Dynamics of energy confinement and electron energy distribution function in the region of ECR heating at heating powers of up to 1mw at the L-2m stellarator [[1]](#footnote-1)\*)

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Meshcheryakov A.I., Grishina I.A., and Vafin I.Yu.

Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia, meshch@flp.gpi.ru

The experiments on ECR plasma heating at heating powers of up to 1 MW (specific heating power of up to 4 MW/m3) were conducted at the L-2M stellarator. The soft X-ray spectra were measured along the central chord, which passes through the region of the ECR radiation absorption (the heating region). It was shown that with increasing heating power, the thermal and suprathermal temperatures determined from these spectra increase [1]. The ratio of the suprathermal “temperature” to the thermal one slightly increases. With an increase in the heating power, the fraction of electrons with energies in the suprathermal part of the spectrum increases. Accordingly, the average electron energy in the suprathermal part of the spectrum also increases, reaching 25% of the average energy over the entire spectrum at the ECR heating power of 950 kW. From the measured SXR spectra, the energy distribution function of electrons in the ECR heating region was reconstructed in the regimes with heating powers from 200 to 1000 kW.

The dynamics of the plasma energy lifetime was studied in the range of the ECRH powers from 200 to 1000 kW [1]. It is shown that, at the L-2M stellarator, when the heating powers become higher than 700 kW, the plasma energy confinement gradually worsens as compared to the scaling of the L-2M stellarator. Deterioration of the energy confinement is observed in the shots with transport transitions, the number of which considerably increases with increasing heating power. Analysis of the experimental dependences of the plasma energy lifetime on the heating power showed that the deterioration of the plasma confinement at high ECRH powers is associated with an increase in the radiation loss power. The radiation losses increase due to the accumulation of impurities, which occurs as a result of the transport barrier formation during the transport transitions.



Зависимость отношения экспериментально измеренного энергетического времени жизни *τ*Eexp к энергетическому времени жизни *τ*EL-2M, оцененному из скейлинга для стелларатора Л-2М, от мощности ЭЦР нагрева.

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References

1. A.I. Meshcheryakov, I.A. Grishina, and I.Yu. Vafin, Bulletin of the Lebedev Physics Institute **47**, 2020, (in press).
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/Mu/ru/AI-Meshcheryakov.docx) [↑](#footnote-ref-1)