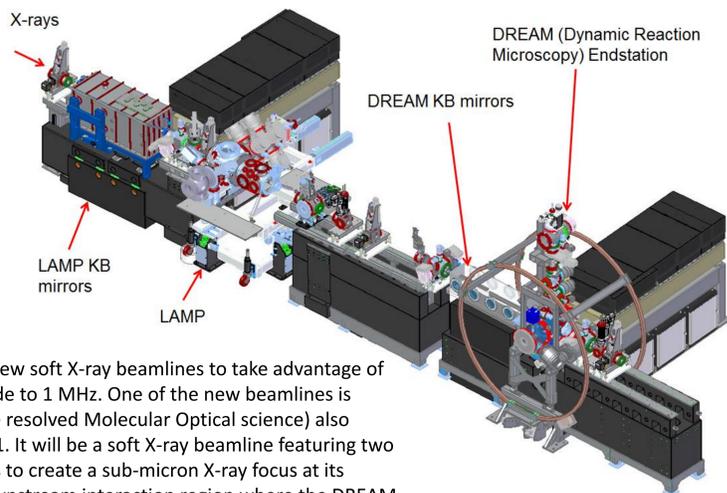


DREAM - A New Soft X-ray (Dynamic REAction Microscopy) COLTRIMS Endstation at LCLS-II

M. Holmes, J.C. Castagna, P. Walter, T. Osipov, L. Amores, J. James,
LCLS, SLAC National Accelerator Laboratory, Menlo Park, CA, United States

Author Email: holmes@slac.stanford.edu

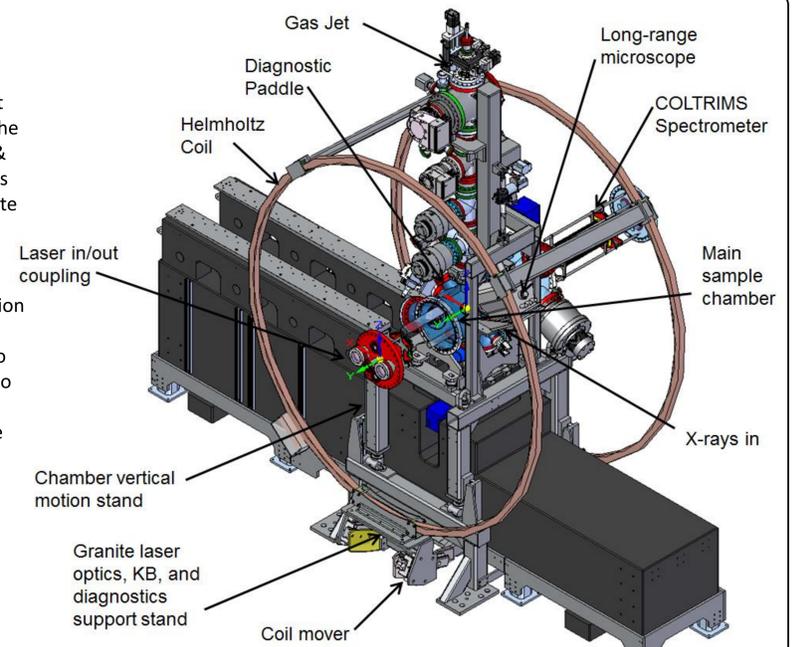
TMO Beamline at SLAC, LCLS-II



SLAC is building new soft X-ray beamlines to take advantage of the LCLS-II upgrade to 1 MHz. One of the new beamlines is called TMO (Time resolved Molecular Optical science) also known as NEH 1.1. It will be a soft X-ray beamline featuring two sets of KB mirrors to create a sub-micron X-ray focus at its second, most downstream interaction region where the DREAM COLTRIMS (COLd Target Recoil Ion Momentum Spectroscopy) endstation will be situated.

