


Primary Beam Test of Cavity BPM

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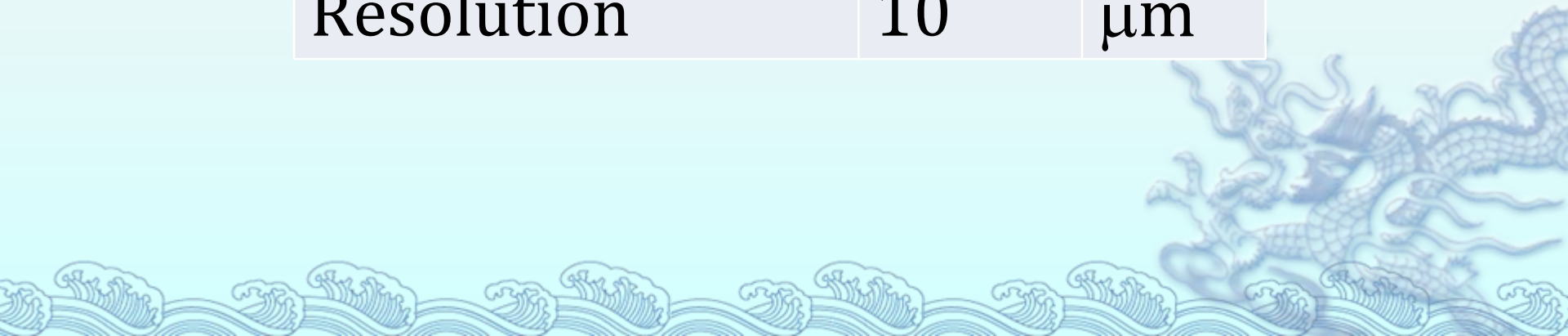
introduction

- ◆ Goal
 - ◆ XFEL: μm
 - ◆ ILC: nm
- ◆ Program Collaborated between SSRF/SINAP and Tsinghua University

