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ASU Cryocooled DC Gun and Cathode Diagnostics

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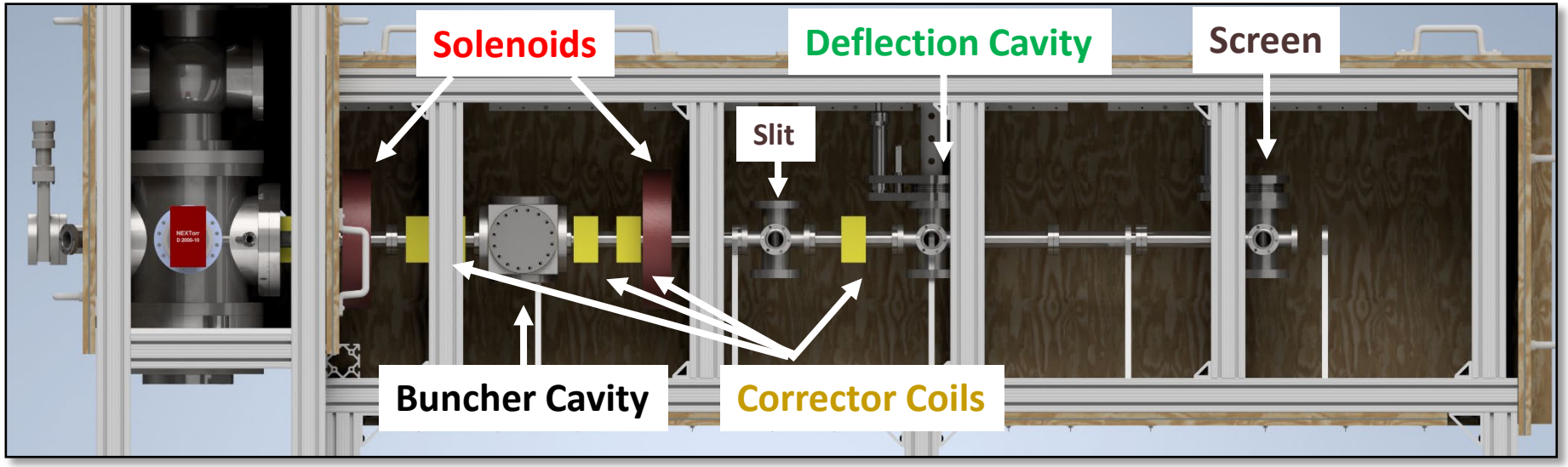
Cryocooled DC Gun and Beamline



- Electron gun capable of utilizing single crystalline cathodes and exotic materials at fields up to 10 MV/m.
- Connected under vacuum with growth chamber and multiple cathode diagnostic tools.
- Cryocooling down to 20-30 K range.

References:
Phys. Rev. Accel. Beams, vol .21, p. 093401, 2018
PRL 125, 054801 (2020)

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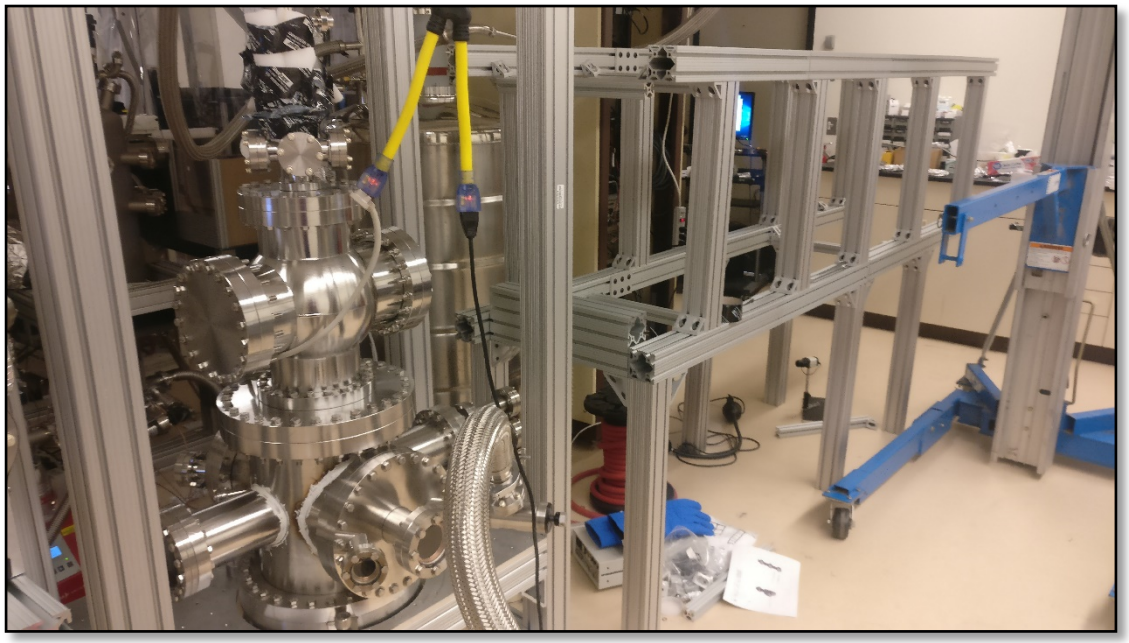
Electron Gun Build Status



