



Center for the Advancement of Natural
Discoveries using Light Emission

BEAM DIAGNOSTICS FOR AREAL (PHASE 1)

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AREAL

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Outline

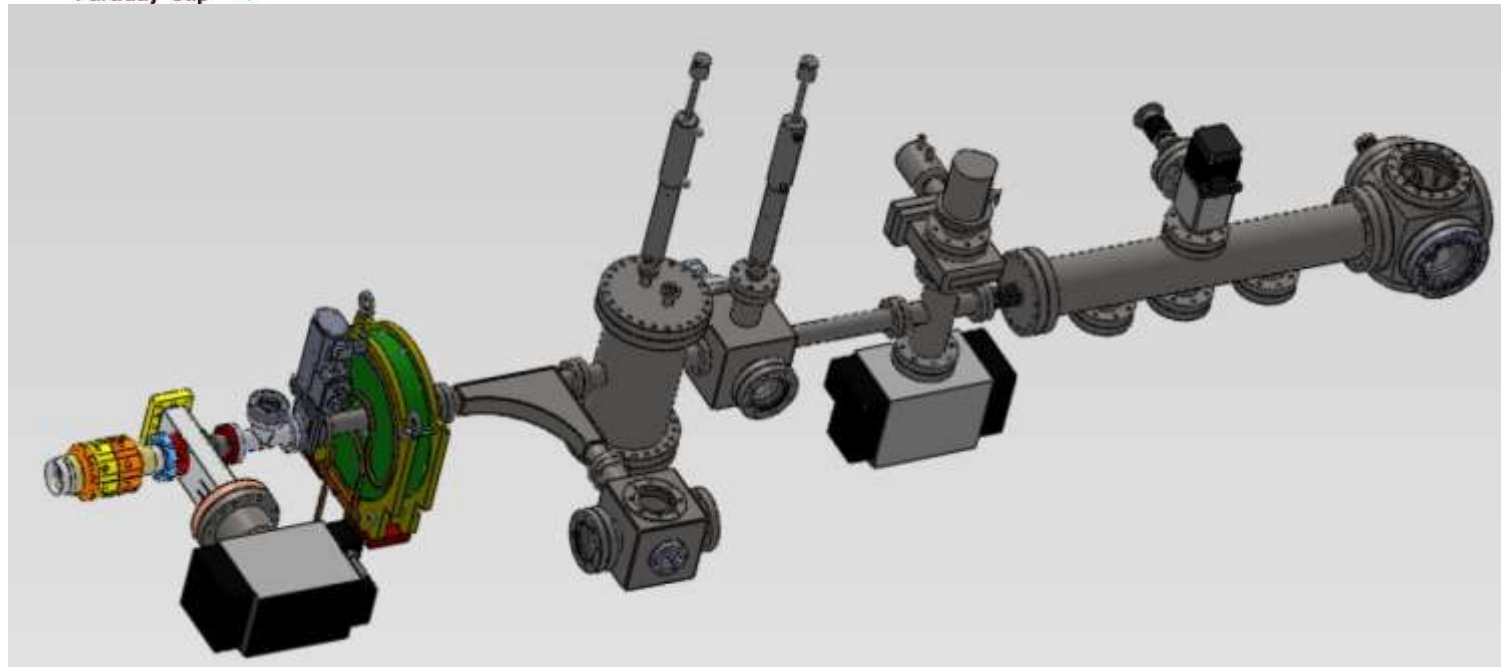
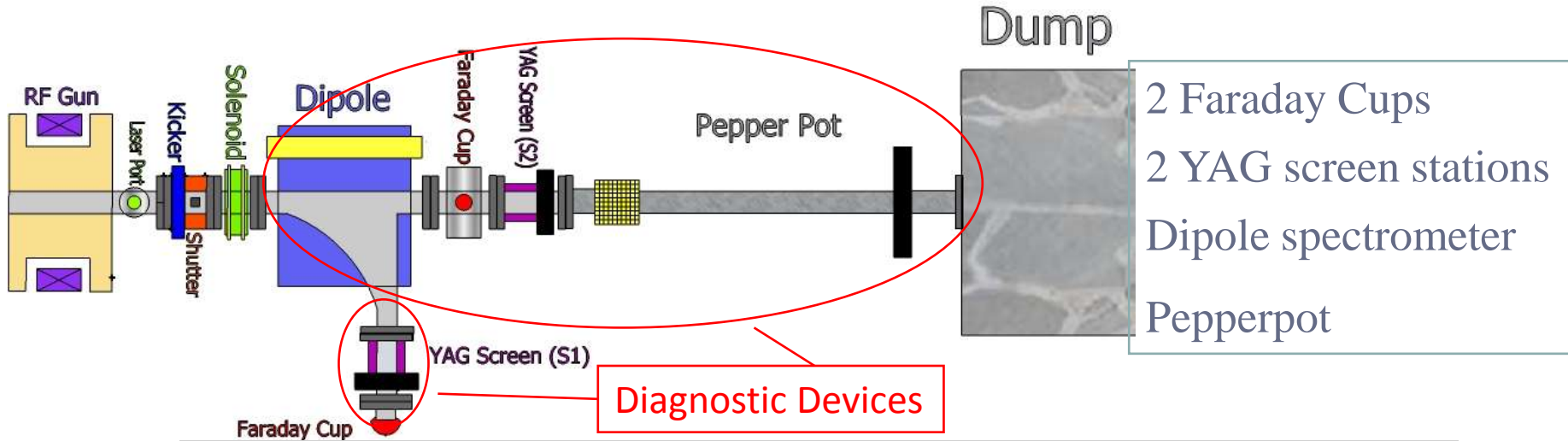
- Introduction
- Gun diagnostics (phase 1)
- Faraday Cups
- YAG screens
- Pepper pot
- Summary

