investigation of plasma radiation losses in regimes with neutral beam heating on globus-m tokamak

A.D. Iblyaminova1, A.G. Alekseev2, N.N. Bakharev1, V.K. Gusev1, V.V. Zabrodskii1, G.S. Kurskiev1, V.B. Minaev1, M.I. Patrov1, Yu.V. Petrov1, N.V. Sakharov1, S.Yu. Tolstyakov1, N.A. Khromov1, P.B. Shchegolev1, and A.V. Voronin1

1Ioffe Physical Technical Institute, Russian Academy of Sciences, Saint Petersburg, Russia,
 a.iblyaminova@mail.ioffe.ru
2Troitsk Institute for Innovation and Fusion Research, Troitsk, Moscow oblast, Russia,
 alex\_ag@triniti.ru

Regimes with neutral beam heating being one of the main methods for auxiliary power input are crucial for operation of future tokamak reactor [1]. Application of neutral beam is followed by rise of radiation losses, related with growth of impurity radiation in tokamak. The mechanisms responsible for radiation losses increase in regimes with neutral beam injection could be following: physical and chemical sputtering of construction materials of tokamak vacuum chamber, heat sublimation of wall material, impurity influx with neutral beam and charge exchange processes of injected neutrals and impurity ions.

For measurement of radiation losses diagnostic complex based on SPD detectors was used: wide-angle and peripheral single channel sensors, collimated photodiodes in four-channel spectroscopic module and 16 x 16 matrix array. SPD sensors are silicon photodiodes measuring electromagnetic radiation in 1.13 eV – 60 keV range with high ampere-watt sensitivity [2].

The experiments were made in hydrogen and deuterium plasmas, auxiliary heating were provided by ~600 kW hydrogen or deuterium beam. As a result, radiated power in various energy ranges depending on electron density in ohmic heated and neutral beam heated plasmas was explored.

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References

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