# Gas lasers preionized by pulse or cw x-ray

*Tsunenori Arai* *Minoru Obara* *Tomoo Fujioka*

(Department of Electrical Engineering, Keio University)

The flash x-ray preionizers which use strong-penetration x-ray photon to preionize high pressure and/or large-volume gas lasers have been already sccessfully demonstrated on KrF, $CO_2$ lasers. As a kind of x-ray generator, cw x-ray generator was generally employed for industrial and medical application. This generator produce continuous ionization, then, it would be apply to the external ionizer on cw discharge and/or would be apply to the preionization source on pulsed discharge. Thus, we have used a cw x-ray generator as a preionization source on pulsed-discharge $N_2$, HF lasers.

We observed that the $N_2$ laser energy increased by a factor of 12 with the addition of $SF_6$ over that of pure $N_2$ gas in the case of x-ray illumination. In order to measure preionized electron number density, ionchamber study was performed. At $N_2$ pressure of 50 Torr, preionized electron number density of $5 \times 10^7$ $cm^{-3}$ was obtained.

The details of the preionization effect of cw x-radiation on $N_2$, HF lasers, the relation between preionized electron number density and the laser energy, and the discussion of applicability of the cw x-ray preionizer will be presented.

# 脉冲或连续X射线预电离气体激光器

Tsunenori Arai, Minoru Obara, Tomoo Fujioka

（日本横滨庆应大学电气工程系）

使用有强穿透能力的X射线光子预电离的高气压、大体积气体激光器的闪光X射线预电离器已在KrF和$CO_2$激光器中获得成功。

与工业和医学中采用的连续X射线发生器一样，这类X射线发生器产生连续电离，它可用作连续放电的外部电离源，或脉冲放电的预电离源。我们已使用一台连续X射线发生器作为脉冲放电$N_2$、HF激光器的预电离源。

我们观察到在X射线照射情况下，掺$SF_6$比纯$N_2$时的$N_2$激光能量增加12倍。为了测量预电离电子密度，进行了电离研究。当$N_2$气压50托时，获得预电离电子密度为$5\times10^7$/厘米$^3$。

文中给出连续X射线对$N_2$、HF激光器预电离效应的细节，预电离电子密度与激光能量关系和连续X射线预电离器的可能性的探讨。