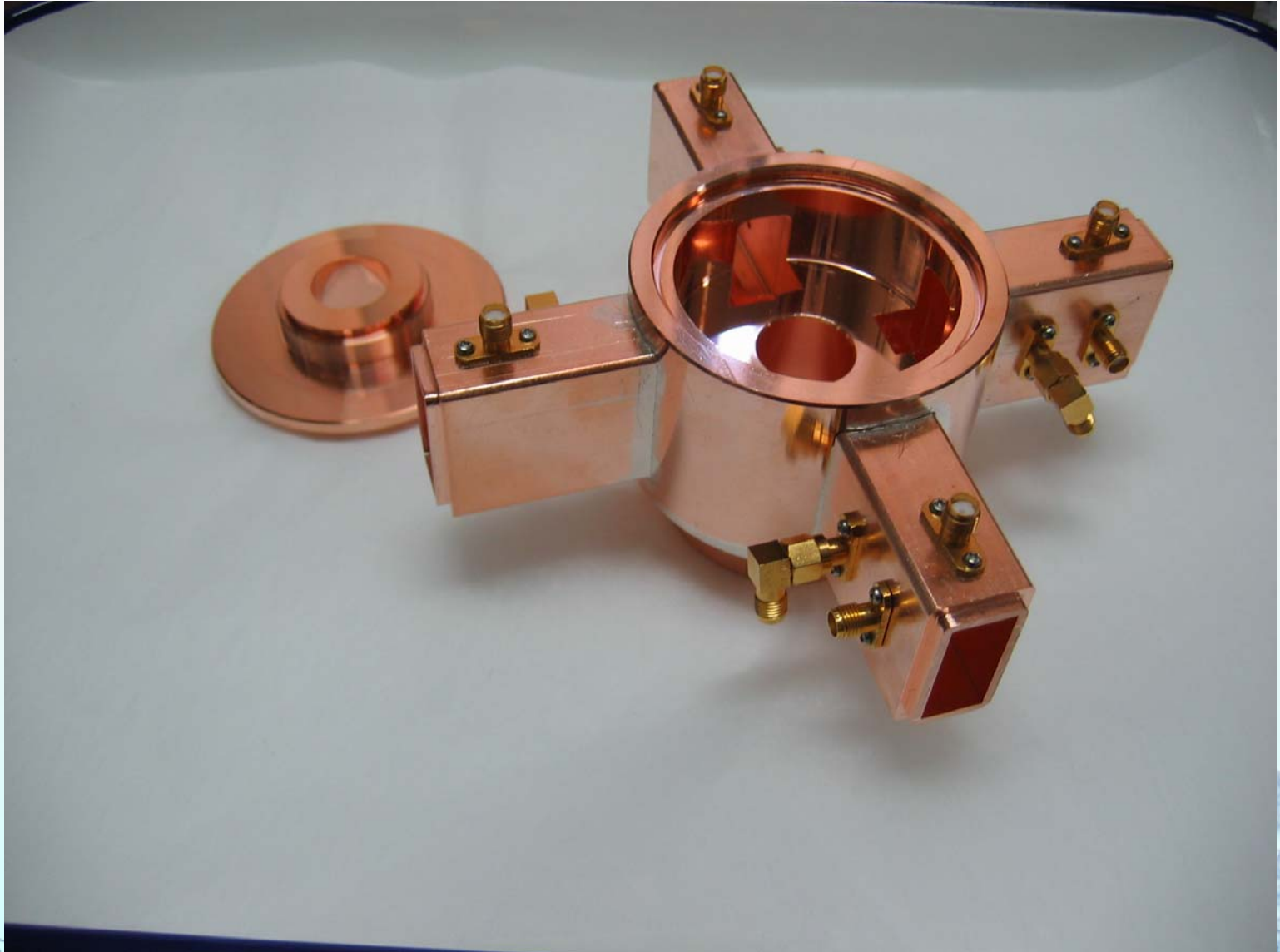


Cavity Parameter

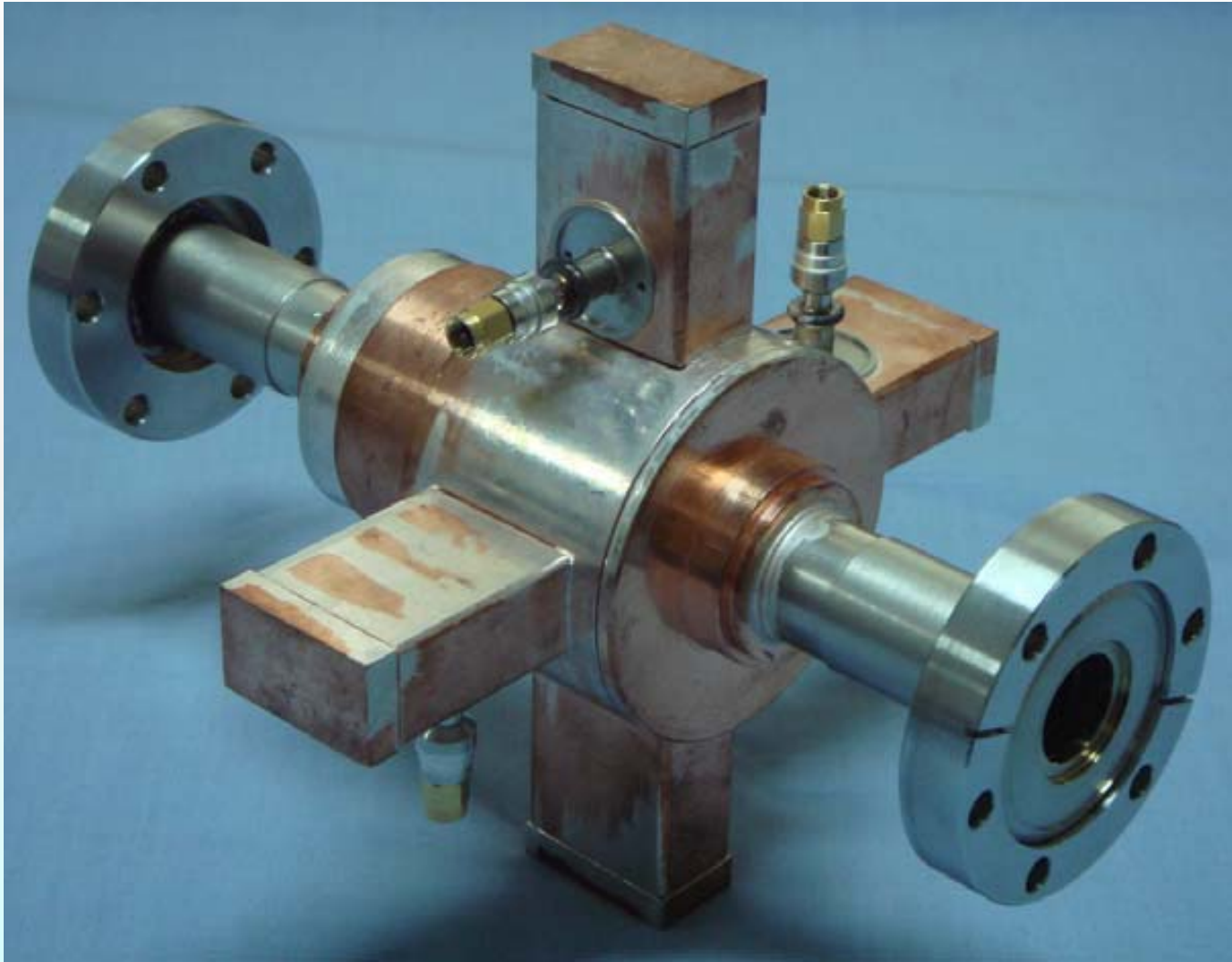
Parameter	Value	Unit
Length	20	mm
Beam pipe radius	10	mm
Frequency	5712	MHz
Resolution	10	μm



