

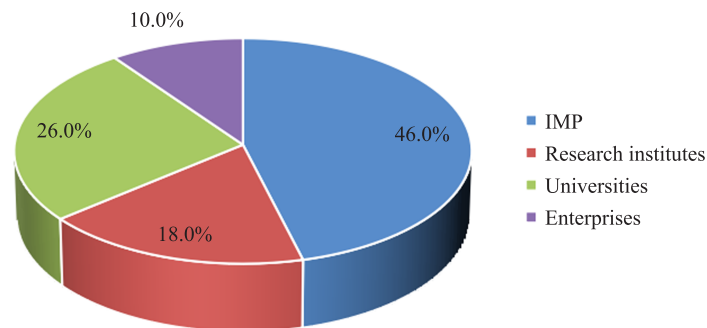
8 - 4 Operation Status of Multidisciplinary Integrated Physics Experiment Platform in 2022

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In 2022, Public Technology Service Center was functioning well with stable operation status, sufficient experimental tasks and excellent opening & sharing effectiveness, which provided high-quality technical support and testing service.

320 kV high-voltage platform with highly charged ions for multidisciplinary research has been working about 7 050 h, including 4 660 h for other domestic universities and research institutes. The percentage of operation efficiency has reached 76%. The beam time proportions allocated to users from Institute of Modern Physics (IMP), research institutes, universities and enterprises were 46%, 18%, 26% and 10%, respectively. The time proportions of different subjects were: 54% for the material irradiation, 29% for atomic and molecular dynamics, 12% for Plasma physics, 3% for Nuclear astrophysics, and 2% for the new ions development. The beam time proportion is displayed in Fig. 1. Ion beams of H, He, C, N, O, Si, Ne, Ar, Kr, Xe, CO, CH, H+He, Fe and the new commissioned elements Au, Zr, Cs, Al, I, Cl tested this year were totally 180 species and switched more than 250 times within the energy range of 15 keV~ 7 MeV. The platform has 26 user organizations, an increase of 5 compared with 2021. The platform supported 130 experiments, including 92 experiments for users from universities, research institutes and international cooperation projects, and 38 for users from IMP. The percentages for these experiments mentioned above are 71% and 29%, respectively. More than 50 papers related to our platform were published at peer reviewed journals such as *Appl. Surf. Sci.*, *Ceram. Int.*, *ACTA Mater.* and *Corros. Sci.*

(a)



(b)

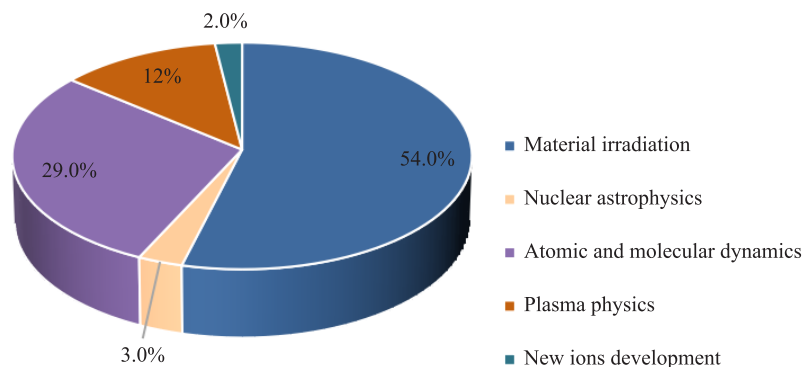


Fig. 1 (color online) (a) The beam time proportions allocated, (b) The time proportions of different subjects.

Material analysis platform has been operated for 24 021 h, and the average operation efficiency is 130.2%. In 2022, the platform has served 10 organizations, supported more than 450 experiments, and tested over 4 000 samples. 32 papers related to this platform have been published.

In 2022, the working hours of the Biomedical platform are 23 440 h, and the average operation efficiency is 116.5%. There are 22 cooperative organizations on this platform, 670 experiments were supported, and 16 000 samples were tested. There are 22 papers published related to the platform. Due to its outstanding contribution, the platform was awarded the title of “Excellent Platform” by Lanzhou Regional Center of Chinese Academy of Science.

