Improvement of Vacuum Pressure of Annular-ring Coupled Structures for the J-PARC Linac

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The Japan Proton Accelerator Research Complex (J-PARC) linac is an injector to a 3-GeV rapid cycle synchrotron. The energy upgrade of the linac from 181 to 400 MeV was completed in January 2014, and then beam commissioning and increasing the beam power of a user operation gradually proceed. In this energy upgrade, 25 annular-ring coupled structure (ACS) modules [1] were additionally installed at the downstream of the 191-MeV separated-type drift tube linac. To keep a stable operation in future, we should make adequate provision against possible future contingencies, for example, of a discharge in a cavity. Improving the vacuum pressure is one of the solutions of such discharge issue. More high pumping speed and/or more less outgas are required to decrease an achieved pressure. Non-evaporable getter (NEG) pumps are possible candidate [2]. This is because that it does not require power cables, so that it is easy to be installed to an already existed cavity. It, however, cannot evacuate noble gas and it has a lifetime. Thus, we measured a residual gas component of a small vacuum chamber evacuated by a NEG pump to examine the installation procedure, including activation, for the existed cavity. In this paper, we present the measurement results and the perspective of vacuum pressure improvement in future.

References

[1] H. Ao et al., Phys. Rev. ST Accel. Beams, 15, 051005 (2012)

[2] H. Ao at el., in Proceedings of the 4th International Particle Accelerator Conference, 3845 (2013).