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Polarimetric measurements of line-integrated electron density at JET based on Cotton-Mouton effect in presence of large Faraday rotation FRANCESCO ORSITTO, ENEA C R Frascati (Italy), LUCA ZABEO, UKEA Culham Science Centre (UK), EDMONDO GIOVANNOZZI, PAOLO BURATTI, ENEA C R Frascati (Italy), JET-EFDA CONTRIBUTORS TEAM — Comparison between theory and polarimetry measurements have been carried out on selected JET discharges. In particular, an assessment of the line integrated plasma density along the vertical chords is done using the Cotton-Mouton effect in the presence of strong Faraday rotation. These measurements have been made for the first time in this regime, characteristic of a large tokamak, thus generalizing earlier experiments carried out under special conditions where the Faraday effect was negligible. The robustness of the measurement is demonstrated for the majority of JET plasma configurations, in particular for ITER-like plasmas. In the work, the rigorous numerical solution of the Stokes propagation equations (using dielectric tensor evaluated from equilibrium and Thomson scattering) are compared with the data available at JET from the polarimeter and interferometer. The evaluated phase shift and Faraday rotation angle of the emerging beam for the vertical chords of the JET polarimeter are compared with the corresponding measured quantities. The agreement with theory is satisfactory within the limits of experimental errors. The limits of the extraction of the line integrated electron density from the polarimeter data are discussed. Extrapolation to conditions of a burning plasma such as ITER is carried out using the theory checked on the JET database.

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