

DIGITAL LOW-LEVEL RF SYSTEM FOR RESONANT BEAM DEFLECTING SYSTEM OF LAPLAS EXPERIMENT

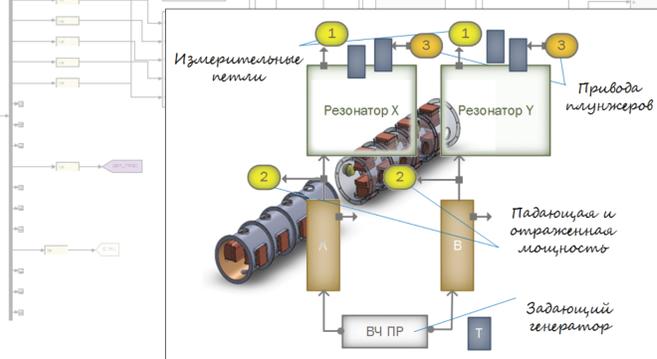
D.Liakin, S.Barabin, A.Orlov, ФГБУ 'ГНЦ РФ ИТЭФ' НИЦ 'КИ'

Abstract

A two-resonator deflecting system will be used in FAIR LAPLAS high-energy heavy ion experiment. Lightweight prototype of a deflector was built and put into operation in ITEP. High performance radio-frequency control units have been developed to be used in both systems with minor changes. The LLRF includes a two-channel reference generator based on digital signal processing core and resonant frequency control modules, also powered by the appropriate DSP.



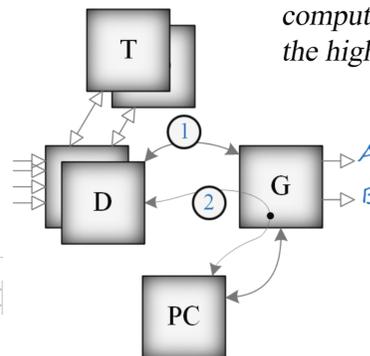
Four-channel RF signal measurement module combines on same board two ADCs with up to 100 samples per microsecond in IF mode.



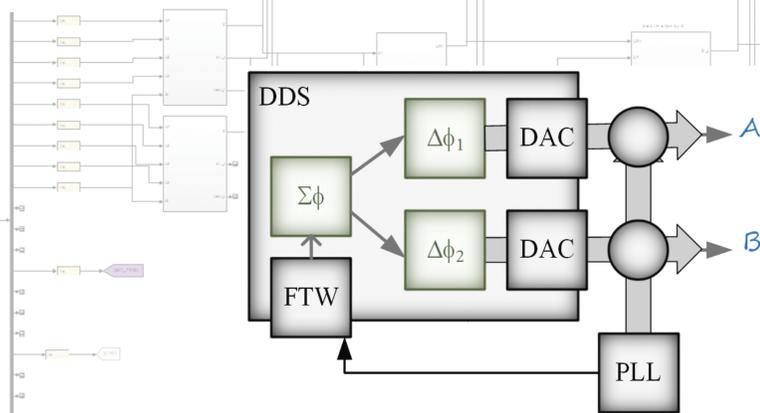
Radio-frequency system of the resonant deflector. The status of the system monitored by measuring of EM field in resonators (signal 1), incident wave (signal 2). The phase difference correction and fine adjustment of the resonators frequency provide the system homeostasis.

The intermediate frequency signals with needed phase relation are formed by the integrated two-channel synthesizer. Required for excitation of resonators signals are taken from outputs of frequency upconverters.

1- local control loop used in standalone mode.
2- System control over the host computer allows the integration into the higher level control system.



G-reference generator
D- vector RF signal detectors
PC - host computer
T - tuners of resonators



Assembled LLRF module includes two-channel signal generator, two multichannel RF vector detector modules and electronics to control the position of plungers.



Signal generator module has onboard a pair of two-channel synthesizers, ARM microprocessor for general and remote control, FPGA for signal processing and fast interboard communication.