Introduction

AREAL diagnostics tasks

- **Charge**
 - Faraday cups
 - ICTs (phase 2)
- **Trajectory** (phase 2)
 - Cavity BPM
 - Stripline BPMs
- **Transverse beam profiles**
 - YAG:Ce screens
- **Transverse emittance**
 - Pepperpot (phase 1, 2)
 - Quad. Scan (phase 2)
- **Energy and energy spread**
 - Dipole spectrometers
- **Bunch length** (phase 2)
 - Cherenkov radiator + streak camera

Gun diagnostics (phase 1)

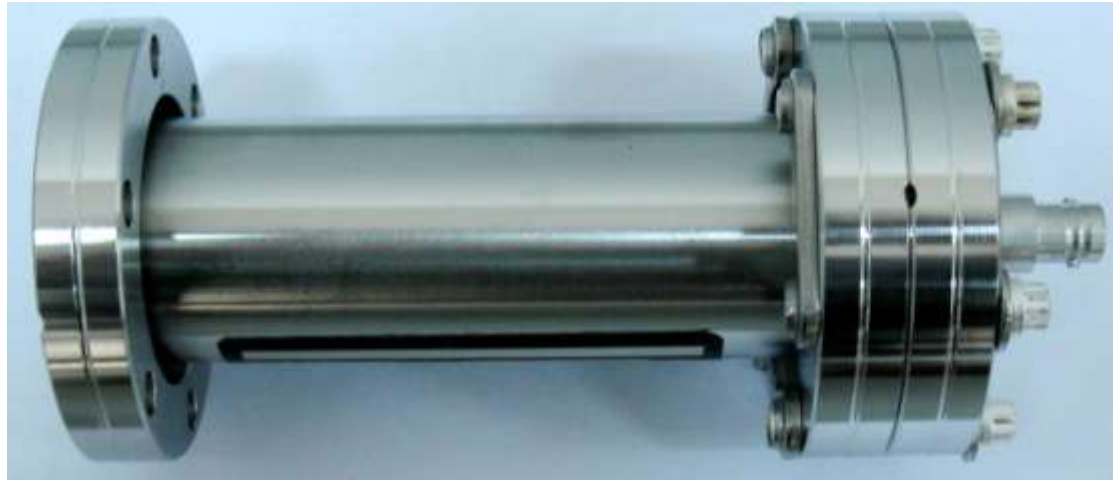


Insertable Faraday Cup



Cup Diameter	9.5 mm
Cup Length	69.5 mm
Maximum Power	4 watts
Stopper Material	stainless steel
Impedance	50 Ω
Signal Output	BNC

Non-insertable Faraday Cup



Cup Diameter	15.1 mm
Cup Length	75 mm
Maximum Power	10 watts
Stopper Material	aluminum
Impedance	50 Ω
Signal Output	BNC

YAG:Ce screen stations



YAG:Ce	25x35x0.2 (mm)
1/10 wave mirror	40x40x5 (mm)

CCD + optics



CCD camera

Sensing area	4.8 x 3.6 (H x V in mm)
Maximum Resolution	1032 x 776 (H x V)
Pixel size	4.65 x 4.65 (H x V in μm)
Frame rate (maximum)	30 FPS
Shutter speed	0.02ms to greater than 10s

Optics

Focal length	80 mm
Lens dia.	36 mm
Diaphragm aperture	2.8 - 22
Minimum focusing distance	300 mm

Pepper pot



Tungsten Mask

Diameter	5 mm
Hole spacing	150 μm
Hole diameter	20 μm

YAG Screen

Diameter	5 mm
Thicknesses	150 μm

Optics

Obj. focal length	800 mm
Obj. lens dia.	100 mm
Mirror dia.	90 mm

Summary

Diagnostic devices for phase 1

- ✓ 2 YAG:Ce screens
- ✓ 3 CCD cameras + 1394 FireWire card + cables
- ✓ 2 Objectives for optical boxes
- ⊗ Pepper-Pot (Step-motor controller in progress)

provided by PSI

- ✓ 2 YAG screen stations
 - ✓ Insertable Faraday Cup station
 - ✓ Non-insertable Faraday Cup
 - ⊗ Global control (in progress)
 - ⊗ Dipole spectrometer (in progress)
 - ⊗ Optics boxes for YAG screens (in progress)
- ✓ cables
 - ⊗ electronics