Foreword

As one views the history of cyclotrons one can sense well-marked trends. Twenty years or more ago there was a surge of cyclotron construction, inspired by the early successes at Berkeley, and most of that crop of machines bear a derived resemblance to the Berkeley designs of about 1937. Following the war, there was another surge, this time into the relativistic range of energies made accessible through the artifice of frequency modulation. We are now embarking on a third wave, toward machines that return to non-modulated frequencies but use sector focusing to retain isochronism in the face of the relativistic increase in particle mass. The world construction of a dozen or so of sector-focused machines is now contemplated or started, and the present Conference brings together nearly all of the interested parties for an exchange of ideas.

It is well known that L. H. Thomas realized many of the possibilities of sector focusing in his now celebrated paper of 1938. Why was not his suggestion seized upon avidly at the time? The answer, one might suggest, is two-fold. In the first place, time was required for accelerator builders to absorb the growth of orbit theory. Secondly, and more importantly, the early cyclotrons were sufficient for the state of physics at the time. There was so much nuclear physics to be done that people were, quite correctly, doing experiments rather than seeking fancier and more difficult machines. Today the situation has changed. Nuclear physics has matured; now, as never before, detailed and carefully-controlled experiments are demanded, and consequently there is a requirement for cyclotrons of increased sophistication that yield a superior beam quality with greater versatility and power than ever before. It is indeed fortunate that the principle of sector focusing can be drawn upon to meet this demand, and the general tenor of this Conference implies a confidence that with energies variable into the relativistic range, and with sundry ion species under acceleration, the new cyclotrons will introduce a new sweep and compass into research upon the physics of nuclear reactions.

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