Updates of the EC experiment at KEKB

Comparison of the electron cloud density in Al duct and Cu duct

11 November 2009

K. Kanazawa, KEKB vacuum group
Conditions

- Location: ~100m downstream from the soft bend for the SR monitor (The major electron source is scattered photon.)
- Duct size: ID94, 1350mm long

<table>
<thead>
<tr>
<th>Cu duct</th>
<th>Al duct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrusion</td>
<td>Extrusion</td>
</tr>
<tr>
<td>JIS C1011 (AMS C10100)</td>
<td>JIS A5052</td>
</tr>
<tr>
<td>Chemical etching (H$_2$SO$_4$+H$_2$O$_2$)</td>
<td>Chemical etching (H$_3$PO$_4$)</td>
</tr>
</tbody>
</table>
Comparison (linear scale)

- Near Beam Electron Cloud Density [m$^{-3}$]
- LER Bunch Current [mA]

A5052 Extrusion
- D Al[1585] 04Nov09 (decreasing current)
- D Al[1585] 03Nov09
- D Al[1585] 01Nov09
- D Al[1586] 30Oct09

C1011 Extrusion
- D(D7)[4,200,3]Cu

Graph showing data points and trends for different extrusions.
Comparison (log scale)

Near Beam Electron Cloud Density \([m^3]\)

LER Bunch Current \([mA]\)

A5052 Extrusion

C1011 Extrusion
Updates of the EC experiment at KEKB

Groove structure in a wiggler magnet

11 November 2009
Y. Suetsugu, KEKB vacuum group
Setup in KEKB $e^+$ ring

- A test chamber was installed in a wiggler magnet.
  - For tests of a clearing electrode or a groove structure
- With a RFA, flange insertion
- Wiggler magnet:
  - Magnetic field: 0.78 T
  - Effective length: 346 mm
  - Aperture (height): 110 mm
  - The monitor and insertion are placed at the center of a pole.
- Irradiated photons: $2 \times 10^{17}$ photons/s/m at 1600 mA
Setup in KEKB e⁺ ring

- A test chamber with an electron monitor (with RFA) and a clearing electrode or a groove structure.

- Applied voltage
  Collectors: +100V
  Retarding Grid: 0 ~ -1 kV
- Measurement: DC mode
Experiments

• So far, we had tested;
  – Flat TiN-coated surface
  – Groove
    • 20° triangle, 5 mm depth, R<0.1, with TiN coating, SS
    • 20° triangle, 2.5 mm depth, R~0.1, no TiN coating, SS (electro-discharge)
  – Electrode x 2

• From 14th, October;
  – Groove
    • 20° triangle, 2.5 mm depth, R~0.1, with TiN, Aluminum
Results

- ~2009/11/10
Updates of the EC experiment at KEKB

Clearing electrode for a wiggler section of SKEKB

11 November 2009

Y. Suetsugu, KEKB vacuum group
Beam pipe for wiggler section

- We will use clearing electrodes for beam pipes at wiggler sections of SKEKB.
  - Straight beam pipe
  - Total length is ~180 m (/3016m), but a key section for EC.

- A test beam pipe with antechambers with two electrodes was manufactured.
  - The actual structure
  - The final beam test
Test beam pipe

- Electrode: ~900 mm length, 40 mm width, with basically the same structure to those developed so far.
- Beam pipe: Extruded copper
- Electrode was welded by EB.
Test beam pipe

• The beam pipe will be installed in KEKB LER next week
  – Check the effect of electrode (outside of magnet)
    • The beam pipe has an electron monitor with RFA
  – Check the heating of electrode, feed through, etc.