

Proposal for helium gas support for low temperature research at IITK

Low temperature research at IITK has flourished since its inception with a number of active faculty members and has been supported by various funding agencies, like DST, CSIR, MHRD, DRDO, MICT. Other than experiments set-up by individual groups a good number of central facilities like helium liquefier, nitrogen liquefier, low temperature characterization systems (MPMS, PPMS), have been in use in the recent past. At present we have about six physics faculty members who directly use liquid helium and there are at least twenty in other departments who indirectly use it by using MPMS. We are also planning to hire more faculty and post-docs in low-temperature physics. Also we would like to apply for funding to get more low temperature facilities like dilution refrigerator; however, the current helium prices are discouraging us.

We have a new helium liquefier which we procured with support from DST under FIST scheme in 2009. The current helium gas price of Rs. 650/m³ amounting to ~Rs.500/ltr of liquid and with ~15-25% per cycle loss and use of liquid nitrogen (1.3ltrs) in liquefying He we are forced to charge Rs.200/ltr to all the users. We are also supporting one staff salary (Rs.1.6 lacs/yr) from helium account with R&D in order to run the liquefier. The high cost of liquid helium has discouraged most groups from pursuing research requiring liquid helium in IITK campus. At present most measurements are being carried out in other institutes (like TIFR, IGCAR, SINP) in India or abroad. We have been getting some support from the institute but that is barely able to meet the maintenance budget of the facility. To revive the low temperature research at IITK we need to reduce the high cost of liquid helium by subsidizing it. We would be very grateful if the Alumni can provide us some financial support to ease this burden.

Budgetary estimates:

Estimation of consumption in ltrs/month:

MPMS:	500
PPMS:	500
Anjan Gupta (STM):	200
Satyajit Banerjee (MOKE):	200
KP Rajeev (Transport):	100
Zakir Hossain :	100
RCB :	200
New faculty and facilities:	500

Total: 2300ltrs/mo.

Liquid nitrogen consumption in above LHe production: 3000ltrs.

20% per cycle loss = 450ltrs/mo. (i.e. 340m³ of helium gas)

Total monthly cost = 340*650+3000*25 = 296,000

If we charge a token amount of Rs.40/ltr to discourage frivolous use we can earn 92000 per month from the users. In this case we need Rs.200,000 per month to smoothly run the facility. We plan to use the institute annual budget for maintenance purposes. Thus we would need Rs.20 - 24 Lacks per year for this facility. If we can get a corpus of Rs. 2 or 3 Crores from the alumni that would suffice to run the helium facility from the interest income.