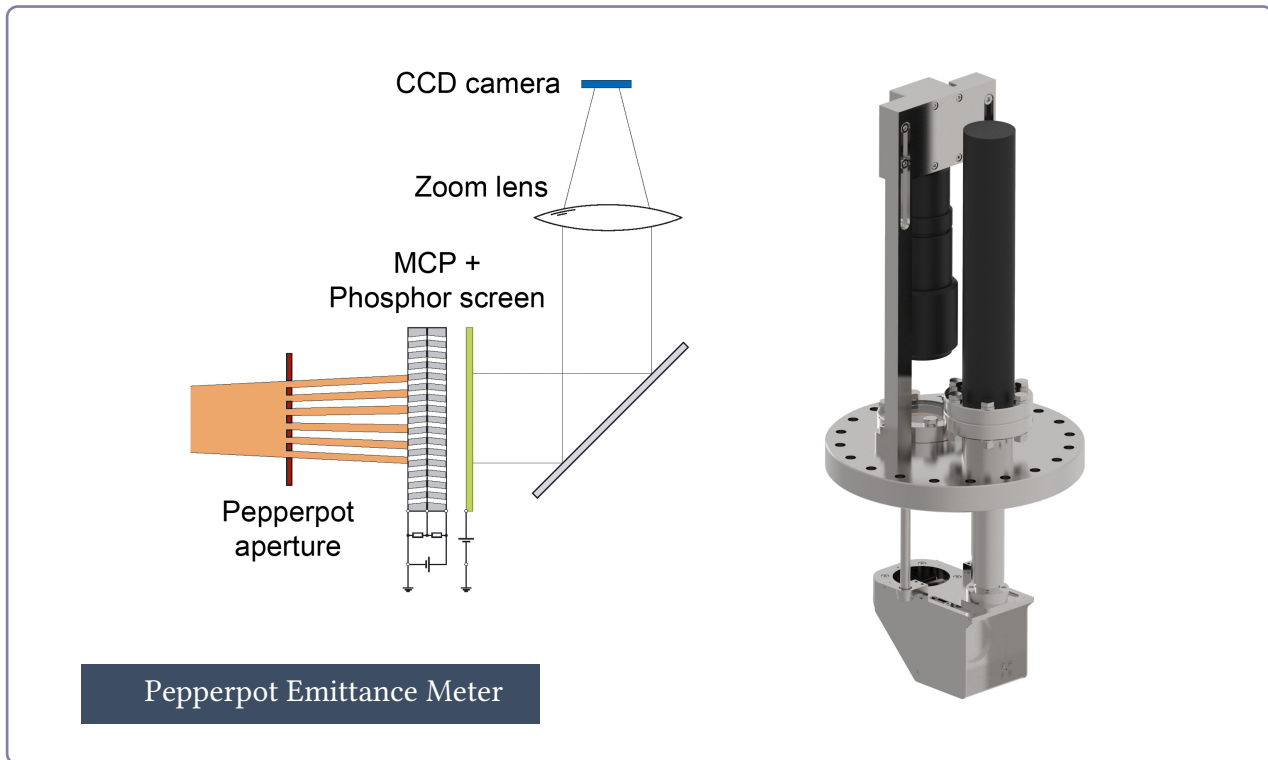


PEPPERPOT EMITTANCE METER

- A REAL-TIME BEAM MONITORING AND EMITTANCE MEASUREMENT SYSTEM-



The Pepperpot Emittance Meter is an imaging system which allows for detecting and evaluating beam parameters of particles as well as x-rays in real-time. The setup is mounted onto a single DN 160 CF flange with a linear motion vacuum feedthrough, two SHV high voltage feedthroughs, a glass viewport, and a camera holder. The main components of the diagnostics unit are a pepperpot-like pinhole mask, a micro channel plate (MCP) and a phosphor screen assembly, a mirror, and a CCD camera.

The Pepperpot mask separates the incident beam into several beamlets. In case of low-intensity charged particle beams, the beamlets are converted to secondary electrons using the MCP and finally an optical image is produced by the phosphor screen. In this standard setup, the MCP-produced electrons are accelerated onto a phosphor screen producing visible light which can be monitored through the glass window.

For high-intensity beams or x-rays the imaging system can be modified according to the different requirements in these cases. For example, high-intensity beams do not demand signal amplification through an MCP system. Instead, high beam intensities may require the use of special Pepperpot mask materials or an additional shutter system with active cooling to reduce the power introduced to the Pepperpot by the incident beam. Customer-oriented solutions can be offered to find the optimal setup for a specific application.

The camera, the Pepperpot power supplies, and, optionally, also the linear feedthrough can be remote controlled which is especially important in case operators do not have access to the measurement setup during charged particle beam operation. Using the control software for the Pepperpot system the high voltage for the MCP and the phosphor screen can be adjusted defining the amplification factor of the beam visualization. After having adjusted the voltages, an image of the ion beamlets can be observed in real time and captured for further data evaluation.

The control and analysis software package is delivered with the setup. It creates x- and y-projections of the beamlets which can be fitted by multiple Gaussians for the following automated calculations of the phase space distribution, the beam rms-emittance, and Twiss parameters.

SCOPE OF DELIVERY

- Pepperpot emittance meter incl. manual linear motion feedthrough, CCD camera, and cables
- MCP and phosphor screen power supplies incl. cables
- hardware and software for computer-based remote control and data evaluation

OPTIONAL EQUIPMENT

- remote controllable linear motion feedthrough
- vacuum chamber with beamline connection flanges according to customer specifications

TECHNICAL PARAMETERS

PEPPERPOT PARAMETERS

beam current range	0.1 pA ... 1 nA (higher currents on request)
beam energy acceptance	10 ... 60 keV (higher energies on request)
max. detectable beam diameter	40 mm (larger diameters on request)
vertical travel	100 mm (other travel distances on request)
minimum mask hole diameter	50 μ m
mounting flange	DN 160 CF
height	480 mm
weight	20 kg
max. bake-out temperature	150 °C
vacuum conditions during operation	from $1 \cdot 10^{-10}$ mbar up to $1 \cdot 10^{-6}$ mbar

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