Abstract

CIADS project is a strategic plan to solve the nuclear waste problem and the resource problem for nuclear power plants in China. The linac will accelerate 10mA proton beam from 35keV out of ECR ion source to 600MeV. For CIADS driven linac, which is a 6 MW machine, the most critical issue is the beam loss control. The RT section producing good beam performance for SC section is beneficial for beam loss control. LEBT and RFQ will respectively be used to provide good quality beam in transverse and longitudinal.

1 Introduction

1. Unwanted particles: H$_2^+$ and H$_3^+$
2. H$_2$ removal from the ion source to the downstream
3. Good beam quality to SC section
4. More online beam diagnostics tools

2 LEBT System

1. To scrap the unwanted particles, the bending magnet rotation angle and edge angle is chosen with 20° and 6°.
2. A "point source" concept is proposed in CIADS LEBT design to improve the solenoid spherical aberration.
3. With aperture the beam current adjusting, and improve the beam quality.

The beam dynamics design of RT section and SC section for CIADS linac are presented, and a new RFQ with small longitudinal emittance is proposed to improve beam transport and accelerating efficiency.