Partially welded



Cavity BPM Picture



Microwave parameter

Port	F(MHz)	Qe	Q0
X position	5709.9	1.9×10^4	1.6×10^4
Y position	5710.4	1.8×10^4	1.3×10^4
Ref. Cavity	5717.2	7.9×10^3	1.8×10^3

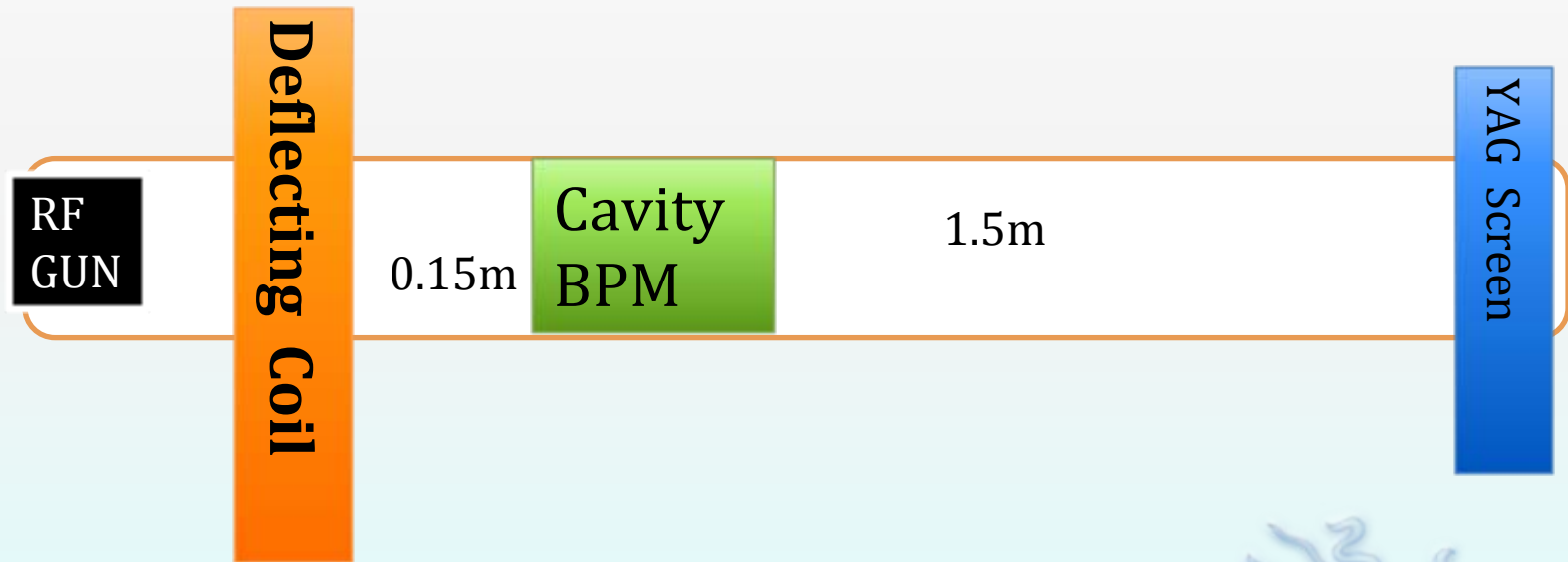


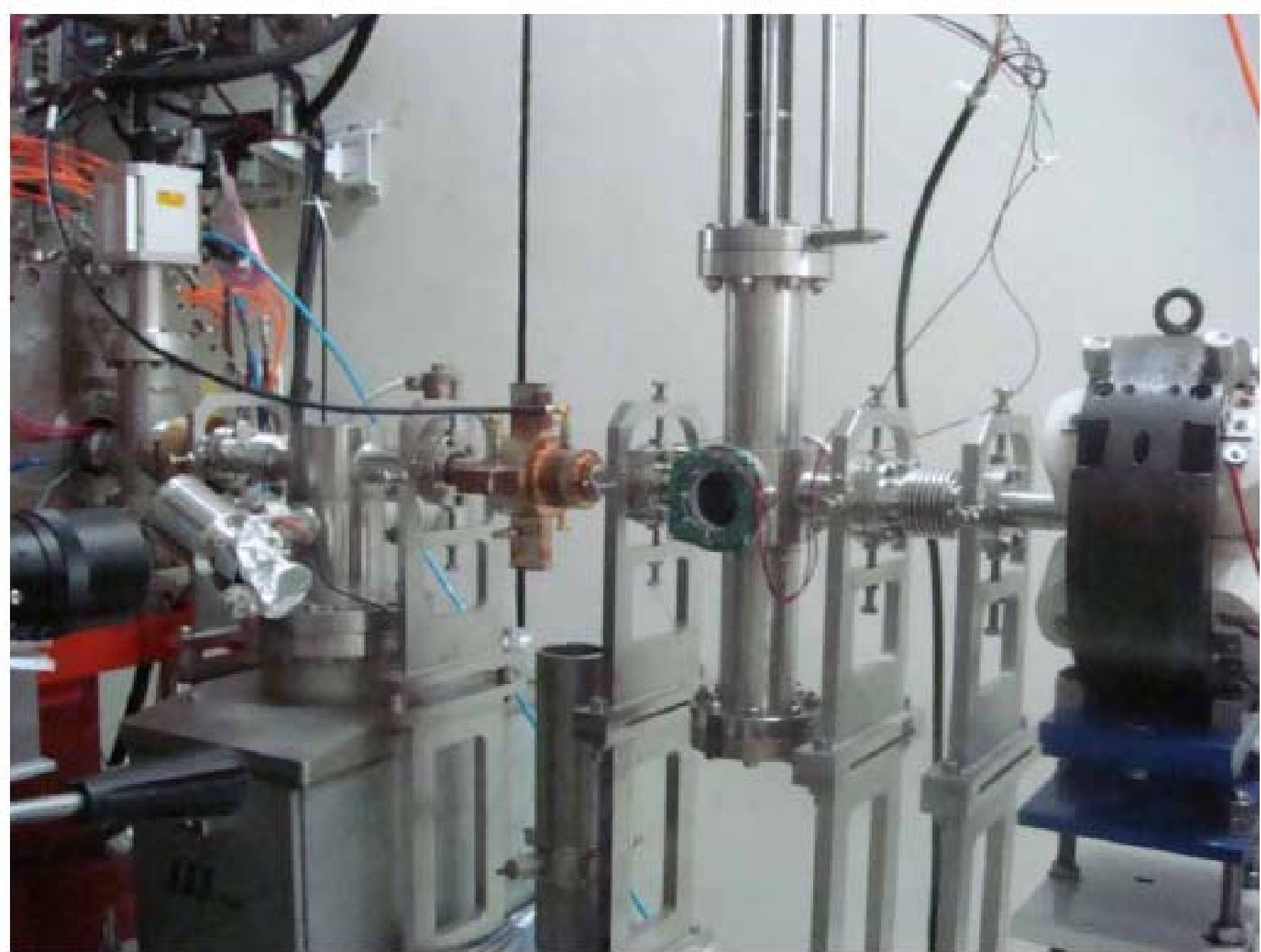
Primary Beam Test

- ◆ Laser RF Gun
 - ◆ Charge: 700pC
 - ◆ Dark current: 20nC
 - ◆ Position jitter: 0.1mm
 - ◆ Length: 4~7ps

