Vacuum Chamber R&D for Super-KEKB

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Contents

1. Introduction

- Parameters Considered Here (Super KEKB)

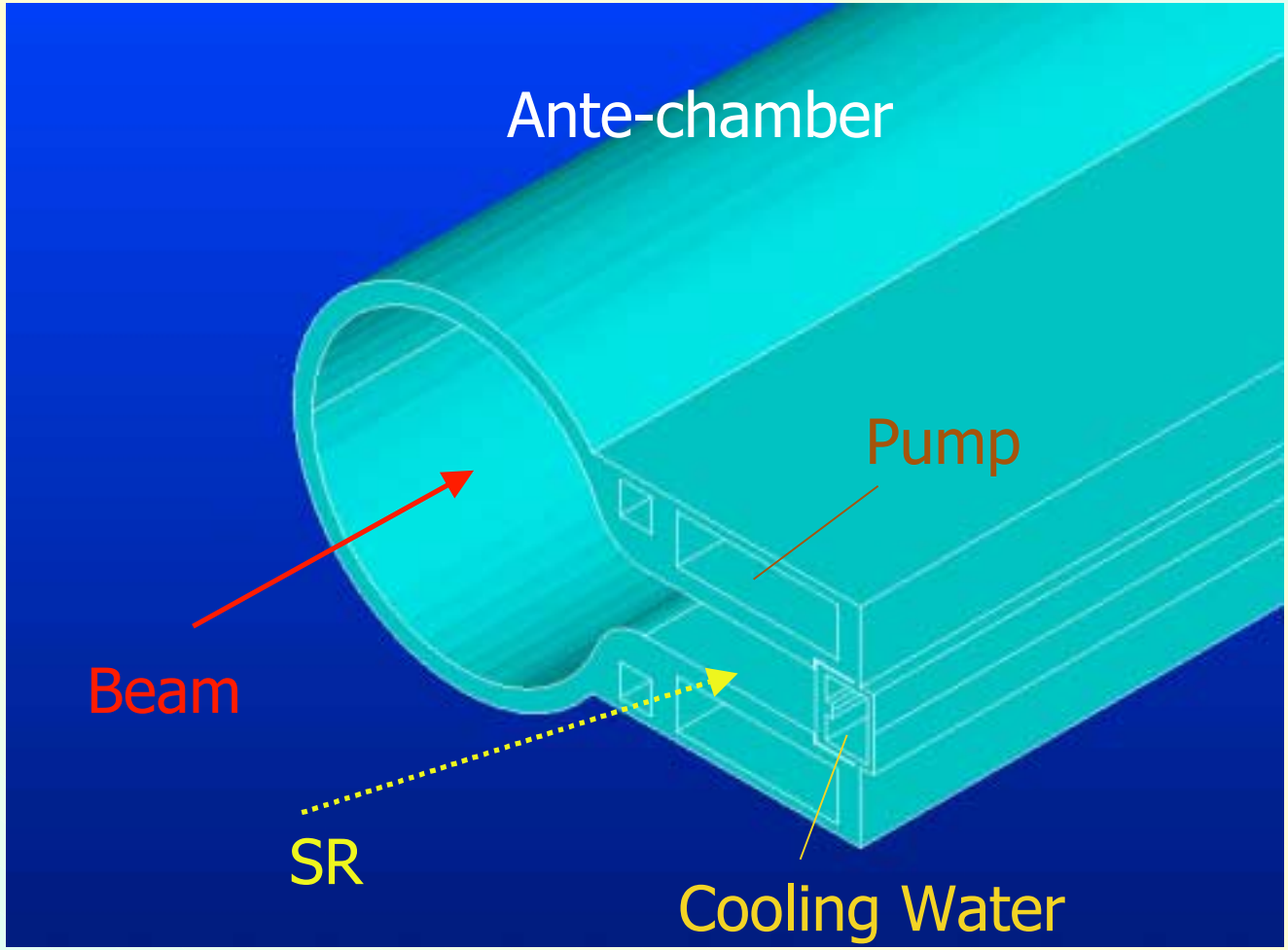
	LER (e^-)	HER (e^+)
Energy [GeV]	3.5	8.0
Beam Current [A]	9.4	4.1
Bunch Length [mm]	3	3
Bunch Number	5018	5018
Bending Radius [m]	16.31	104.46

- Key Points in Designing Beam Chambers and Components
  - How to deal with intense SR?
  - How to reduce beam impedance?
  - How to avoid excess heating?

