



Status of Activity on GOL-NB Multiple-Mirror Experiment

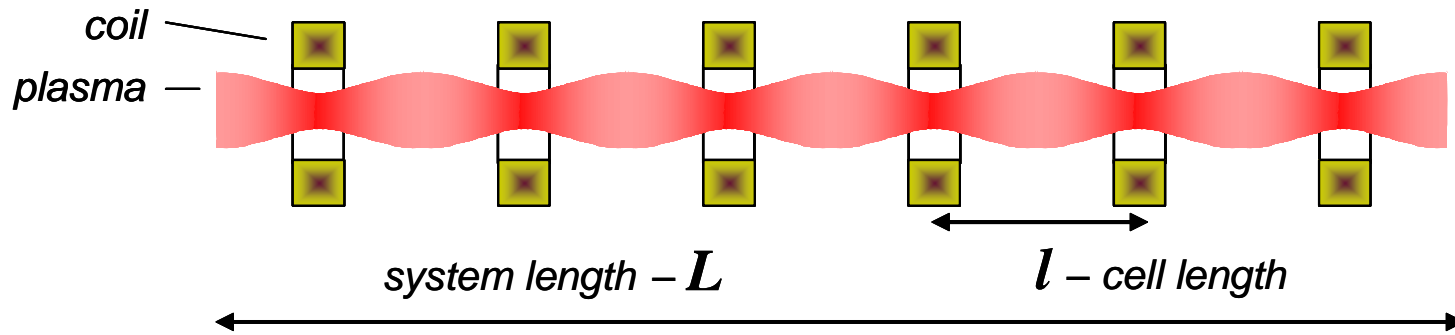
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Introduction to Multiple-Mirrors

The multiple-mirror confinement idea was introduced as the method of suppression of the longitudinal plasma expansion by a multiple-mirror (periodically varying along the axis) magnetic field.



The friction between transiting and locally-trapped particles transfers momentum from the plasma flow to the magnetic field and therefore slows down the flow. This technique is effective at moderate collisionality, at ion free path length comparable with the modulation period of the magnetic field.