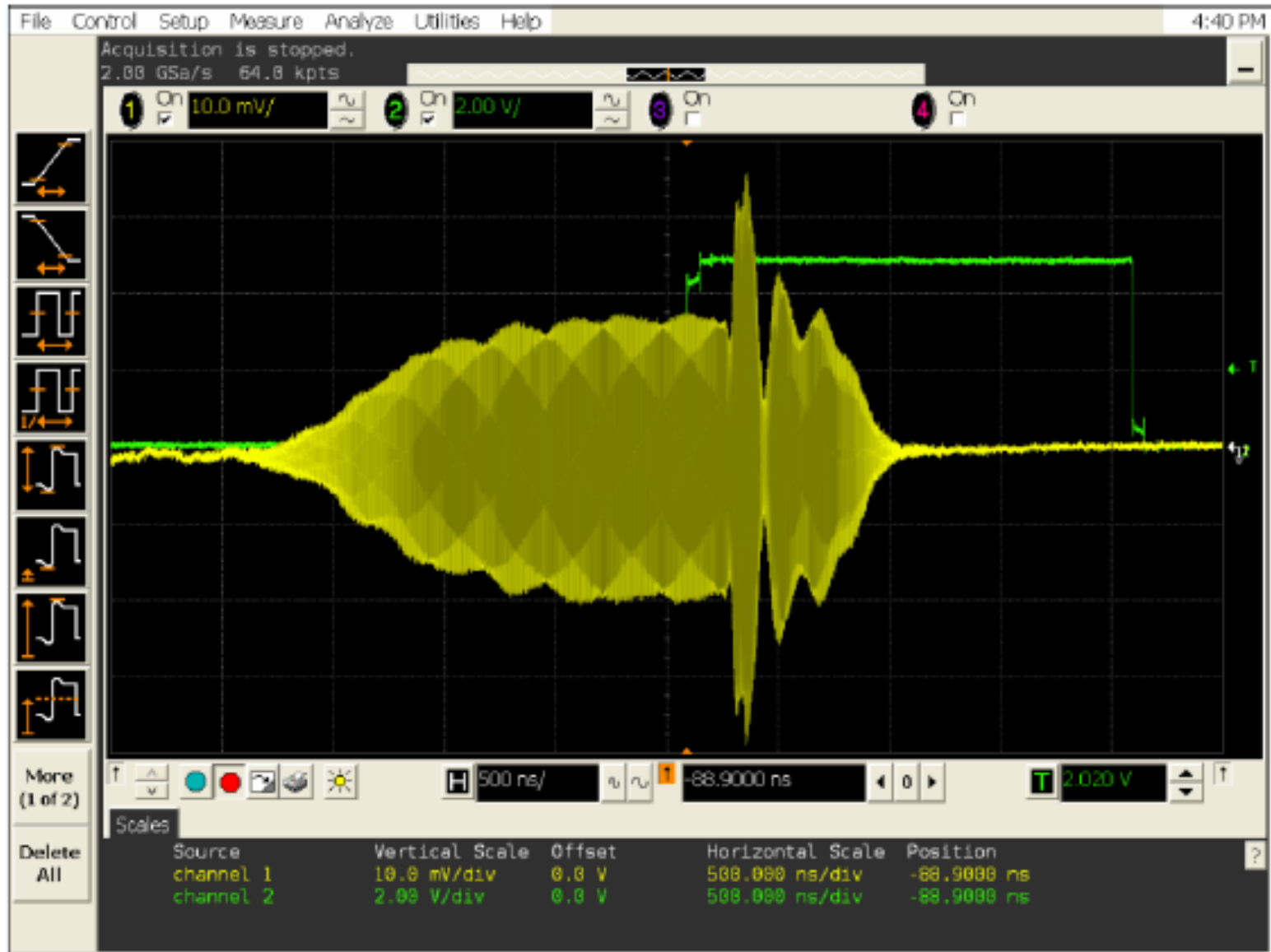


Experiment Setup

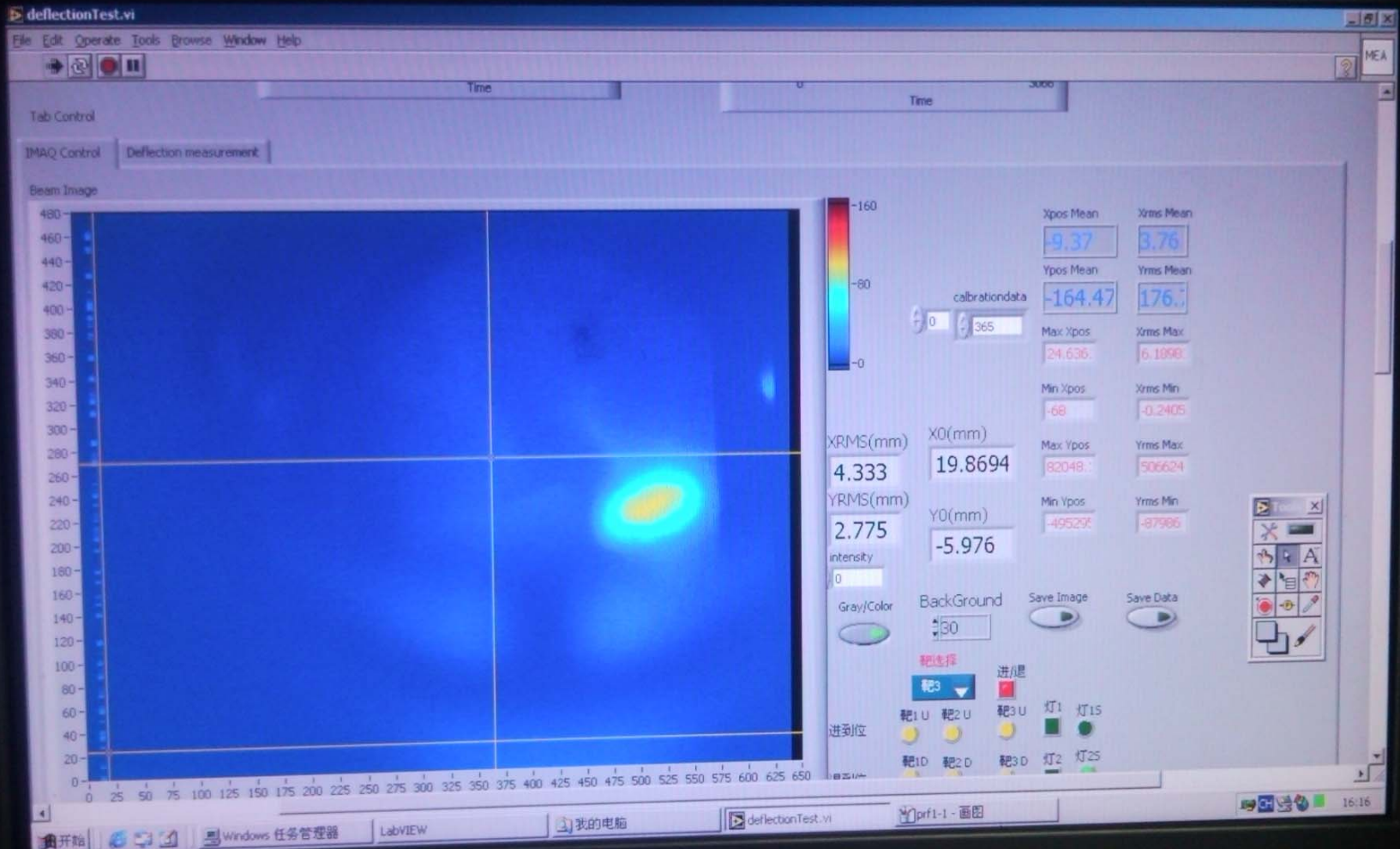




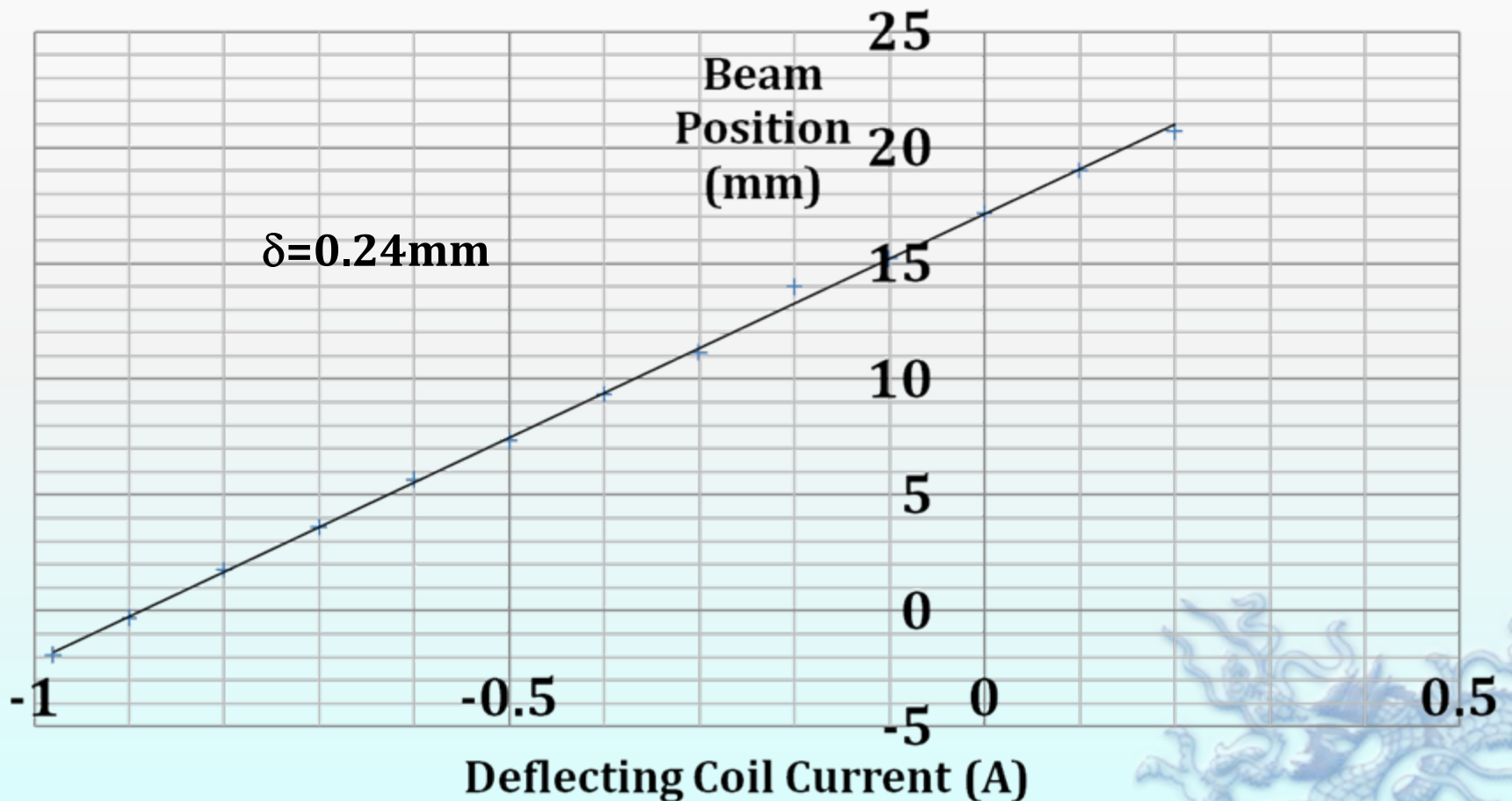
