

Vacuum ultraviolet radiation of continuous ECR discharge plasma

*R. L. Lapin, S. V. Golubev, V. A. Skalyga, I. V. Izotov, A. F. Bokhanov,
E. M. Kiseleva and S. S. Vybin*

Federal Research Center IAP RAS
46 Ul'yanov st., Nizhny Novgorod, 603950, Russia
E-mail: lapin@ipfran.ru

Received 26.10.2022; accepted 10.11.2022

Experimental studies of intrinsic vacuum ultraviolet (VUV) emission intensity of continuous hydrogen discharge sustained by high-power gyrotron radiation ($f = 28$ GHz / $P_{\text{gyr}} = 5$ kW) in an open magnetic trap under electron cyclotron resonance (ECR) conditions are presented. The optimal system parameters for VUV radiation generation of ECR discharge plasma were determined. It was shown that the emission power in the range $\lambda = 120\text{--}160$ nm could reach $W = 0.75$ kW, which corresponds to an efficiency of $\eta = 20$ %.

Keywords: ECR discharge, vacuum ultraviolet radiation, gyrotron, magnetic trap.

DOI: 10.51368/1996-0948-2023-1-33-37

REFERENCES

1. Skalyga V., Izotov I., Golubev S., Sidorov A., Razin S., Vodopyanov A., Tarvainen O., Koivisto H. and Kalvas T., Rev. Sci. Instrum. **87**, 02A716 (2016).
2. Lapin R. L., Izotov I. V., Skalyga V. A., Razin S. V., Shaposhnikov R. A. and Tarvainen O., J. Instrum. **13**, C12007 (2018).
3. Dougar-Jabon V. D., Chacon Velasco A. J. and Vivas F. A., Rev. Sci. Instrum. **69**, 950 (1998).
4. Dougar-Jabon V. D., Phys. Scr. **63** (4), 322 (2001).
5. Leung K. N., Ehlers K. W. and Bacal M., Rev. Sci. Instrum. **54**, 56 (1983).
6. Lapin R. L., Skalyga V. A., Golubev S. V., Izotov I. V., Razin S. V. and Tarvainen O., J. Appl. Phys. **131**, 093301 (2022).
7. Skalyga V. A., Bokhanov A. F., Golubev S. V., Izotov I. V., Kazakov M. Yu., Kiseleva E. M., Lapin R. L., Razin S. V., Shaposhnikov R. A. and Vybin S. S., Rev. Sci. Instrum. **90**, 123308 (2019).
8. Golant V. E., Zhilinsky A. P. and Sakharov I. E., Fundamentals of plasma physics, New York, John Wiley & Sons, 1980; Moscow, Atomizdat, 1977.