Contribution ID: **43** Type: **Contributed Oral**

# NBI for W7-X: A Four Operational Campaign Overview

*Monday, 8 September 2025 14:40 (20 minutes)*

The Stellarator Wendelstein 7-X (W7-X) used neutral beam injection (NBI) for plasma heating in the last four experimental campaigns (called OP1.2b, OP2.1, OP2.2, and OP2.3). In OP1.2b was the initial operation of the first injector box with two sources. In OP2.1 the second injector box with two sources was brought into operation. In OP2.2 and OP2.3 both boxes were used routinely for experiments. In OP2.3 the operation of one source in Helium for injection into W7-X was tested. The NBI system uses inductively coupled RF driven ion sources operating in Hydrogen. The sources operate for 5 seconds at 55 keV with a current of 90 A, and achieve ~2 MW of neutral beam power at the calorimeter. The paper will first focus on the ion sources and detail their operation over the four campaigns with their fixed frequency solid state RF amplifiers. The focus of the paper will then shift to the topic of the un-expected. Over the campaigns there have been un-anticipated events or results that are worthy of note. These include: pulse length limitation due to ion dump overheating, a sudden change in the required capacitance for source ignition, damage to the source Faraday screens, W7-X magnetic field effects, an enhancement in neutralization efficiency, and observation of beam influence on the bending magnet. For each of these topics the reason, when known, will be given followed by what was done to mitigate the effect, if this was necessary.

**Primary author:** MCNEELY, Paul (Max-Planck-Institut für Plasmaphysik)

**Co-authors:** Dr HARTMANN, Dirk (Max-Planck-Institut für Plasmaphysik); Dr RUST, Norbert (Max-Planck--Institut für Plasmaphysik)

**Presenter:** MCNEELY, Paul (Max-Planck-Institut für Plasmaphysik)

**Session Classification:** Oral Session

**Track Classification:** Negative ion sources and sources for fusion facilities