In order to continuously improve the service level and quality of the platform, we organized 16 times of training related to the instrument operation and method development in 2022. Through the methods of “Going out and bringing in”, we organized technical seminars, participated in technical communications actively to broaden the horizons of technicians and optimize our service concept constantly.

IMP ranked the eighteenth among the 345 institutions and received award for excellence in the assessment of opening and sharing of major scientific research infrastructure and large-scale scientific research instruments of central-level universities and scientific research institutes, which was organized by the Ministry of Science & Technology and Ministry of Finance. Due to the sufficient resources, complete management system, good instrument operation, high utilization rate and sharing rate, outstanding operation effect and contribution, remarkable service and support effects, the Institute of Modern Physics has been awarded excellence for four consecutive years.

8 - 5 The Status of Superconducting RF Cavity System

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In 2022, the SRF team completed the production delivery of 21 superconducting cavities for the China initiative Accelerator Driven Sub-critical System (CiADS), High Intensity heavy-ion Accelerator Facility (HIAF) and Nuclotron-based Ion Collider facility (NICA). And 12 cavities for researching and development have been delivered too. 21 sets of power couplers for the SRF cavities have been finished too, and the RF condition is carrying on. 9 sets of new designed frequency tuners with driver pressure by helium gas have been completed, and the testing with cavity is going on. Last year, totally 25 cavities vertical testing were conducted to support the key project and SRF researching work. The details are showed in Fig. 1.

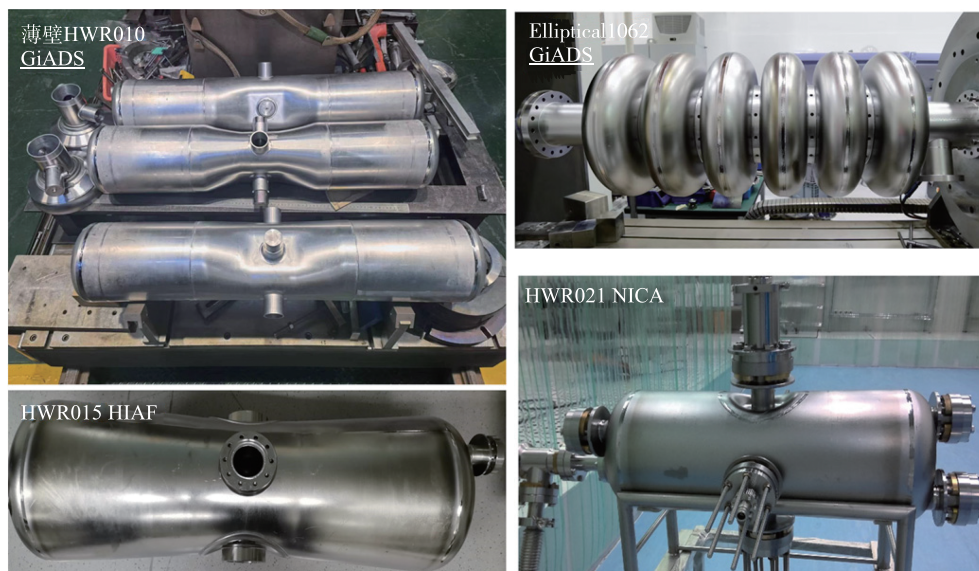


Fig. 1 (color online) The SRF cavity production for the projects of CiADS, HIAF and NICA.

The main R&D task for improving the stability of CiADS driving superconducting Linac system has shown positive progress. One of the critical paths, which are developed with coating copper layer on niobium, shows no negative affect on the SRF cavity performance. And 9 HWR010 cavities for CiADS are under coating process. The other critical paths with casting material on niobium have figured out the main issues for the declining of Q_0 and acceleration gradient. The casting method shows much higher thermal conductivity comparing with coating, which will be useful to improve the heat transfer of SRF cavity. The solution with aluminum layer casted on niobium has been tested. The engineering design with this technology is moving on.