

## Theme Meeting on Operational Experience of Helium Liquefiers, 19<sup>th</sup> October 2016 at TSH, BARC

Research equipment operating at extremely low temperatures are quite common these days. Dr. S C Gadkari, Head TPD, pointed out in his opening address that scientific institutes find it advantageous to operate helium liquefiers onsite where many equipment need liquid helium or cooling capacities beyond few watts at T = 4.2 K are required. Dr. N.K. Sahoo, Associate Director, Physics Group gave an overview of applications of liquid Helium in his presidential address. Mr. S. K Gupta, President, Indian Vacuum Society and Head TPCD described past association of Indian Vacuum Society in organizing meetings on cryogenics. Dr V C Sahni, Former Director, Raja Ramanna Centre for Advanced Technology, Indore and Director, Physics Group, BARC in his keynote address highlighted the association of Physics Group with different types and capacities of liquefiers since early eighties. He expounded on the importance of current projects critically dependent on Liquid Helium.

Technical Physics Division (TPD), BARC has been operating helium liquefiers for two decades and Cryo- Technology Division (CrTD), BARC has recently succeeded in making an indigenous liquefier (see the brief communication in this issue). Liquefiers are complicated machines needing skill and experience which are specific to its operation. The deployment and operation of Helium Liquefiers varies with institutes according to specific applications and site specific requirements. Therefore it is important to share techniques and valuable operating experience among community engaged in this activity. With this aim, TPD organized the theme meeting on operational experience of helium liquefiers where participants from many institutes such as IIT Bombay, Tata Institute of Fundamental Research, Mumbai, Inter University Accelerator Centre (IUAC), New Delhi and UGC-DAE CSR, Indore in addition to TPD and CrTD from BARC discussed their requirements, type and capacities of liquefiers and shared acquired wisdom for successful operation.

Prof. C V Tomy from IIT Mumbai has discussed how swelling of the fiber piston due to moisture absorption caused serious interruption of their reciprocating expander based liquefier and emphasized the periodic examination and maintenance of the machine. IUAC uses the machine in liquefier cum refrigerator mode with major application in the operation of Nb-superconducting cavities for heavy ion accelerator. These cavities use liquid helium for cool down and refrigeration (closed loop) mode during operation. Sh. Anup Choudhury presented the requirement of specific cool-down rate to minimize impurity gas absorption by Nb. Mr. M. R. Singh, TPD, presented general safety measures for low temperature laboratories, the regulatory processes for operation of equipment needing liquid helium and special safety measures required for large volume storage of cryogenes.

In the afternoon session Mr. M.P. Saravanan discussed the experience of UGC-DAE CSR, Indore with numerous

nitrogen and helium liquefiers of different capacities. Mr. A.A. Shinde talked on Helium refrigerator being used for superconducting lead cavities for ion accelerator at TIFR. He told about the onsite upgradation of refrigerator capacity and the intricacies of simultaneous control of valves on the feed and return lines of cryogen. Mr. Mukesh Goyal, CrTD, BARC gave a historical perspective of the success story of the indigenous efforts in developing the turbo expanders, liquefier and external purifier. This led to discussion about the type, sizes, speed, capacities and variation in deployment of turbo-expanders in liquefier process cycle.

The meeting was well attended and appreciated by all including users of cryogen, particularly the discussion on safety aspects. The organizers thanked BRNS-DAE for providing financial support for theme meeting and also appreciated IVS for lending its name to the occasion.