- Electron gun has been assembled and beamline stand is prepared.
- Chamber leaks were detected, we have a temporary resolution until a new chamber body arrives.
- Cryogenic testing and high voltage conditioning underway.

References:
Proc. NAPAC, moplm16 (2019)

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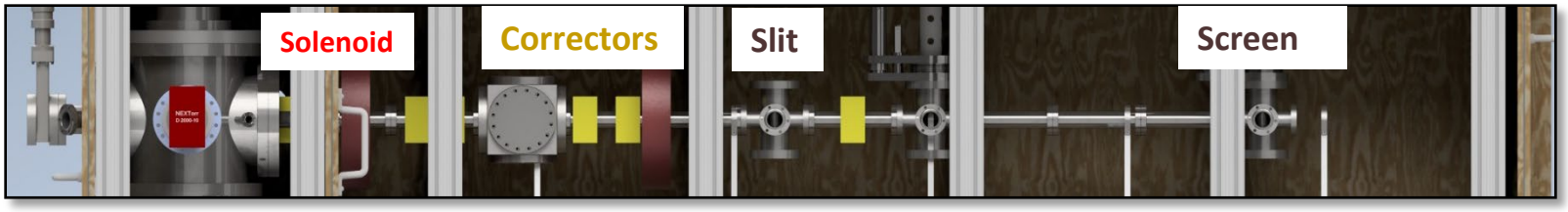
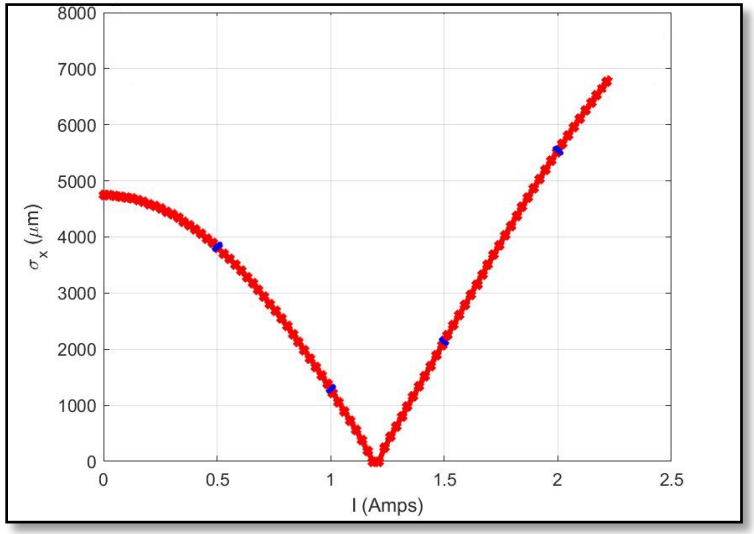
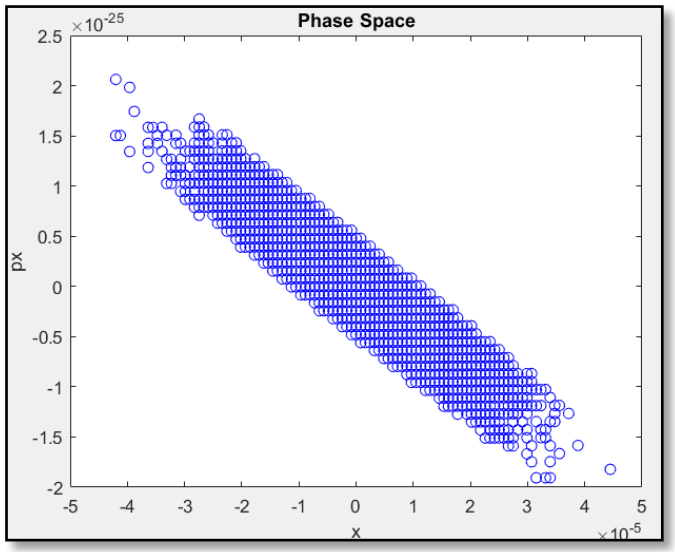
Emittance Measurements



Solenoid scan: Fits of emittance
Small range possible with < 20% error.



