Tokamak GOLEM for fusion education – chapter 15

J. Vinklárek[1], S. Abbasi[1], J. Buryanec[1], J. Čeřovský[1,2], J. Chlum[1], O. Ficker[1,2], V. Ivanov[1,2], D. Kropáčková[1], L. Lobko[1], S. Malec[1], P. Mácha[1,2], M. Odložilík[1], M. Pokorný[3], V. Svoboda[1], M. Tunkl[1]

[1] *Faculty of Nuclear Sciences and Physical Engineering CTU in Prague, Prague, Czech Rep.*

[2] *Institute of Plasma Physics AS CR, Prague, Czech Rep.*

[3] *Jana Nerudy Grammar School, Prague, Czech Rep.*

The GOLEM tokamak is the oldest operational tokamak in the world. Its main mission is the education of future thermonuclear fusion specialists. The GOLEM tokamak features full remote-control system [1] which extends its reach worldwide. This contribution is devoted to student's current projects.

Progress was made in the **automatization and energy calibration of scintillation detectors for RE diagnostics**, specifically measuring their bremsstrahlung radiation. **Data analysis from AdvaPIX Timepix3 pixel detectors** used for HXR detection has been improved. Currently, the detectors are being prepared for standard HXR diagnostics on the GOLEM tokamak. **Measurements with ECE radiometer of non-thermal electron radiation** in plasma with low optical thickness were conducted and their energy distribution function is being recovered. **Numerical simulations of HXR radiation generation and transport using Geant4 toolkit** are being made and will be used for reconstruction of the energetic spectrum of runaway electrons from HXR measurements. **Visible plasma tomography** is being studied using a newly trained neural network model. The tomography system is also being automated for use as a standard diagnostic. The **application of video motion amplification technique** to the observation of deformations of the coils and supporting structures caused by the electromagnetic forces is being tested. The **spontaneous formation of a transport barrier** in the GOLEM tokamak within a helium plasma is studied. To assess the **impact of the conducting structures on the stabilization of plasma position** in the tokamak GOLEM, magnetic fields are measured and their dynamic evolution is analysed. Apparatus of **current amplifiers used for the stabilization of plasma current** is being tested and optimal configuration of current amplifiers for the GOLEM tokamak is being determined. New **plasma detection method was implemented using a photodiode signal,** which is resistant to electromagnetic induction and various plasma behaviour.

References:

[1] GOLEM Tokamak, Czech Technical University in Prague, http://golem.fjfi.cvut.cz/ [online]