

**LIGHT SOURCE**

# FREE ELECTRON LASER EXPERIMENT AT UVSOR

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Storage ring Free Electron Laser (FEL) experiment using the UVSOR is planned. The wavelength considered for this study is decided within visible light, especially 488 nm wavelength, for simplicity of the optical system. Parameters of this experiment are tabulated in Table 1. For this purpose a plane undulator was constructed, of which parameters are shown in Table 2. Effects of the undulator on the stored electron beam are studied and the required low energy operation of the ring for studying the FEL can be accomplished. And the beam lifetime of the single bunch beam of 10 mA is about 5 minutes, which is well agreed with the calculated value. The spectrum of the undulator radiation was analyzed by a monochromator Jobin Yvon (HR-320). And the intensity of the light was measured with a photomultiplier which was placed at the outlet of the monochromator. This measurement was carried out with the undulator gap between 29.5 mm and 31.5 mm as shown in Fig. 1.

To measure the gain of the FEL, the laser light of 488 nm was run through the undulator duct from the other end of it, and aligned to overlap on the electron beam. At the same time, the circuit for the gain measurement, of which block diagram is shown in Fig. 2, is tested.

Electron Energy	Number of Bunches	Current in a Bunch	Wavelength	Length of the Optical Cavity	Expected Gain
270 MeV	2	10 mA	488 nm	13.3 m	1 %

Table 1 ; Parameters of FEL at UVSOR

magnet	$B_r$ (gauss)	N	K	$\lambda_0$
SmCo <sub>5</sub> (LM22) (18.5 <sup>t</sup> x18.5 <sup>h</sup> x90 <sup>w</sup> )	8700 ~ 8900	29	2.5 (gap=30)	74 nm

Table 2 ; Parameters of Undulator

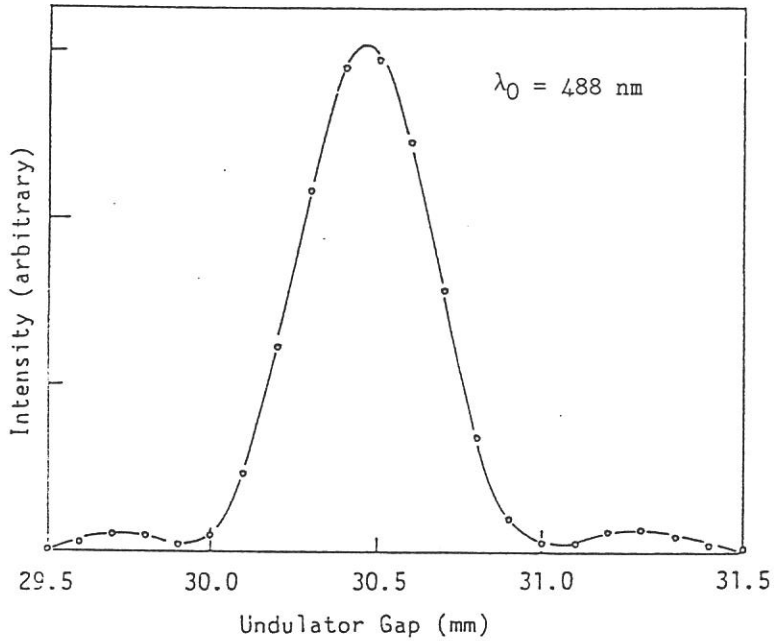


Fig. 1 ; Intensity Distribution vs. Undulator Gap

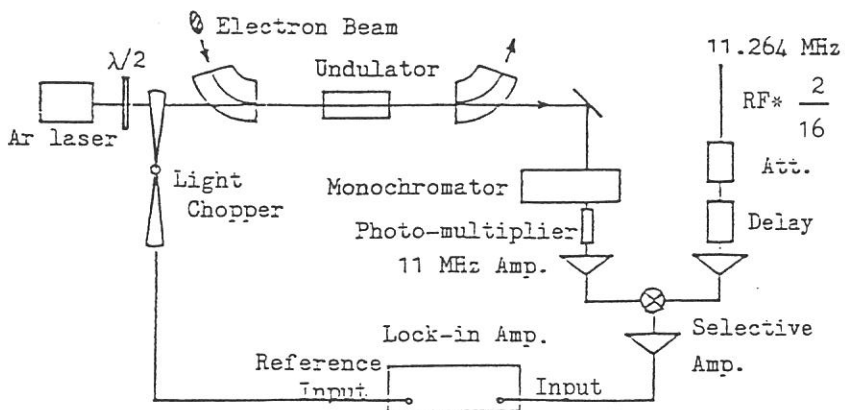


Fig. 2 ; Block Diagram of Gain Measurement