

Seminar

Institute for Plasma Research

Title : Design verification of inner piping and deviation in 80K Cryopump for LIGO-India

Speaker: Dr. Gaurav Kumar Singh
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Date : 7th July 2020 (Tuesday)

Time : 10.30 AM

Venue : Online - Join the talk:
<https://meet.ipr.res.in/GauravSinghPDFExtensiontalk>

Abstract :

The 80K cryopumps are a part of the LIGO vacuum pumping subsystem. Together with the ion pumps, these cryopumps are designed to provide “vibration-free” pumping during normal operation of the LIGO interferometer. Cryo-pump is fed by a liquid nitrogen storage Dewar. The cold surface of Cryopump is made of Al, and the Outer vessel is made of SS304L. 80K cyopump for LIGO-India is planned to have different internal piping for vent line, supply line, DPT lines, etc. This would need the requirement of Bi-metallic joint of Al-SS to be taken out (for maintenance purpose) if there is a risk of failure due to induced thermal stress or improper fabrication. There are 5 bi-braze joints in each cryopump. If such failure occurs the repair time will be less and the interferometer need not be shut down.

To reduce the downtime of the interferometer, an approach will be to take these active joints outside and make them passive. The deviation in design from the existing model in LIGO-US is proposed and the same will be analysed. To verify the changes, the study begins on the existing LIGO-US cryo-pump. The internal piping is designed similar to the existing system except for the position of the joints. Thermal stress analysis of piping of the existing system is will be compared with the proposed change by performing structural analysis using ANSYS. Similar analysis will be done for other internal piping of the cryopump. The effect of these changes will be discussed in the presentation.