Beam Signal



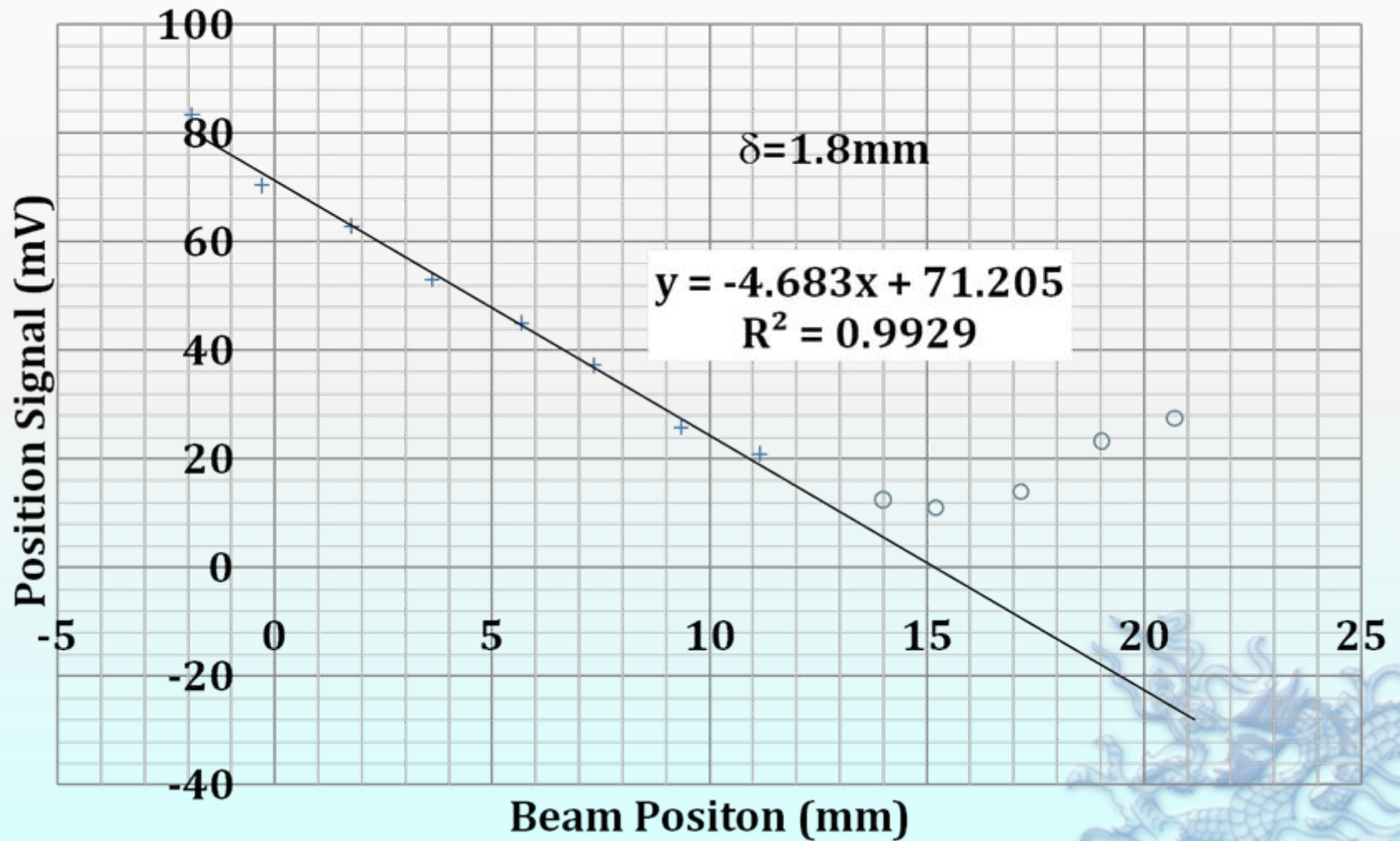
YAG Screen Monitor



Beam Position on YAG vs. Coil Current

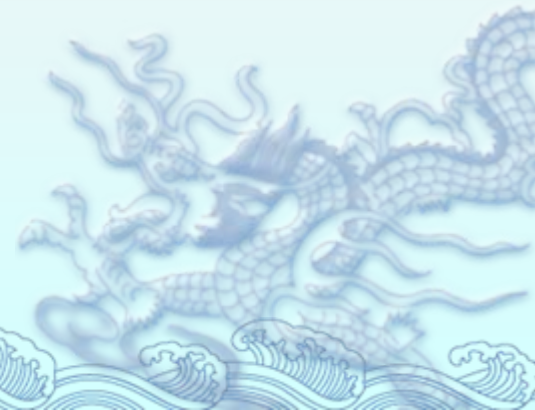


Position Signal



Resolution

- ◆ Voltage noise
 - ◆ $\delta v = 1.8\text{mm} \times 4.7\text{mV/mm} = 8\text{mV}$
 - ◆ Mainly from dark current?
- ◆ Resolution@0.7nC
 - ◆ $1.8\text{mm}/11.6 = 0.16\text{mm}$
- ◆ Error
 - ◆ Dark current
 - ◆ Trace tilt



Thank you
for your
attention

