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## Quantum efficiency measurements and beam diagnostics test stand design for a dual-mode electron gun at ELSA

*Monday 8 September 2025 16:00 (2 hours)*

To support both routine operation and accelerator research at ELSA, a dual-mode dispenser-cathode based electron gun capable of thermionic emission and thermally assisted photoemission (TAPE) is being developed. A dedicated gun test stand is being designed to measure beam properties and quality, as well as quantum efficiency in the TAPE mode under operational conditions. Instrumentation will include a pepper pot emittance stage, quadrupole scan capabilities, profile measurements using screens and wire-scans or SEM grids, and bunch charge and energy spread determination. In a basic test environment, experiments were carried out at low accelerating voltages using a setup consisting of the dispenser cathode, a pickup anode, and a simple laser system with an optical shutter. The shutter enables alternating measurements of photocurrent and dark current at the anode, allowing first estimations of quantum efficiency. The influence of different cathode heating cycles on both the absolute quantum efficiency and its temporal stability was investigated with this setup. Quantum efficiency measurements under different conditions and simulations of the test beamline are presented.

### Footnotes

### Funding Agency

### I have read and accept the Conference Policies

Yes

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