2. Beam Chamber

- Present Design : Ante-chamber (arc section)

Conceptual Drawing

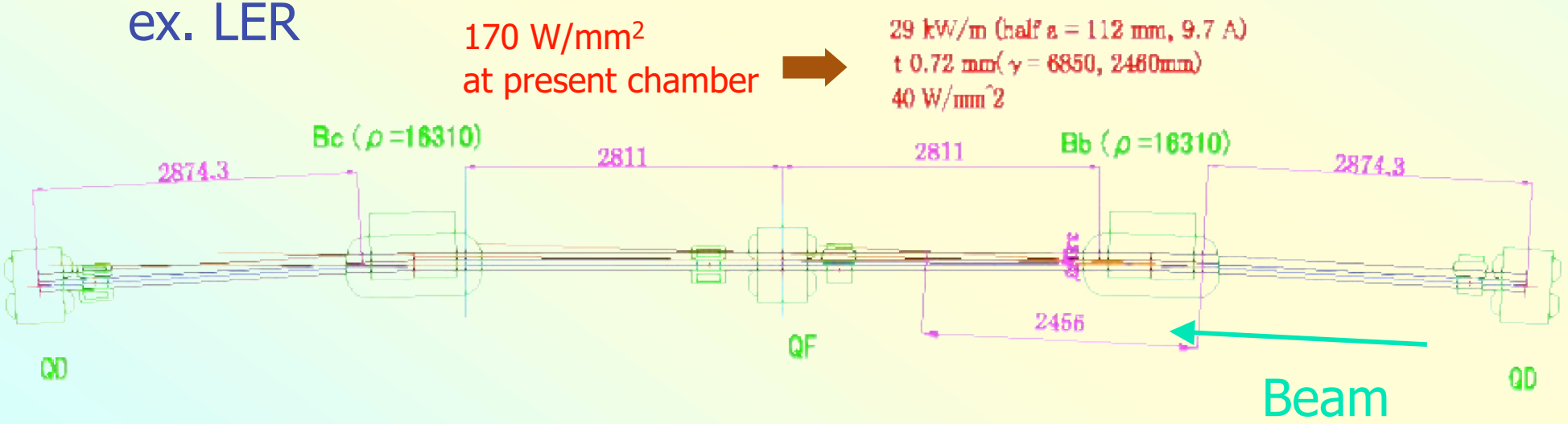


2.1 Ante-Chamber

- Merits of Ante-Chamber
  - Weak power density of synchrotron radiation at wall.
  - Reduction of photoelectrons in beam duct (e^+ ring).
  - Low impedance (no pumping port in beam duct).
  - High linear pumping speed (goal : 100 //s/m)

ex. LER

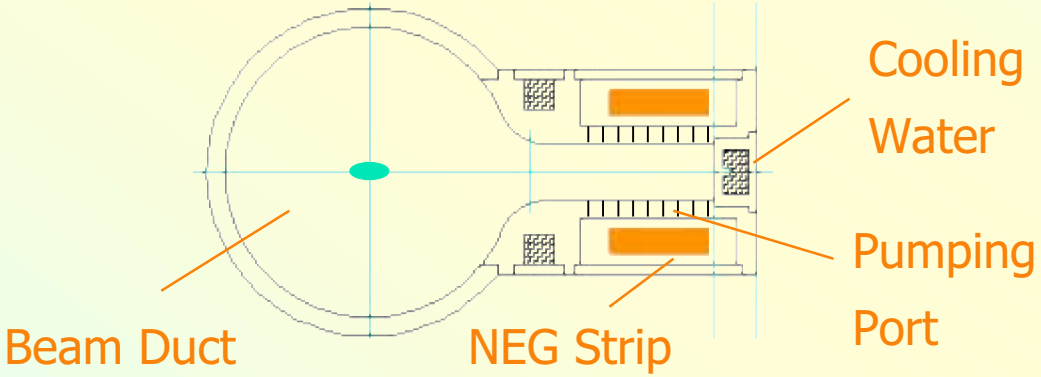
170 W/mm^2
at present chamber



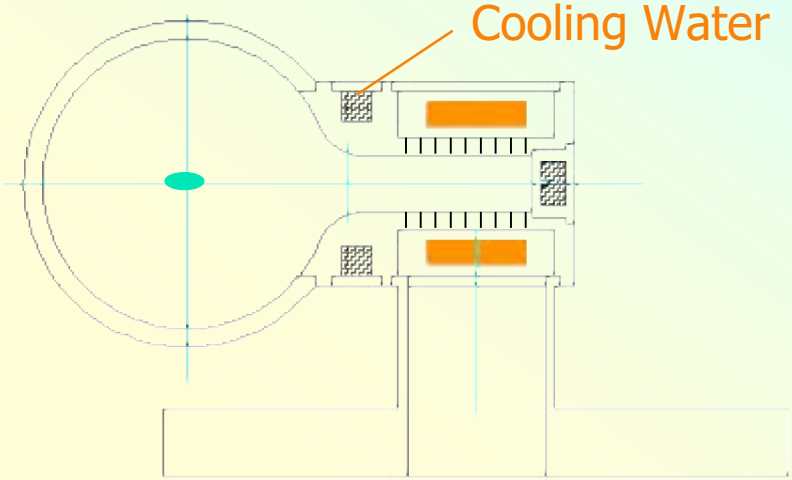
2.2 Basic Design of Ante-Chamber

- Typical Cross Sections for LER

[B Magnets and Straight Section]

