Contribution ID: **64** Type: **Poster**

Preliminary conceptual design of the COMPASS Upgrade ECRH heating system

Tuesday, 21 June 2022 14:00 (2h 30m)

Tokamak COMPASS Upgrade, a medium-sized device is under the design at the Institute of Plasma Physics in Prague. COMPASS Upgrade will operate with a high magnetic field $B_{\mathrm{T}} = 5\tilde{}$T, flat top current up to 2 MA with correspondent $n_{GW} = 8.7 \cdot 10^{20}$ m^{-3}. The baseline heating system will be composed of NBI heating system with a power up to 6 MW. To get the ability to heat electrons directly and control the T_i/T_e ratio additional ECRH heating power is required. Two midplane narrow ports are allocated for the core plasma heating launches. One incline port is assigned for the the edge deposition and NTM control launcher.

In the first phase of COMPASS Upgrade operation, the ECRH system will be mainly used for the central plasma heating with a target power $1 - 2$ MW. The system will be gradually extended and it will also serve to achieve advance plasma heating and current drive scenarios.

The ECRH system is foreseen to comprise gyrotrons, of 1 MW power each with a pulse length from 1 to 10 s. The first aim of this study is to determine the best choice of operating frequency. System of multiple options is considered: Dual frequency gyrotrons 105/140 GHz, 170 GHz gyrotron, and in the future $>$ 200 GHz gyrotron. The choice of the optimal frequency for the plasma discharge depends both on the range of the magnetic field at which COMPASS Upgrade tokamak is expected to operate, and on the physics objectives of the experiment itself. Combination of above mentioned gyrotrons needs to be employed to cover the entire anticipated physics program of COMPASS Upgrade.

Restricted space inside the ports and also inside the tokamak hall precludes the use of separate waveguides and launchers for different frequencies. The transmission line and launcher options are under investigation and the preliminary design, solution, and studies are discussed within this study. A significant proportion of electron heating implies a limitation on the safety of some plasma diagnostics.
The level of stray microwave radiation is evaluated for considered frequencies by the multiresonator model.

Primary authors: BOGAR, Ondrej (Institute of Plasma Physics of the CAS, Za Slovankou 1782/3, 182 00 Prague 8, Czech Republic); FARNIK, Michal (Institute of Plasma Physics of the CAS); Mr CASOLARI, Andrea; Mrs MACUSOVA, Eva; MOHELNIK, Martin (Institute of Plasma Physics of the CAS, Za Slovankou 1782/3, 182 00 Prague 8, Czech Republic); HAVLICEK, Josef; Mr HRON, Martin; PANEK, Radomir

Presenter: BOGAR, Ondrej (Institute of Plasma Physics of the CAS, Za Slovankou 1782/3, 182 00 Prague 8, Czech Republic)

Session Classification: Poster Session 1