

Low Temperature Instrumentation for Superconducting Accelerators, YU.P. FILIPPOV, S.V. ROMANOV, I.A. SERGEYEV, JINR - As acknowledged recently, to achieve the ultimate performance of an accelerator it is necessary to control precisely the state of a cryogen. For instance, at TEVATRON [1], the stratification of two-phase helium flow in dipoles reduces the attainable energy; at TESLA [2], the smooth cooldown procedure (controlled mixing of gaseous and liquid He) is necessary to prevent mechanical problems in the TTF structures. So, while employing two-phase coolant, one has to monitor the void fraction besides flow temperature and pressure. Next issue is the temperature measurement in numerous locations over the cold mass. It requires a multitude of sensors operating under irradiation and corresponding wiring which has to be simplified with the use of multiplexers. The report presents R&D program performed at JINR covering the mentioned problems. Design, calibration technique and working characteristics of the void fraction transducers (RF sensors of dielectric permittivity of helium flow) are described. Tests of cryogenic thermometers and analog multiplexers under fast neutron fluence and gamma irradiation at 77 K are reported. Modular multichannel measuring system (up to 512 channels, 18 bit resolution) capable to manage the resonant void fraction sensors, resistance thermometers, pressure gauges and other sources of analog signals is presented.

- [1] T.J. Petersen - FERMILAB-Pub-97/217 (1997)
- [2] D. Barni et al. - Report FF4 at CEC/ICMC-97, Portland, OR (1997)