Slit scan: 2D phase space fits within 4%
Wide range, using YAG screen, d = 1 µm
Can measure 1 nm.rad



References:
J. Appl. Phys. 103, 054901 (2008);
Physical review accelerators and beams 22, 082801 (2019)

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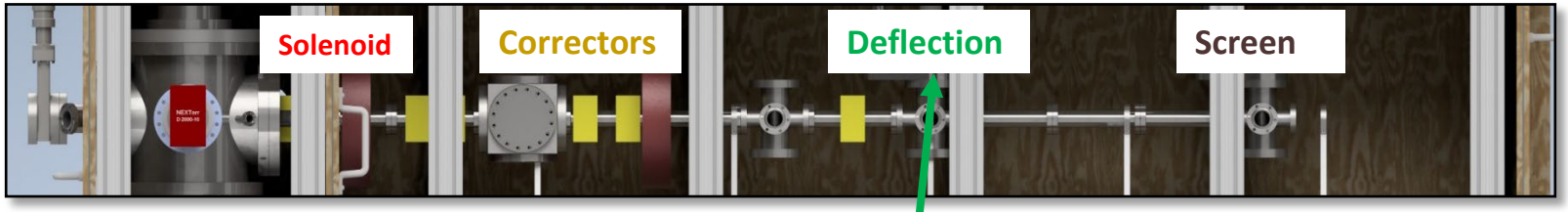
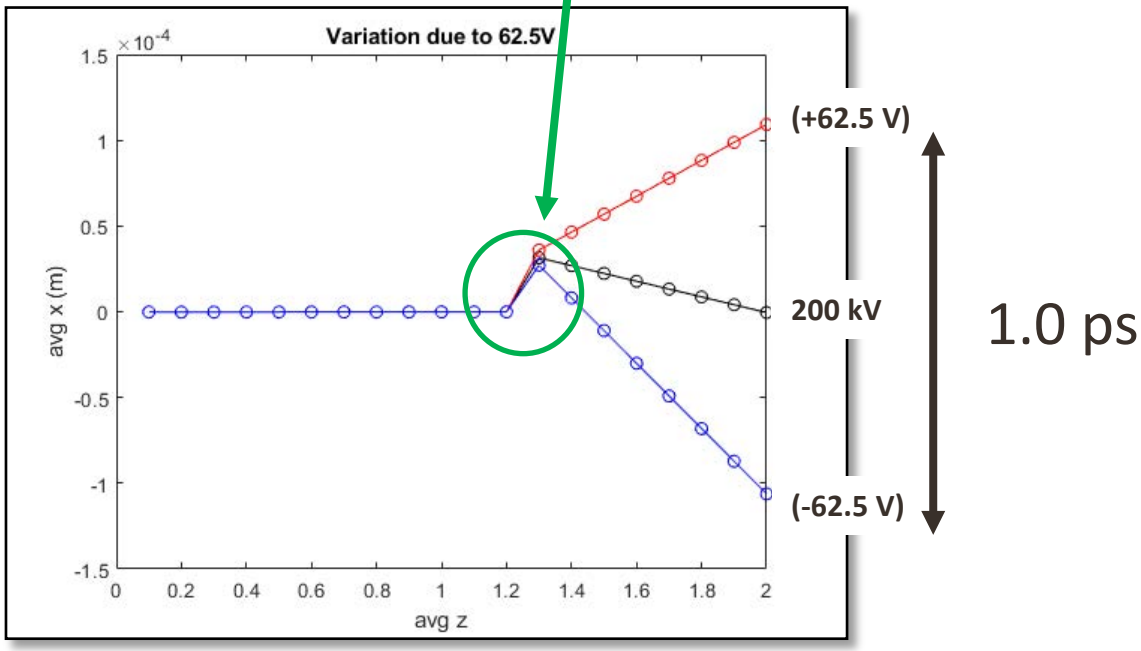
Time Response Experiment





Measurement resolution 100~150 fs in setup.
Jitter of HVPS is a major limiter, up to 1.0 ps.

References:
J. Appl. Phys. 103, 054901 (2008);
Physical review accelerators and beams 22, 082801 (2019)

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