BPM for FF test (ATF2)

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KEK

1.- Cavity sensor.
2- Heater.
3 – Temperature sensor.
5 – Coupling slot.
6 – Output waveguide.
7 – Output feedthrough.
8 – Beam pipe.
9 – Vacuum flange.
10 – Support plate.
11 – Y position output.
12 - X position output.
13 – Heater control connector.

Std=200 nm
BPM for VLEPP, 14GHz, 1991
BPM setup
1. Three BPMs for Y, than 3 for X,
2. One Y, One X, three times?

IRIE KOKEN CO., LTD
Welded bellows
NS122-1, Dmax=22mm
  Dmin=8mm
L from 7 to 17 mm +2*3mm
Principle of electronics for FF BPM

9500 MHz
dF 20 MHz

8700 MHz
dF 20 MHz

714 MHz
dF 3 MHz

Sin(\phi)

Cos(\phi)
Q=1*10^{10}, Z_{load}=50\,\text{Ohm}, \delta=1*10^{-9}\,\text{m},

Thermal noise
(dF=3\,\text{MHz}, T=300\,\text{K})
1.57\,\mu\text{V}

Q_{load}=1500
\beta=2.0
\sigma_z = 8\,\text{mm}

\[
V = \pi * 10.8 * \delta * q * f^2 * \left( \frac{R}{Q} \right)^{0.5} * T(\theta/2) * S(\omega, \sigma_z) * \left( \frac{\beta * Z_{load}}{(1 + \beta) * 2 * Q_{load}} \right)^{0.5}
\]

\[
S(\omega, \sigma_z) = \frac{\sin(\omega * \sigma_z / 2 * c)}{\omega * \sigma_z / 2 * c}, \ldots S(\omega, \sigma_z) = \exp(\omega^2 * \sigma_z^2 / 2 * c^2)
\]

\[
T(\theta) = \frac{\sin(\frac{\pi * \text{Leff}}{L * 2})}{\frac{\pi * \text{Leff}}{L * 2}}
\]
Method of determination the BPM resolution

1. Three BPMs for Y and X:

2. 10 nm step mover

3. Beam movers and?
two steering magnet in the fix distance
Do we have enough space?