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23rd LHD experimental campaign successfully completed

The 23rd experimental campaign of the Large Helical Device (LHD) in Toki, Japan, was successfully completed in February 2022. During the 17 weeks of the campaign, LHD operated for 61 days, and 9257 discharges were accomplished. Starting with this campaign, the main goal of the experiments was changed from achieving world-leading performance, such as highest temperature and longest discharge duration, to acquiring scientific knowledge that will deepen our understanding of magnetically confined toroidal plasmas. In line with this change, the application of heating devices such as electron cyclotron heating (ECH), ion cyclotron heating (ICH), and neutral beam injection (NBI) heating was also changed from operations aiming at highest performance to operations aiming for stable, high-performance operation. As a result, no major trouble with heating devices has occurred. The change in the operation policy led to a higher plasma experiment execution rate (98.6%) than the previous year (96.7%). In addition, most of the 192 experiment idea proposals submitted to the 23rd LHD experiment campaign have been implemented, especially those from overseas institutions. However, unfortunately, the impact of the spread of COVID-19 has not subsided. Therefore, this year, we continued to conduct remote experiments utilizing Zoom and Microsoft Teams applications.

Some of the international collaborations at NIFS/LHD have achieved excellent scientific accomplishments. For example, F. Nespoli (PPPL) published a paper describing the turbulence reduction during the boron powder injection in LHD in *Nature Physics* (the article can be downloaded here). And F. Warmer (IPP-Greifswald) has published a paper describing the impact of magnetic configurations on heat transport in stellarators and heliotrons at *Physical Review Letters* (the article can be downloaded here). In addition, to promote the results of international collaborations at NIFS, NIFS has published a press release on these impressive scientific results (see NIFS press release in *Nature Physics* and *Physical Review Letters* for details).

Currently, NIFS strongly promotes open science in the fusion community. Therefore, any researcher can access LHD experimental data through the LHD Experiment Data Repository. This means that any researcher can now publish articles using LHD experimental data much more easily than before. In addition, other repositories (Publications/Scientific Achievements) make it easy to find out what research papers have been published.

Next year will be the last year for experiments at LHD in which deuterium can be used. Although it is unfortunate that interactive experiments with deuterium cannot be performed in the large stellarator/heliotron type experiment devices (LHD and Wendelstein 7-X), we hope that the fusion/plasma community will make good use of this last opportunity at LHD. The schedule for next year's LHD experimental campaign will be similar to last year's, but it may start a little earlier than in the past. As in the previous year, experimental proposals will be collected through the website in June 2022. We look forward to receiving your interesting and meaningful proposals for this campaign.

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