EMITTANCE MEASUREMENTS
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EMITTANCE MEASUREMENTS

Goal

• Document emittance and QE evolution during all parts of cathode lifetime

Steps

• Measure post gun emittance of current gun prototype („gun0“) for BERLinPro with installed slit mask
• Support Susanne Schubert’s work at BNL with in-situ QE and emittance measurements of the prepared cathodes
• Magnetic mirror based emittance meter
EMITTANCE MEASUREMENTS

Measure post gun emittance of current gun prototype („gun0“) for BERLinPro with installed slit mask:
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Support Susanne Schubert's work at BNL with in-situ QE and emittance measurements of the prepared cathodes:

Idea:
Emittance measurement similar to Theo Vecchione's work

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Support Susanne Schubert‘s work at BNL with in-situ QE and emittance measurements of the prepared cathodes:

Questions:

- How large need the beam be to resolve it at the screen? A few mm?
- How to commission device in Berlin?
- How accurately can we align the sample and the grid?
- Additional comments?
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Involves:
Helmholtz Centres Berlin and Dresden-Rossendorf
Mainz University
Inst. for nuclear physics at Lomonossov University, Moskow
Polytechnical University St. Petersburg

Work Items:
• Modelling and initial measurements of $K_2$CsSb emission, retarding field energy analyzer
• Operational testing in DC and SRF gun, response time measurements, cathode transport system
Cathode transport system

- load-lock to preparation chamber and insertion chamber at the gun
- Battery powered pumping
- Standardized cathode plug in participating gun projects
- **Idea**: integrated QE & emittance measurement
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Idea: integrated QE & emittance measurement in cathode transport chamber
EMITTANCE MEASUREMENTS

Magnetic mirror based emittance meter:

Concept:

e\text{-} bunch in a magnetic guiding field compresses if field strength increases (and vice versa)

measure shift in longitudinal energy in retarding field analyzer
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