Spectral intensity of electron cyclotron radiation coming out of plasma in various regimes of ITER operation [[1]](#footnote-1)\*)

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Electron cyclotron radiation (ECR) in ITER is expected to play an important role in power loss balance due to high electron temperature and strong magnetic field [[1](#_ENREF_1)], [[2](#_ENREF_2)]. This radiation is also a source of additional thermal and electromagnetic loads on microwave and optical diagnostics [[3](#_ENREF_3)]. The ECR generated in plasma dominates over the stray radiation from electron cyclotron resonance heating (ECRH) and current drive (ECCD) microwave power sources in high performance discharges, and therefore its impact upon diagnostics must be investigated [[3](#_ENREF_3)]. This is especially important for mm-wave diagnostics in ITER such as microwave reflectometers and Collective Thomson Scattering system, whose transmission lines allow the transport of EC waves emerging from the plasma and even additional measurements of their spectrum [[4](#_ENREF_4)]. Therefore, it is necessary to calculate in detail the processes of transport of such EM waves (taking into account the reflection of EC and absorption of the waves in the metal structural elements of waveguides and detectors of diagnostic systems) and the possibility of appearance of high-frequency and still sufficiently intensive part of EC radiation flow outside the diagnostic systems.

The paper presents calculations of the spectral intensity of EC radiation coming out of plasma for various scenarios of ITER operation. The algorithm for calculating the intensity of EC radiation from plasma is mainly based on the previous works of the authors [5], [2] for calculation of the spatial profile of the net power loss due to EC waves in tokamak-reactors. The EC net power loss mostly depends of transport of EC waves with harmonic numbers n ≥ 3 of fundamental EC frequency, defined with respect to the magnetic field on the torus axis. To describe the contribution to spectrum of EC radiation on small harmonics, we apply a well-known model of black-body radiation, which is widely used in diagnostics of electron temperature by EC radiation (n = 1 и n = 2).

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