As a result of calculation it was concluded that for H^- cyclotron it is reasonable to use a magnetic structure with a high spirallity and small value of flatter. The structure with small value of flatter provides a low field at the hill and low beam losses due to electro-magnetic dissociation. The necessary vertical focusing is provided at the expense of high spirallity.

In conclusion it should be recorded that analysis of electro-magnetic beam losses is of fundamental importance for design new generation H^- cyclotron with high beam intensity. Ten percent beam losses give rise the inacceptable radioactivation elements of vacuum chamber. To decrease the beam losses the special magnetic structure to be selected for the isochronous cyclotron.

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THE FIELD MAPPING SYSTEM FOR THE ISOCHRONOUS CYCLOTRON AT GATCHINA

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INTRODUCTION. The magnetic field measuring system must meet followinnng requirements: the range of the measuring field 0-20 kGs, field gradient up to 1.5 kGs/cm, accuracy of measurement at uniform field 1 Gs, accuracy of the probe positioning 0.1 mm , time of measurements all the map 8 hours. To meet the requirements Hall probes were used for magnetic field measurements and mapping should be computer controlled. Mapping system consists of the Hall magnetometer and computer controlled scanning machine. The block diagram of the mapping system is devoted at Fig.

HALL MAGNETOMETR. For increasing a rate of measurements twenty Hall plates are mounted with 5 cm step on a moving carriage. The magnetometr consists of two groups Hall plates of ten plates at every chain and two stubilised current sources. Hall plates the type ПХЭ 1602 118 A with sensitivity of 16μV/Gs at current 160 mA and temperature stability $2{\cdot}10^{-3}\%/$K were developed at Joffe Physical Technical Institite. The temperature coefficient is so low that there is opportunity to use the Hall plates without the temperature stabilisation. The reference voltage elements and current measuring resistances are disposed at the thermostat. The temperature of the thermostat and a current are controled during the measurements. The longtime exciting Hall plate current stability is $\sim 3 \cdot 10^{-5}$. The Hall and another voltages are measured with digital voltmeter (DV) Ш-1516. The Hall plates are calibrated by NMR. The resulting measurement error is added together the error of the

