STATUS OF THE ALADDIN PROJECT *

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SUMMARY

The first description of an electron storage ring
designed specifically to be a source of synchrotron
radiation appeared in the proceedings of an earlier
meeting in this series. We now report on the status
of the 1 GeV electron storage ring Aladdin which is a
development of the earlier work cited. This machine,
now nearing completion, will be an intense source of
synchrotron radiation over the wavelength range extend-
ing from the far infrared (100 μm) to the Beryllium window
(3 μm). The machine incorporates a number of
novel design features: a 100 MeV microtron injector, a
simple but powerful computer based control system and
an extremely flexible lattice.

DESCRIPTION

The parameters of Aladdin are given in Table I and
a lattice element is shown in Fig. 1. The ring is made
up of twelve lattice elements arranged in four quadrants
separated by four long straight sections. The long
straight sections include 4 m drift spaces. Three of
the long straights will be used in the future for the
installation of wigglers, undulators and free electron
lasers. The fourth long straight is taken up by the
RF cavity and the injection system. The ring is shown
schematically in Fig. 2.

Table I

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>1 GeV</td>
</tr>
<tr>
<td>Circumference</td>
<td>88 Meters</td>
</tr>
<tr>
<td>Magnetic Radius</td>
<td>2.08 Meters</td>
</tr>
<tr>
<td>Focusing Order</td>
<td>F D B O</td>
</tr>
<tr>
<td>Periods</td>
<td>12</td>
</tr>
<tr>
<td>Super Periods</td>
<td>4</td>
</tr>
<tr>
<td>Injgction Energy</td>
<td>0.1 GeV</td>
</tr>
<tr>
<td>Injector</td>
<td>Race Track Microtron</td>
</tr>
<tr>
<td>Harmonic No.</td>
<td>15</td>
</tr>
<tr>
<td>Accelerating Voltage</td>
<td>250 KV</td>
</tr>
<tr>
<td>Energy loss per turn</td>
<td>42.5 KV</td>
</tr>
<tr>
<td>β</td>
<td>11.6</td>
</tr>
<tr>
<td>c</td>
<td>66 mm</td>
</tr>
<tr>
<td>e/σ</td>
<td>0.52 mm</td>
</tr>
<tr>
<td>σx/σy</td>
<td>at the SR source points</td>
</tr>
<tr>
<td></td>
<td>0.075 mm</td>
</tr>
<tr>
<td>e/σ</td>
<td>0.063 mm μm</td>
</tr>
<tr>
<td>e/σ</td>
<td>0.001 mm μm</td>
</tr>
</tbody>
</table>

The vacuum chamber is constructed of stainless
steel and includes both "in tank" pumps in the dipoles
and "house keeping" pumps in the straight sections. The
pumps in each quadrant are powered by two power supplies
operating through vacuum relays. Individual pump cur-
cents are monitored by the Aladdin control computer.

All magnets except the sextupoles are laminated.
The dipoles are excited by a SCR regulated supply. Control
signals for the quadrupole and sextupole supplies are
derived, via the control computer, from the dipole
current.

The RF cavity, which has both automatic tuning and
coupling, is constructed of aluminum. The method of
connection of the aluminum cavity to the stainless steel
vacuum chamber is described in another paper in the
proceedings of this conference.

The injection system utilizes a pulsed magnetic
inflector and two kickers for five turn injection. The
injector is a 100 MeV race track microtron.

Control of the machine is through a computer based
system consisting of three head end processors and an
executive computer. All sub-system statuses and para-

CURRENT STATUS

At this time, construction and installation of the
ring are complete and the pressure in the vacuum cham-
ber has reached 5 x 10^-7 without baking. Check out of
the computer and the various sub-systems is proceeding.

Completion of the construction and installation of
the microtron is expected by the end of March. Ring
injection studies will begin when the microtron is
commissioned.

References

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Fig. 1

ALADDIN TYPICAL PERIOD WITH NEW COUPLING ROTOR

Fig. 2

ALADDIN + S.OT. WIGGLER

Fig. 3 Spectrum of Synchrotron Radiation from Aladdin at 1 GeV.