**Status of the Factory of Superheavy Elements**

***V. Semin and A. Popeko***

The DC-280 will be the basic facility of the Super Heavy Element Factory, which is being created at the FLNR JINR. The main parameters of DC-280 systems were presented in Refs.[1,2,3,4,5,6].

In 2016, the cyclotron main magnet was assembled in the DC-280 hall and adjusting of the magnet structure was made. In January-February of 2017, the switching magnet of the accelerated beam transport system was installed in the DC-280 hall, the holes for beam transport channels were made in the protection wall. Since the beginning of March, assembling of the beam transport channels was started. In April-May, the base platform of the injection system and the high voltage (HV) platform N1 were installed. In May-June, the power supply of the main magnet was connected and the water cooling system was launched. In June-September, magnetic field measurements were carrying out, correction of first harmonic of magnetic field was made with using shimming of the magnetic structure, deposits to magnetic field of the radial trimming coils were measured. Distribution of average magnetic field along radius measured at several levels was close to the calculated one. In July and September the elements of ion optics were installed in the injection channel. In July-October, the RF generators and feeder lines, which leads to the DC-280, were mounted. In September-October, the azimuthal trimming coils were installed on the magnet sectors, also the guides of internal probes were installed. In November, the vacuum chamber of the DC-280 was mounted and test vacuum pumping to 3·10-3Torrwas carried out together with helium leak testing, the revealed leaks were successfully eliminated. In the end of October, the bench tests of a DECRIS-PM ECR-source lasting since the end of 2016 were completed. The source parameters corresponds to designed ones. In the end of November-December, the ECR-source was transported to the DC-280 hall and was installed on the HV platform N1. Before the source installation, adjustment of the axial injection elements was carried out and vacuum equipment was installed. To the end on the year we plan to connect the elements of the injection channel to water cooling and power supply systems. In December, we plan to mount and adjust of the accelerating system (resonators, dees) and internal current probes. The main part of installation works is planned to be finished by the end of 2017. Adjustment and tests of systems, complex commissioning works and the DC-280 launching are planned for the first half of 2018.

To address the needs of experiments planned at the SHE Factory three different separators of reaction products are underway:

* the new gas-filled separator GFS-2 for experiments on the synthesis and study of superheavy elements which comprise the Qv-Dh-Qv-Qh-D ion optical scheme is manufactured and delivered to Dubna. At the beginning of 2018, the separator will be installed at the beam line No. 3 of the cyclotron DC-280;
* the velocity selector “SHELS” is now in routine operation for nuclear spectroscopy and reaction mechanisms studies, and it will run for several years at the U-400 cyclotron;
* For studies the chemical properties of the heaviest elements and precise mass measurements we analyzed several constructions of a preseparator for primary beam suppression, and as the result the schema identical to the GFS-2 gas filled separator was found as the most efficient. The contract is signed with the SigmaPhi. The preseparatorwill be installed at the beam line No 1 of the DC-280 cyclotron in May 2019.

**References:**

1. StatusoftheDC-280 cyclotronproject, G.G. Gulbekian, S.N. Dmitriev, Yu.Ts. Oganessian, B.N. Gikal, I.V. Kalagin, S.L. Bogomolov, I.A.Ivanenko, N.Yu.Kazarinov, G.N. Ivanov, N.F.Osipov,In. Proc. ofCyclotrons2016 Int. Conf, p.p. 363-365, Zurich, Switzerland, 2016.

<http://accelconf.web.cern.ch/AccelConf/cyclotrons2016/papers/thp25.pdf>

See also:<https://agenda.infn.it/getFile.py/access?contribId=1&sessionId=1&resId=0&materialId=slides&confId=12207>

1. [High-Frequency Acceleration System of the DC-280 Cyclotron](http://www1.jinr.ru/Pepan_letters/panl_2012_8/07_gul.pdf), G.G.Gulbekyan, V.B.Zarubin, G.A.Karmysheva, O.V.Karmyshev, J.Franko, Physics of Particles and Nuclei Letters, Vol. 9, N8, p.p. 637-642, 2012.<https://link.springer.com/content/pdf/10.1134/S1547477112080067.pdf>
2. DC-280 cyclotron central region with independent flat-top system, G. Gulbekian, B.Gikal, I.Ivanenko, N.Kazarinov, Proc. of IPAC-2011, San-Sebastian, Spain, p.p. 2703-2705, 2011.

<http://accelconf.web.cern.ch/AccelConf/IPAC2011/papers/weps083.pdf>

1. The project of the HV axial injection for the DC-280 cyclotron at the JINR FLNR G.G.Gulbekian, B.N.Gikal, V.V.Bekhterev, S.L.Bogomolov, A.A.Efremov, I.A.Ivanenko, N.Yu.Kazarinov, I.V.Kalagin, V.N.Melnikov, N.F.Osipov, S.V.Prokhorov, A.V.Tikhomirov, M.V.Khabarov, Physics of Particles and Nuclei Letters, 2014, Vol. 11, No. 6, pp. 763–773, 2014.<https://inis.iaea.org/search/search.aspx?orig_q=RN:46024650>

See also: Proc. of RUPAC-2014, Obninsk, Russia, p.p. 333-335, 2014.<http://accelconf.web.cern.ch/AccelConf/rupac2014/papers/thpsc08.pdf>

1. Development of the magnetic system for new DECRIS-PM ion source, V.Bekhterev, S.Bogomolov,A.Efremov, N.Konev,Proc. of ECRIS-14, Nijniy Novgorod, Russia, 2014.<http://accelconf.web.cern.ch/AccelConf/ECRIS2014/papers/weommh03.pdf>

 See also new:

<https://agenda.infn.it/getFile.py/access?contribId=2&sessionId=7&resId=0&materialId=slides&confId=12207>

1. The project of the beam transportation lines for the DC-280 cyclotron at the JINR FLNR,G.G.Gulbekyan, B.N.Gikal, G.N. Ivanov, I.V.Kalagin\*, V.I. Kazacha, N.Yu. Kazarinov,M.V. Khabarov, V.N. Melnikov, N.F. Osipov, A.V. Tikhomirov, Y.G. Teterev, In Proc. of RuPAC-2014 Int. Conf., p.p. 336-338,Obninsk, Russia, 2014.<http://accelconf.web.cern.ch/AccelConf/rupac2014/papers/thpsc09.pdf>