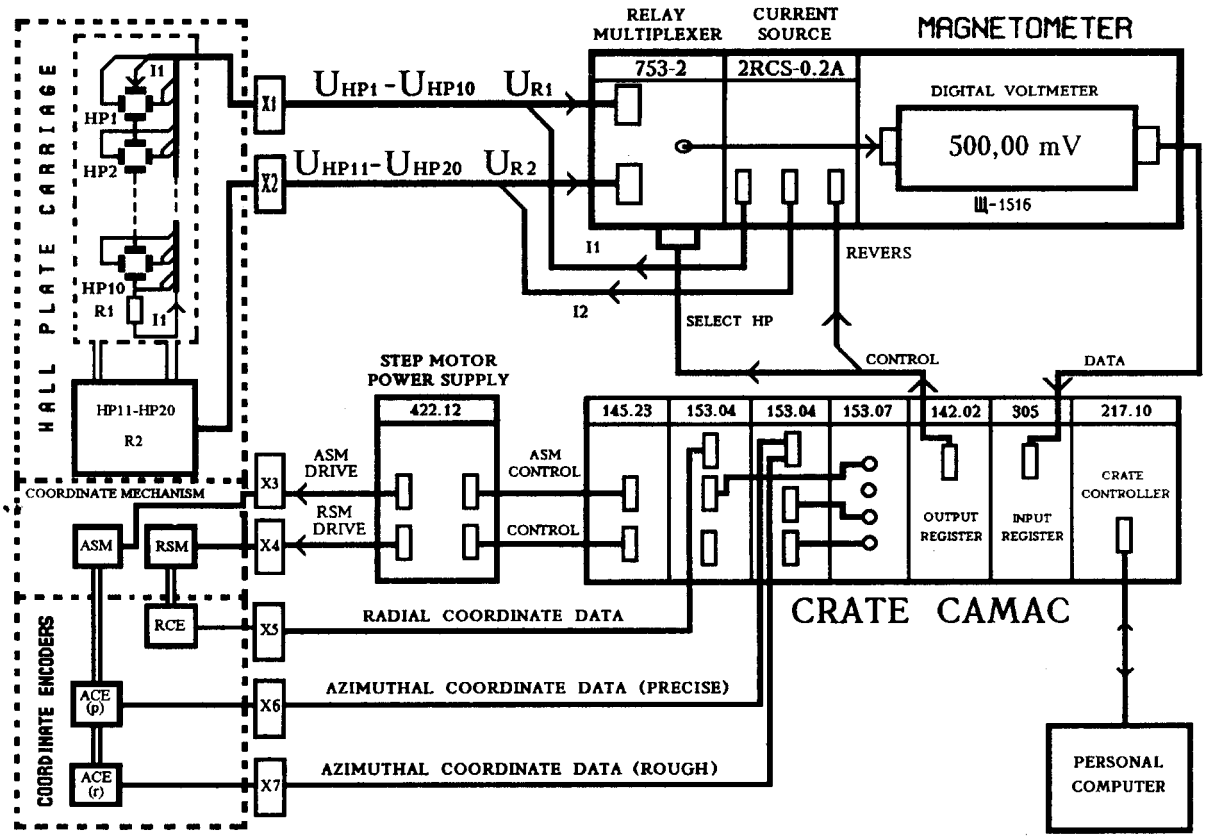

Fig. Block diagram of the mapping system electronics HP – Hall plate, 2RCS–0.2A – current sourse, ASM – azimuthal SM, RSM – radial SM, ACE – azimuthal coordinate encoder (CE), RCE – radial CE

digital voltmeter 0.015%, errors of temperuture instability of the Hall plate and instability exciting current. The summing error is not exceded 0.02%.

THE SCANNING MACHINE enables to place Hall plates at points of measurements in polar coordinate system. It consists of two parts azimuthal and radial. The azimuthal mechanism consists of circular rail and circular gear placed on supporting trolleis on the rail. The rail is installed on the magnet coil. The circular gear is driven by step motor with reductor. To determine the azimuthal coordinate is used a system of two angular encoders connected at the circular gear with backlash free reductor. The radial mechanism consists of the radial arm at one side of which is mounted a measuring carriage with Hall plates and at the another end a radial driver. The radial driver consists of step motor, a lead screw with backlash free nut, coordinate encoder joined with a screw with backlash free reductor. The reductor coefficient of the encoders is designed so that the minimal measuring steps on radius and on the circle of the radius 1m were equal 0.1mm.

The azimuthal and radial step motors (SM) and the CAMAC electronics are controled by a personal computer. The CAMAC moduls designed at PNPI are as follows: the 145.23 module is intended to control of step motors, the 153.04 module is to convert the encoder code

to binary one, the 153.07 module is intended to generate a signal proportional to difference between given and current angels.

DATA ACQUISITION SYSTEM consists of DV, control electronic equipment, personal computer and software. DV surveis the Hall voltages, current and temperature by using the 753-2 relay multiplexer. Relay multiplexer has (2 × 32) channels. One channel is allowed to switch three lines and it is possible to use a scheme recommended by the DV designers to suppress an inteference voltage. Also it was used reverse of the Hall plate current. Summing the measurements in the direct and reverse current direction through Hall plates it makes possible to avoid the termoelectric voltage on the relay contacts.

The designed mapper makes enable to measure all field map on 18 thousend points at duration 7.5 hours with ten measurements at each point.

THE CONSTRUCTION FEATURES OF AN ACCELERATION SYSTEM FOR THE ISOCHRONOUS CYCLOTRON AT GATCHINA

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The acceleration system (AS) is intended for the accelaration of H^- ions up to 80 MeV and operates at the second harmonik of ion revolution 41,2 MHz. AS consists of two identical 1/4 wave resonators with 60^0 dees. At 60 kV on the dee AS provides energy gain 200 KeV per turn. The conception design of the AS is described at works [1,2] where were analysed the requirements, block-diagram, methods and results of calculations as well as results of measurements on the model.

Presented work is intended for the technical design of AS. The drawing of AS is presented on the Fig. On the Fig. only one part of AS is presented due to symmetry of the dee system. The dees (*8*) are console-settled at base-plates (*11*) and conductivy coupled in the center. The upper and lower AS ground liners are formed by lids of vacuum chamber (VC) (*15*). The resonant volume (*12*) around the rectangular stem (*4*) is separated by side-plates (*16*) and by the shorting plate (*18*). The dee stem is fastened at the shorting plate. The dee fastening has a positioning device (*13*). After the dee positioning they are bridged with a removable rigid shorting jumper (9), which have a different configuration depending on the internal or external ion source being used. A dummy-dee (*5*) is fastened to VC lids and formed accelerating gap 20 mm.

A frequency tuning device such as a tuning capacitor (*7*), a fine trimmer (*6*) are attached to the shorting plate as well as RF probe (*2*) and RF power input (*3*). The plates (*17*) are used for primery tuning of frequency by the regulation the effective stem width. The access to AS can be obtained only after the upper part of a magnet together with VC lid are lifted up. Therefore the upper and lower ground liner are separated by a gap and connected only on the shorting plate by clamping contacts (10) after assembling of VC.