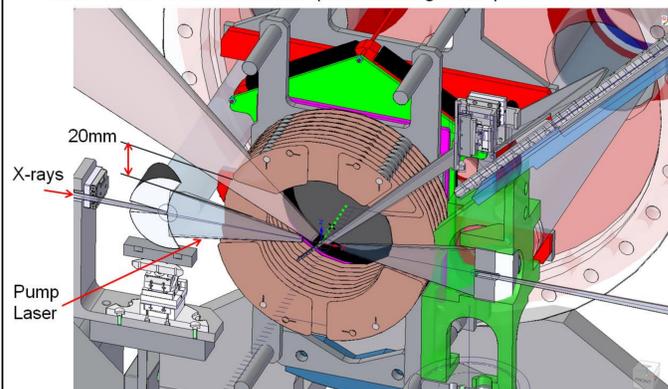
DREAM Endstation

In order to achieve a spot overlap spec of 0.5 μ m; the KB mirrors, laser optics, & beam position diagnostics all sit on a common granite support structure to minimize mechanical vibrations and thermal drifts. The entire endstation will have a motorized vertical range of 20mm to offset the spectrometer to account for varying kinetic energies of a wide range of gas samples.

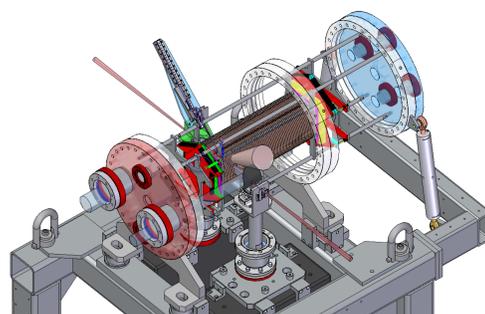


COLTRIMS Spectrometer and Laser Path

- Notches are included for laser path and diagnostic paddle

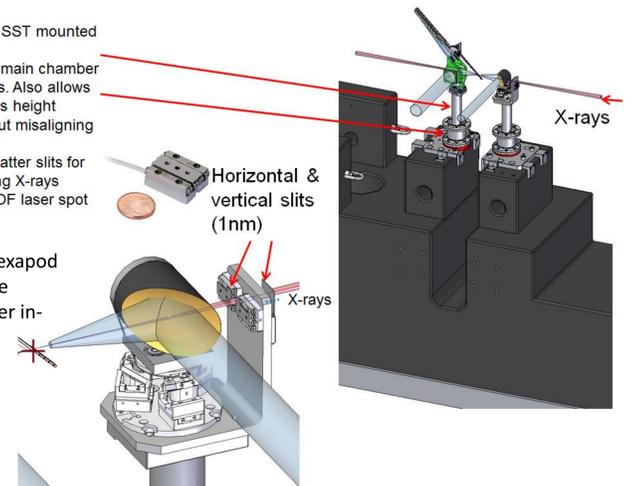


Ion and Electron spectrometers with MCP's and Hex delay lines

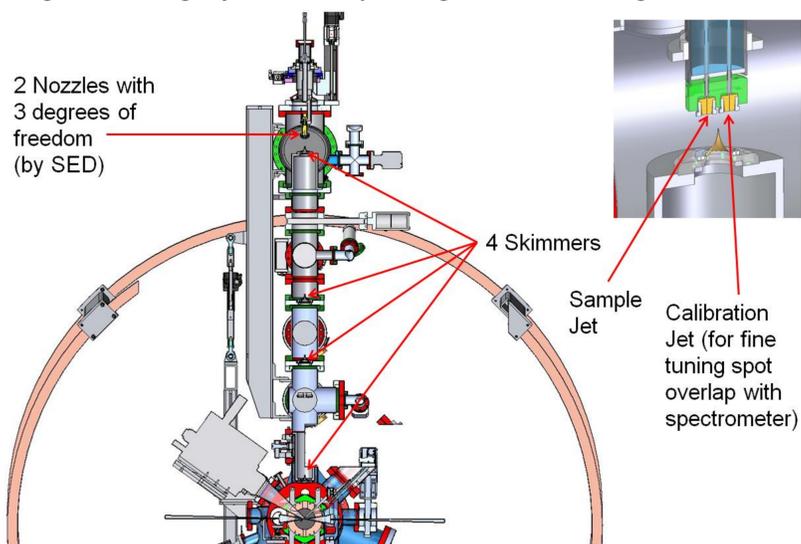


- Support rods are SST mounted to granite
- De-coupled from main chamber motion by bellows. Also allows for 20mm Coltrims height adjustment without misaligning laser path
- Incorporates 4 scatter slits for cleaning in-coming X-rays
- Hexapod for 6 DOF laser spot pointing

An in-vacuum UHV hexapod will be utilized for fine positioning of the laser in-coupling optic.