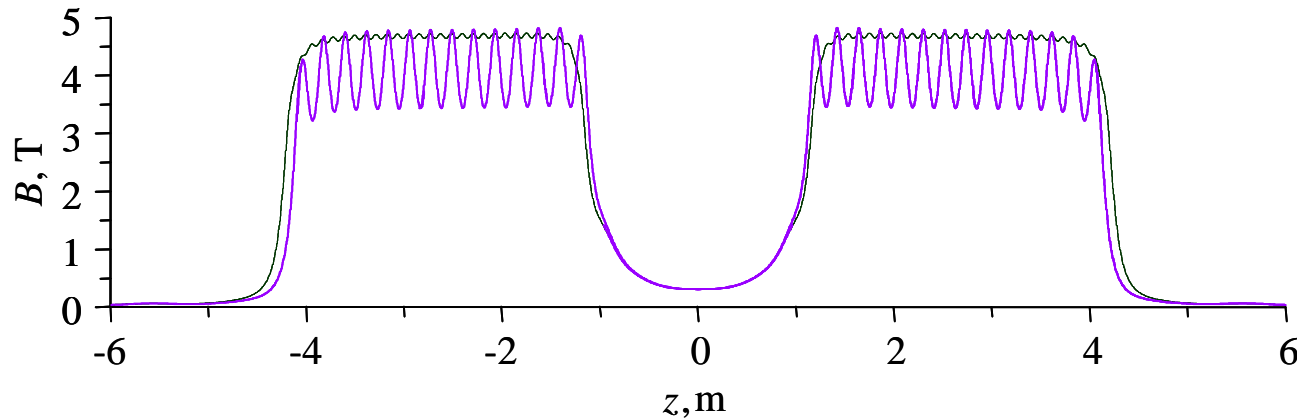
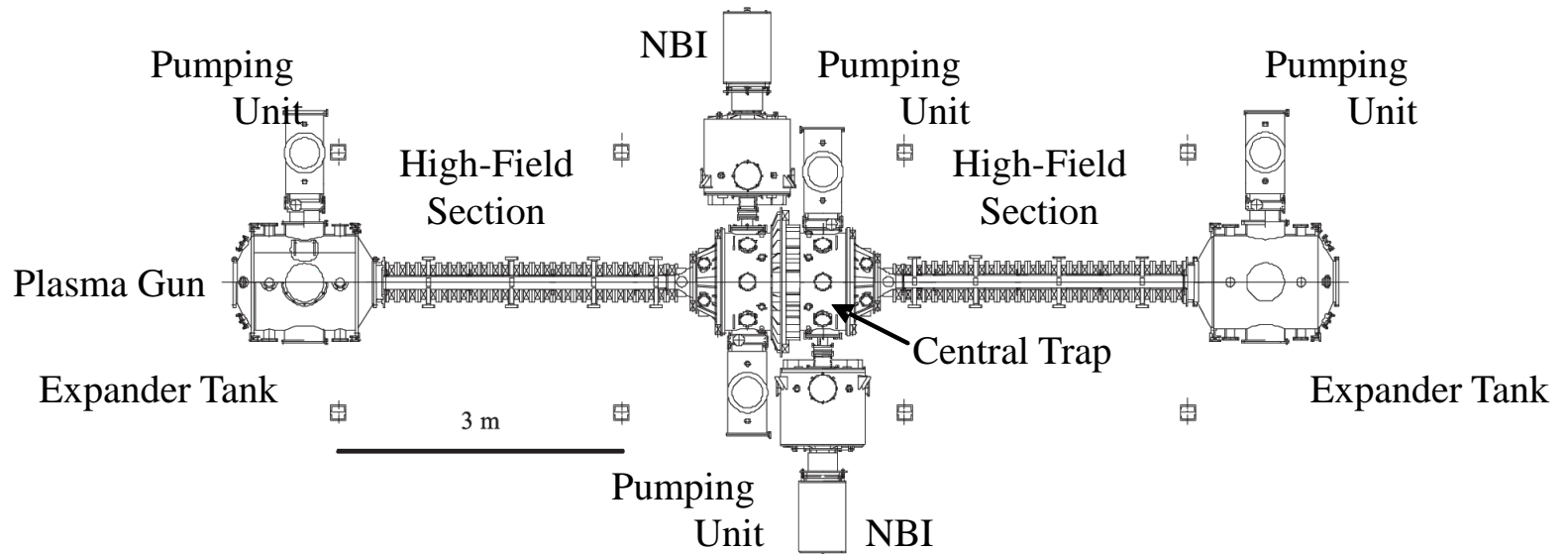


The GOL-NB Program

- GOL-NB is the first device with the magnetic system that includes the central trap for plasma confinement and two attached multiple-mirror sections for improving the energy and particle confinement.
- Plasma will be heated by two 25 keV, 0.75 MW neutral beams.
- The trap was intentionally designed with large particle and energy losses along the magnetic field; this makes changes in axial confinement at different magnetic configurations more evident.
- 1-D kinetic simulations predicted $T \sim 40$ eV at $n = 3 \times 10^{19} \text{ m}^{-3}$ in the worst-case gasdynamic configuration.
- Direct demonstration of the confinement and plasma parameters improvement at the transition to the multiple-mirror configuration is the main goal of the GOL-NB program.