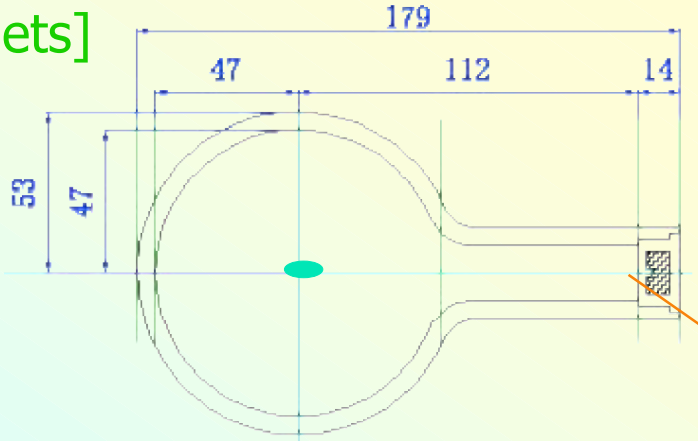


[Ion Pump Section]



IP, NEG Feed through

[Q, SX Magnets]



Saw-tooth surface to reduce photoelectron yield and reflection

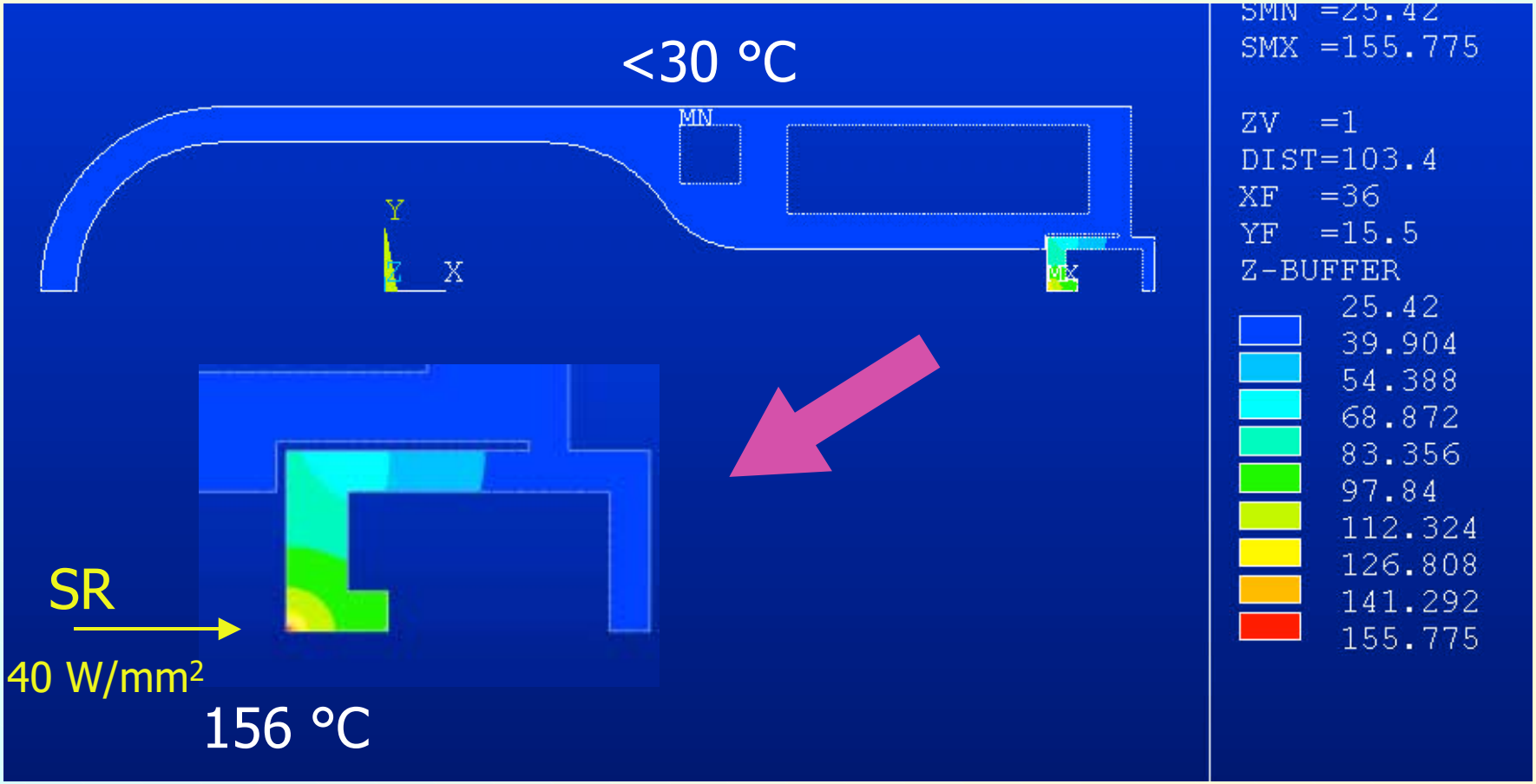
* Depth of ante-chamber is limited by magnet aperture.

