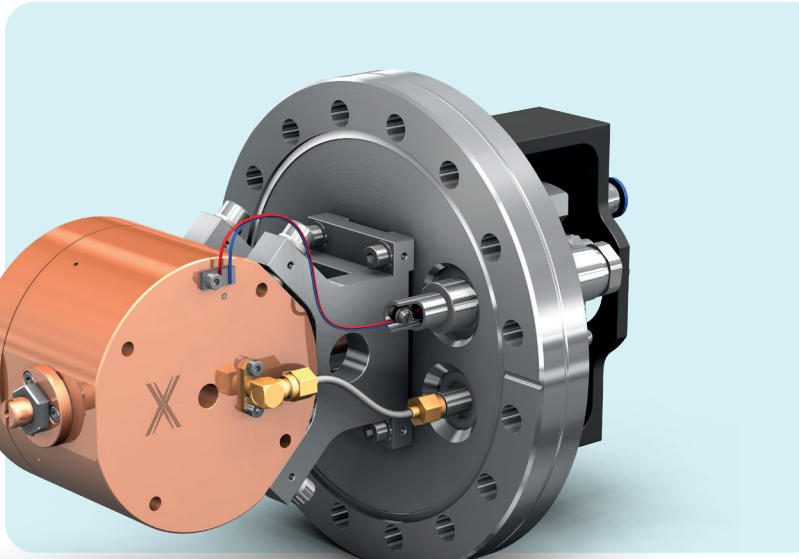
Doctor X

Compression Module

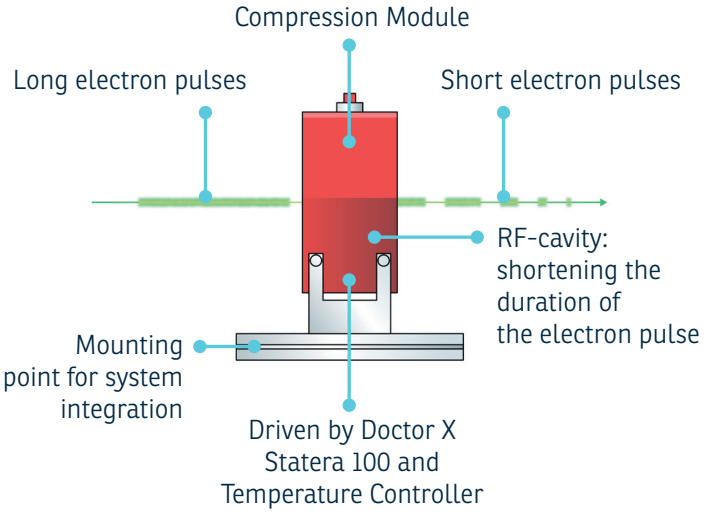
Ultrafast electron techniques for crystallography

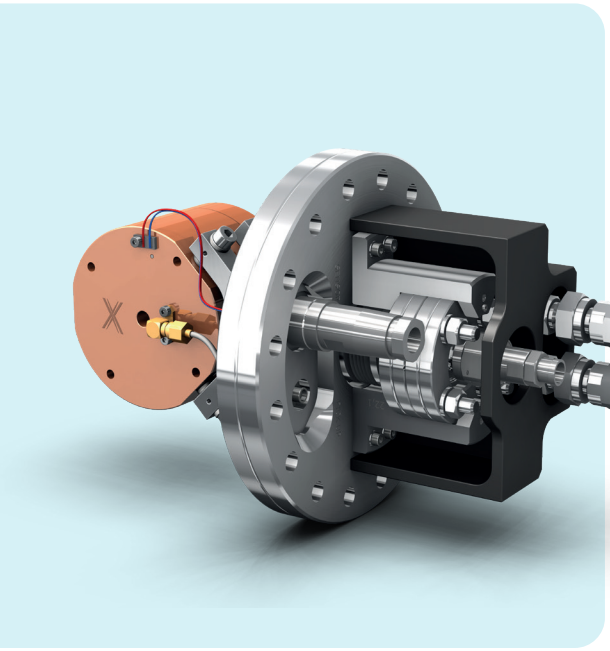


Cabinet with RF electronics and temperature control

Electron pulses spread due to velocity differences. Additionally, space-charge repulsion can stretch femtosecond bunches into picoseconds over just centimeters of drift. The Compression Module reverses this.

An RF cavity operating in the gigahertz range applies oscillating electric fields along the beam axis. Electrons arriving early get decelerated; electrons arriving late get accelerated. The bunch compresses as it drifts downstream—from tens of picoseconds back to sub-100 fs at the sample position.





Compression Module

The cavity achieves 2.5 MV/m on-axis field strength at 100 W input, with Q > 8500 for stable operation. Active phase- and amplitude lock electronics synchronize the RF to your reference signal.

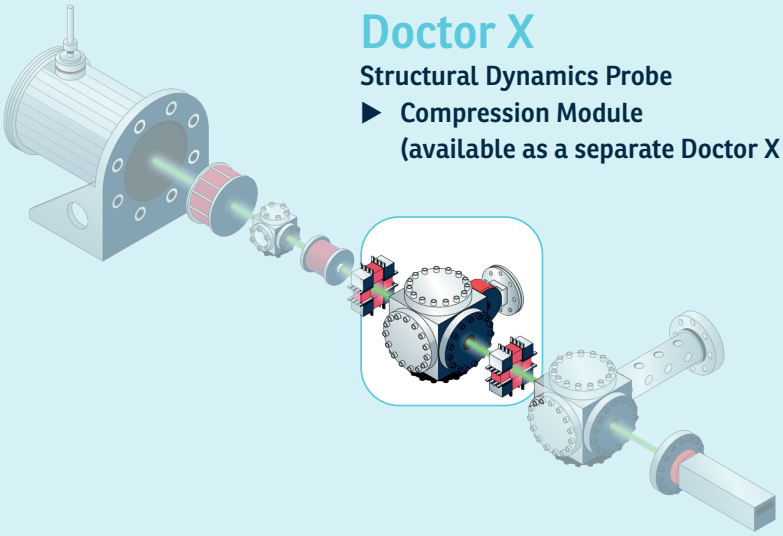
The module ships complete: precision-machined TM-010 mode RF cavity, 100 W amplifier with phase- and amplitude lock, thermal controller, vacuum housing, and control software. Positioned downstream of Photogun Module or existing electron sources.

Specifications

- Frequency: 1.5 to 3.5 GHz
- Quality factor: Q > 8500
- On-axis field: 2.5 MV/m at 100 W
- Compression: typicaly 100x, from 10 ps to 100 fs

> "Doctor X makes research instruments that give scientists state-of-the-art time resolution which was previously not commercially available."

Dr. Ir. Jim Franssen - Senior Manager Research & Development



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Structural Dynamics Probe

▶ **Compression Module**
(available as a separate Doctor X Module)

Doctor X

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