

Mirror movement mechanism for synchrotron radiation mirror box.

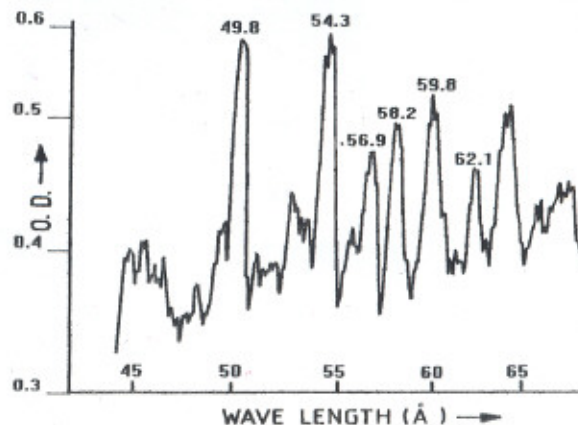
30" with respect to beam path. This system is at present under vacuum testing.

LASER PROGRAMME

Flat Field Grating XUV Spectrograph

A flat field grating spectrograph has been built and made operational. The spectrograph covers a spectral range from 30 Å to 300 Å in the XUV region. This instrument is based on a variable line spacing grating which focuses the spectrum in a plane unlike the conventional spectrographs which focus the diffracted spectrum on a Rowland circle. This unique flat field focusing makes this spectrograph usable with fast devices like x-ray streak camera (for high temporal resolution) or detectors like micro channel plate (MCP) detectors (for on-line measurements) which have a flat input plane.

The spectrograph consists of a Hitachi make concave reflection grating of size 50 mm x 30 mm with a radius of curvature of 5.6 meters. It has a groove spacing varying from 0.69 μm to 0.99 μm (average 0.83 μm corresponding to 1200 lines/mm) from one end to another within the ruled width of 49 mm. XUV films like Kodak DEF-5, UShF4, Kodak 101 etc. are used for recording the spectrum. A 50 mm x 35 mm piece of the film is loaded in a cassette, which is mounted on a stepper motor controlled translation stage. This takes three



Densitometric trace of the spectrum between 45-65

different exposures (8 mm wide) on the same film. A gate valve is provided to maintain vacuum in the plasma chamber while loading/ unloading the film. Performance of the spectrograph has been tested using XUV radiation from plasma produced using 3 J, 28 ns pulses from a Nd:Phosphate glass laser chain. For this purpose, the laser beam was focused on planar targets (Be, C, Mg, Al, Si etc.) using a 400 mm focal length convex lens. The target was kept in a chamber evacuated to 5×10^{-5} torr. Spectrum of Al plasma recorded on a Kodak DEF-5 film is shown in Figure below. The densitometric trace in the wavelength region of 45-65 of the same spectrum is also shown in Figure above. The lines in this range are identified to belong to Al^{+7} , Al^{+8} , Al^{+9} and Al^{+10} ions. The resolution of the instrument is observed to be better than 0.5 Å at $\lambda \sim 55$ Å for a slit width of 100 μm. The spectrograph is being coupled to an x-ray streak camera for temporally resolved measurements.