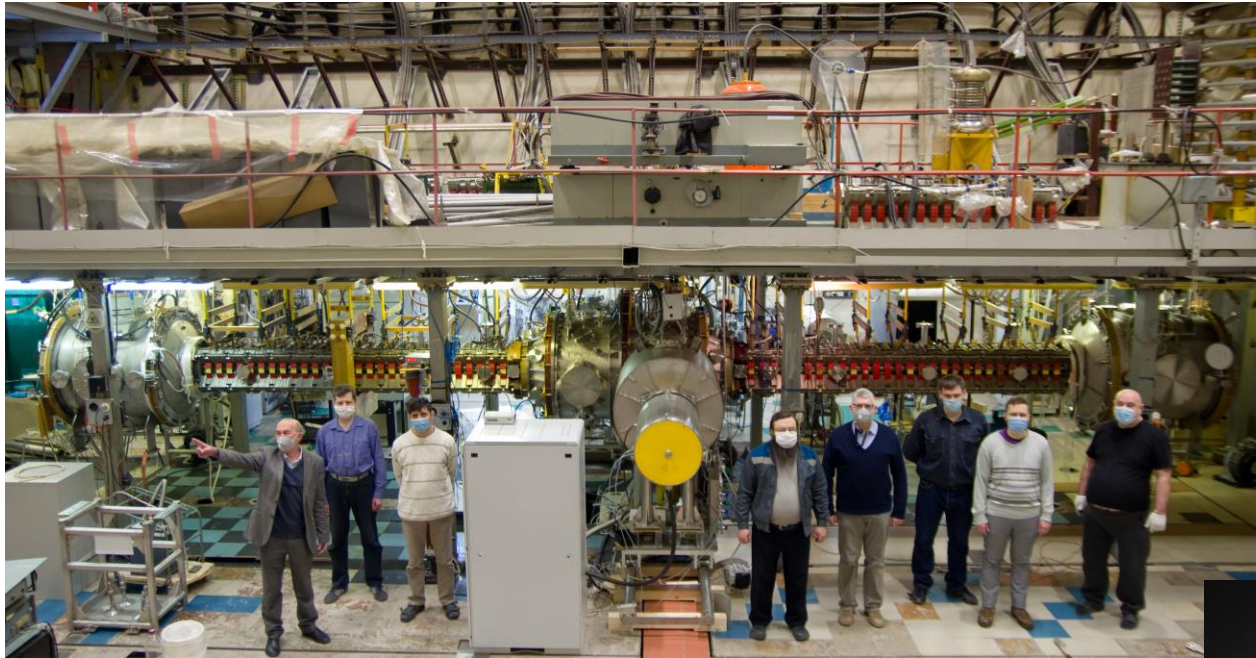
The GOL-NB Device

Layout of GOL-NB (top view) and magnetic field profile at the axis in the solenoidal and multiple-mirror configurations



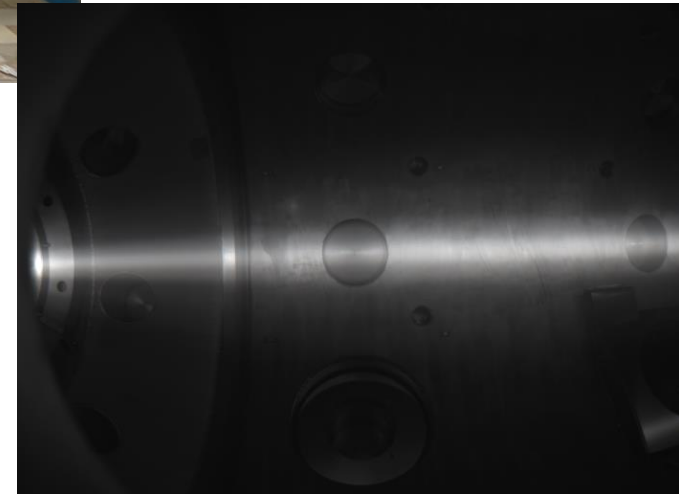
Assembly Status

The GOL-NB multiple-mirror trap is assembled, the first plasma is achieved.



GOL-NB during the assembly

The low-temperature start plasma in the central trap of GOL-NB





Summary

- GOL-NB is assembled in full design configuration.
- The magnetic and vacuum systems deliver the design parameters.
- A limited start set of diagnostics is operational.
- Both neutral beam injectors are in on-site performance optimization.
- With the start configuration of GOL-NB, we confirmed the old theory prediction on low influence of a multiple-mirror magnetic field on propagation of highly-collisional plasma flow.