A Prototype of RF Photogun with GaAs Photocathode for Injector of VEPP-5,
A.V. ALEKSANDROV, M.S. AVILOV, N.S. DIKANSKY, P.V. LOGATCHEV, A.V. NOVOKHATSKI, Yu.I. SEMENOV, S.V. SHIYANKOV, Budker INP, Russia - A prototype of RF photogun with GaAs photocathode was designed and produced for injector of Novosibirsk Phi-factory. The nominal parameters of a prototype are: operation frequency - 2856 MHz, accelerating field - 300 kV/cm, bunch energy - 500 keV, laser pulse duration - 50 ps (FWHM), peak current - 160 A. The design of this source was made in order to use all possible advantages of RF photogun. At first, a production of originally short and intense electron bunch, it helps to avoid a subharmonic buncher system and make an electron source very compact. Second, an operation of photogun at the linac frequency using a small part of power of existing RF source for linac. Third, the possibility to produce an electron bunch with high degree of spin polarization. The GaAs photocathode was chosen as a most effective emitter of polarized electrons. The main goal of this prototype is to demonstrate a possibility of a long time operation for GaAs photocathode in a strong RF field of accelerating cavity. The results of the GaAs photocathode tests in the DC gun at high current density level and short bunch duration are also presented.