**Abstract**

Two neutral beam injectors (NBIs) were installed on the COMPASS tokamak as a main upgrade after its move from the UK to Prague. The thesis deals with general experimental specifications of additionally heated plasmas by the NBI under the wide range of conditions on the COMPASS tokamak.

The geometrical parameters of the beams are determined from the spectroscopic measurements. Consequently, the NBI power passing through the narrow duct connecting NBI and tokamak chamber is investigated. The passing fraction of the NBI power is confirmed by the power balance analysis, which provides information about the delivered power into the plasma based on the plasma parameters.

Once the delivered power is well known a description of beams interaction with plasma via global parameters such as the plasma temperatures, the plasma density, the energy confinement time and neutron yield is given. It is shown, that the NBIs heat mostly ions, which can reach $\sim 1\,\mathrm{keV}$ in the plasma core.

Moreover, the impact of the fast ions presence on the commonly observed MHD activities, the sawtooth instability and the edge localized modes (ELMs), is discussed and compared with results from other tokamaks. The sawtooth period is prolonged by the influence of the NBI from 2 ms up to 4.5 ms. The knowledge of the NBI passing power into the tokamak chamber allows to determine the normed power through the separatrix, which is a key parameter for the ELMs classification.

**Keywords:** fusion, tokamak, neutral beam injection, power balance, neutral particle analyzer