

# **The first experimental campaign results of plasmas heated by a new 1 MW neutral beam injector on the COMPASS tokamak**

K. Bogar<sup>1</sup>, J. Varju<sup>1</sup>, I. Mysiura<sup>1</sup>, M. Komm<sup>1</sup>, M. Jerab<sup>1</sup>, P. Vondracek<sup>1</sup>, O. Ficker<sup>1,2</sup>, F. Jaulmes<sup>1</sup>,

G. Zadvitskiy<sup>3</sup>, M. Hron<sup>1</sup>, R. Panek<sup>1</sup> and the COMPASS team<sup>1</sup>

<sup>1</sup> *Institute of Plasma Physics of the CAS, Prague, Czech Republic*

<sup>2</sup> *FNSPE, CTU in Prague, Prague, Czech Republic*

<sup>3</sup> *Max-Planck-Institut für Plasmaphysik, Garching, Germany*

The COMPASS tokamak had been equipped with two identical neutral beam injectors with a nominal energy 40 keV and power  $2 \times 400$  kW since its re-installation at IPP Prague. During 2021 a new neutral beam injector (NBI) with nominal energy of 80 keV and auxiliary heating power up to 1 MW was installed and connected to the COMPASS vacuum chamber. Such a high total possible heating power allowed to significantly extend the operating space of COMPASS, in particular in the high confinement mode.

This contribution presents experience with the new NBI operation, mainly the beam properties, which were characterised during an extensive experimental campaign in summer of 2021. Although the beam nominal energy is 80 keV, the NBI was operated only at energies up to 70 keV due to temporary operational limits. Despite that, the nominal power of 1 MW was achieved by operating at higher neutral beam current, which was slightly above the optimum for beam divergence.

Second part of the contribution focuses on the plasma parameters, which were achieved thanks to the new NBI. New COMPASS record plasma parameters were obtained, for example the beta reached 2.95 or the total stored plasma energy 16.7 kJ. As the first COMPASS campaign with all three available neutral beam injector was simultaneously the last campaign before the final COMPASS shut-down at IPP Prague, the obtained operational experiences are important mainly for the future COMPASS-Upgrade operations, as all COMPASS neutral beams will be re-used and the auxiliary heating systems will be extended by few almost identical 1 MW units.