

# PhotonMEADOW 2023

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## Development of Precision, Variable Slits for Dynamic X-Ray Scattering Instrument

The LCLS-II-HE beamline at SLAC (Menlo Park, USA) is planned to come online in 2027. With FEL photon energies ranging from 0.25 keV to more than 18 keV at up to 1 MHz repetition rate, the upgraded beam calls for new science endstations to be developed. The Dynamic X-ray Scattering (DXS) instrument will employ experimentation methods such as X-Ray Photon Correlation Spectroscopy (XPCS) and High Resolution Inelastic X-Ray Scattering (IXS) to investigate quantum materials and condensed matter chemistry among other topics. To realize its science goals, DXS requires an energy resolution of less than 3 meV for energies ranging from 6-18 keV, with a tunable energy bandwidth. A key component of DXS is a 4f-High Resolution Monochromator (4f-HRM), featuring a Wavelength Defining Slit (WDS) mechanism. A novel slit blade design absorbs 10 W direct beam heat load, while preventing transmission of relevant photon energies. To achieve less than 3 meV energy resolution with tunable bandwidth, the WDS mechanism features an adjustable slit gap size down to 1.0 micron with 0.1 micron motion resolution and stability. This presentation discusses the goals, design challenges, and solutions for the WDS.

### Journal of Synchrotron Radiation Special Issue: will you submit your contribution?

yes

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