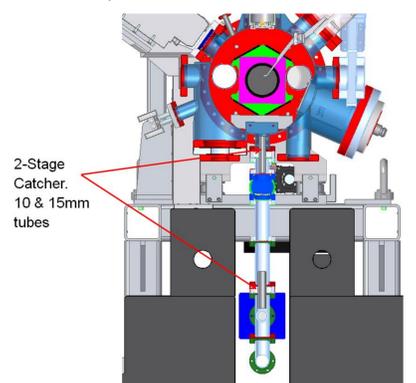


Multi-stage skimmed gas jet, & 2-axis pointing at interaction region



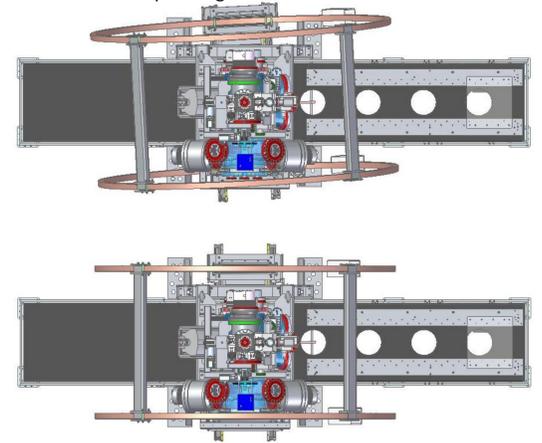
2-stage catcher system

The two stage catcher allows for minimal back-streaming of the jet to the main experimental chamber. An RGA will be installed for jet pointing optimization and calibration.



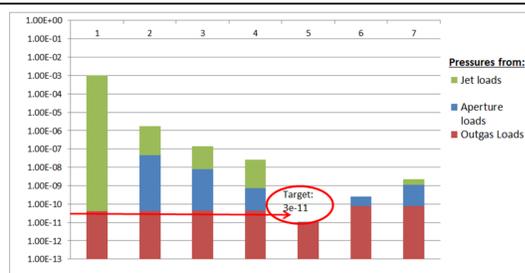
Helmholtz coil motion +/- 3° pitch & yaw

A 30 gauss field is needed. Each coil will be made up with 16 turns of hollow copper square tube flowing roughly 270 amps to generate the field needed. Motorized pointing offsets the earth's field.



Expected pressure profile

In order to achieve the desired base pressure of 3e-11 torr, a 4-stage jet, 2-stage catcher, will be used. In addition, all parts will be extensively cleaned and baked, and a large number of turbo pumps and getter pumps will be used. The calculated pressure profile is shown in the image at the right progressing from the gas nozzle chamber to the end of the catcher.



Summary of partial pressures by contribution (in torr)	Nozzle	1st stage	2nd stage	3rd stage	DREAM	Catcher 1	Catcher 2	Units
TOTAL:	1.00E-03	1.72E-06	1.45E-07	2.63E-08	1.03E-11	2.55E-10	2.22E-09	Torr
Diff pump:	0.00E+00	4.67E-08	7.90E-09	6.66E-10	4.07E-13	1.78E-10	1.00E-09	Torr
Outgass:	4.16E-11	4.16E-11	4.32E-11	4.32E-11	9.85E-12	7.70E-11	7.70E-11	Torr
Jet:	1.00E-03	1.67E-06	1.37E-07	2.56E-08	0.00E+00	0.00E+00	1.15E-09	Torr
Pump speed:	680	255	260	260	3700	67	67	L/S

Acknowledgements

Georg Gassner
Daniele Cocco
Lin Zhang
John Amann

(SLAC National Accelerator Laboratory)