems which appear strikingly similar to those which have since been observed at SLAC and at the NBS machine. It is well that one of our sessions is devoted to problems of beam stability, for these are beginning to be of crucial importance.