Isotope Separator On Line

Target $^{238}\text{U}$

Fission Products

Ion Source

Post-accelerator

Radioactive Ion Beam

50 MeV, 100 kW cw Superconducting Electron Linac
Based on 1.3 GHz, 2K, SRF technology

Scheme of photo-fission production of RIB in ANURIB

Primary accelerator for ANURIB

50 MeV, 500 (100) kW

VECC-TRIUMF MOU phase-1

Injector to be tested at VECC Salt Lake Campus
$^{238}$U Photo-fission cross-section as a function of $\gamma$-ray energy & Bremsstrahlung energy distribution

Fission yield per watt electron power saturates at ~ 50 MeV

- High beam current is more important than high energy
- Present Target technology: 100 kW power handling capacity
- 50 MeV, 100 kW (2 mA) – optimum for RIB production
Production of Neutron-rich RIB using photo-fission of actinide targets

\[ I_{\text{RIB}} = I_\gamma \cdot N_{\text{target}} \cdot \sigma_{\text{fission}} \cdot \text{Efficiency Factor} \]

RIB production rates in $^{238}\text{U}$ target for a total photo-fission rate of $10^{13}/s$

Source: SPIRAL II electron option PDS
Layout of 10 MeV Injector being installed in e-Linac test area at VECC Kolkata

- 300 kV gun
- LEBT
- ICM
- Output energy 10 MeV
Injector Cryo Module (ICM) built in collaboration with TRIUMF Canada

Being developed at TRIUMF for both the institutes
VECC Injector Cryo-Module at TRIUMF

VECC ICM waiting for dressed cavity in Nov. 2015

9-cell Niobium cavity made at Pavac, Canada
VECC Injector Cryo-Module during beam tests at TRIUMF, Oct 2016
Beam successfully accelerated in VECC Injector Cryo-Module

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>$E_{\text{inj}}$</td>
<td>MeV</td>
<td>0.3</td>
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<tr>
<td>$I_{\text{inj}}$ (duty factor)</td>
<td>mA</td>
<td>0.10; 0.5%</td>
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<tr>
<td>$E_{\text{out}}$</td>
<td>MeV</td>
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<tr>
<td>Input power</td>
<td>kW</td>
<td>10.1 (CW)</td>
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<tr>
<td>$E_{\text{acc}}$</td>
<td>MV/m</td>
<td>10.6</td>
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 Beam accelerated to 9.9 MeV on Oct 28, 2016
e-Linac test area is being set-up in one of the experimental caves of K130 Cyclotron

- Pure Helium Tank
- Impure Helium Tank
- Liquid Helium plant
- 500 W, 235 l/hr