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STATUS OF THE HOLIFIELD HEAVY ION RESEARCH FACILITY PHASE II BOOSTER

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Abstract

The first phase of the Holifield Heavy Ion Research Facility will become operational in late 1978. The status of plans for addition of a larger booster accelerator is discussed.

Introduction

At the time of the last Cyclotron Conference, we were in the early stages of designing the first phase of the Holifield Heavy Ion Research Facility (HHIRF) and were proposing the addition of a second phase based on a room-temperature, separated-sector cyclotron.[1,2] This cyclotron, with an energy constant of $K = 300$, would have been capable of providing uranium ions with I/A of at least 10 MeV/nucleon when injected with the 25 MV tandem of Phase I. Since that meeting, good progress has been made on construction of Phase I of our facility. I am sorry to say that despite our efforts Phase II is still not beyond the proposal stage. These last three years have seen as many evolutions in our proposed Phase II booster cyclotron, and this paper is intended to provide a brief historical record of this evolution, some of the reasons for these changes, and the present status of our plans.

HHIRF Phase-I

The present phase of construction is centered around the addition of a 25 MV tandem electrostatic accelerator to our existing cyclotron facility. The new tandem has been designed with particular attention to features such as transport optics, vacuum, and diagnostics that should enhance its ability to accelerate heavy ions. The existing isochronous cyclotron (ORIC) has been modified to serve as a booster accelerator when injected by the new tandem. The two accelerators are also capable of completely independent operation.

Construction on this phase is proceeding well. The building is essentially finished, the large pressure vessel has been completed and tested successfully, the major modifications to the ORIC have been completed, and installation of the tandem inside the pressure vessel has begun.

A view of the HHIRF building, showing the newly completed tower, which houses the pressure vessel for the 25-MV tandem, is shown in Fig. 1. A cross-section of the facility, illustrating the relationship between the new tandem and the ORIC, is shown in Fig. 2. One feature of the 25-MV tandem,[3] readily apparent from the figure, is the "folded" configuration. This feature has been introduced since the accelerator has become large enough, from electrostatic considerations, that both low- and high-energy accelerating tubes can be accommodated within the same column structure. The tandem is being built, to our specifications, by National Electrostatics Corporation. Performance specifications call for 1 puA (6×10^{12} ions/sec) for all ions.

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Fig. 1. The Holifield Heavy Ion Research Facility at Oak Ridge

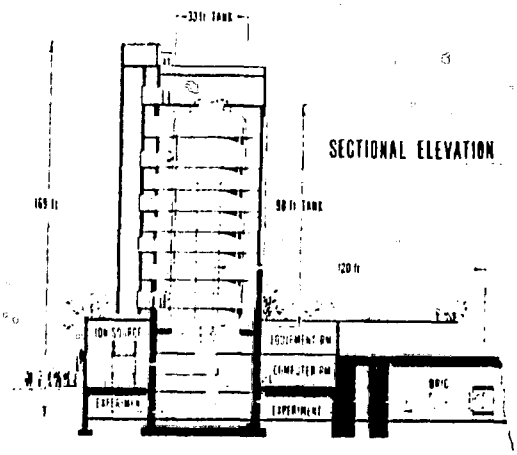

Fig. 2. Vertical section of the HHIRF building

The Phase-I facility is scheduled to be operational in October of next year. A plan view of the facility as it is expected to look during early operation is shown in Fig. 3.

HHIRF Phase-II/77

The ion energy performance that will be available from the 25-MV tandem and the Phase-I facility is shown in Fig. 4. Since the use of ORIC as a booster accelerator will provide ions only up to mass 160 with energies above the Coulomb barrier, the facility has been designed with an eye towards later addition of a larger booster accelerator to make available the full range of ion masses. The proposed booster accelerator discussed at the 1975 cyclotron conference was a separated-sector cyclotron with an energy constant $K_B = 300$. This