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## Mechanical design and analysis for a DMM at the EMBL@PETRA III beamline P14

*Thursday 18 September 2025 16:40 (1 hour)*

Development is underway for a Double Multilayer Monochromator (DMM) at the EMBL beamline P14 at PETRA III (DESY). This beamline focuses on macromolecular crystallography (MX) and biological imaging. It is planned to operate this DMM alternately with the existing Double Crystal Monochromator (DCM). Due to its larger bandwidth, the DMM is expected to increase flux by nearly two orders of magnitude, significantly extending the accessible time domain for time-resolved X-ray crystallography into the microsecond range. Maintaining the stability and performance of the DMM's precision optics and mechanics requires a robust housing. A custom vacuum chamber has been engineered to provide exceptional stability and minimal deformation under operational and vacuum loads. Both the DMM substrates and the vacuum chamber design were rigorously analysed using Finite Element Analysis (FEA). This comprehensive analysis characterised and optimised stress and displacement distributions, ensuring the necessary stability for the DMM's sensitive internal components.

### Footnotes

### Funding Agency

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