Similar cross sections for HER

2.3 Thermal Calculation

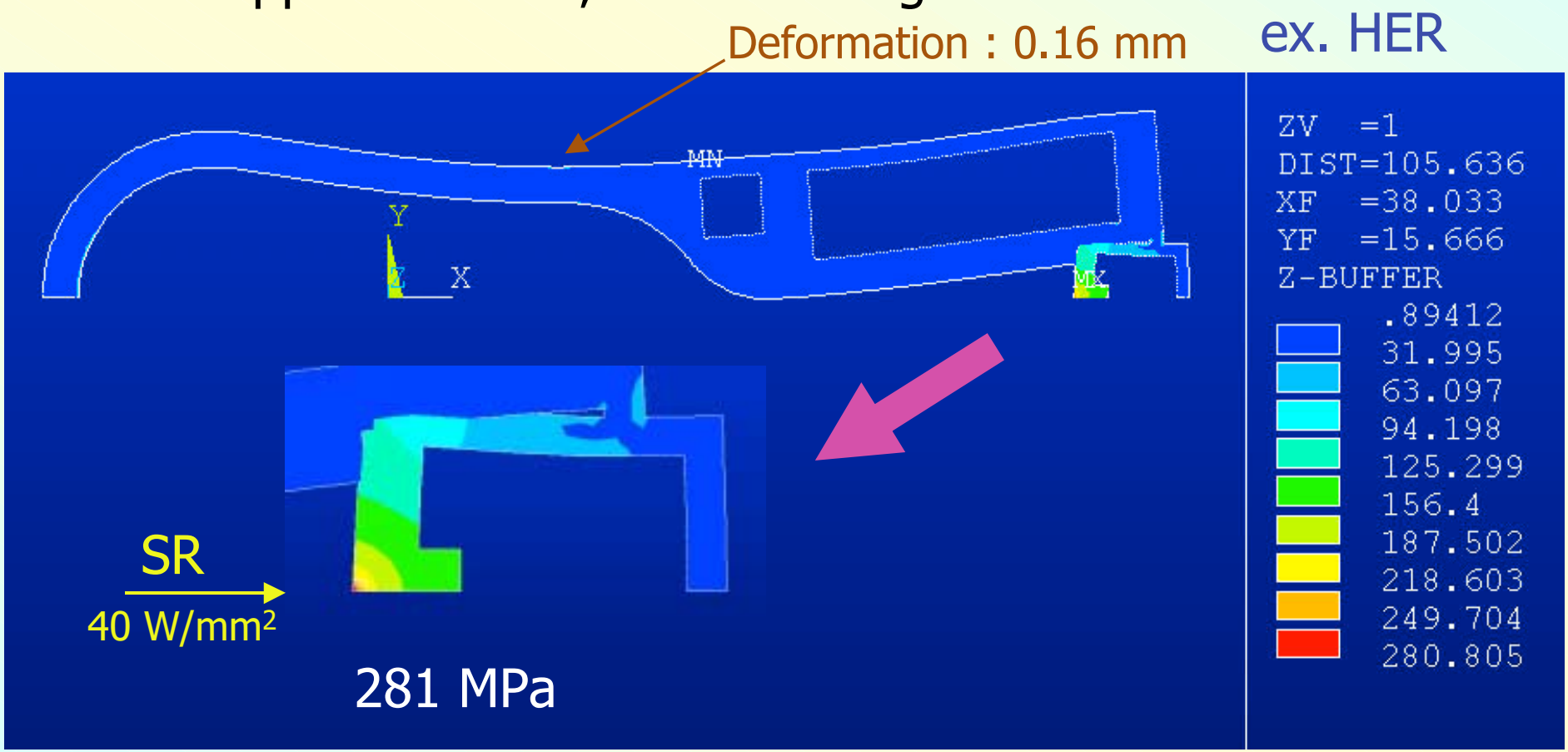
- Calculation by ANSYS (Temperature)
  - Copper chamber, 25 °C cooling water

ex. HER



2.4 Structural Calculation

- Calculation by ANSYS (Stress [von Mises])
  - Copper chamber, 25 °C cooling water



The stress is below the yield strength of drawn copper