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## **ARIEL E-linac Cryogenic System: Commissioning and First Operational Experience**

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The Advanced Rare Isotope Laboratory (ARIEL) is a major expansion of the Isotope Separator and Accelerator (ISAC) facility at TRIUMF. A key part of the ARIEL project is a 10 mA 50 MeV continuous-wave superconducting radiofrequency (SRF) electron linear accelerator (e-linac). The 1.3 GHz SRF cavities are operated at 2 K. HELIAL LL helium liquefier by Air Liquide Advanced Technologies (ALAT) with a tunable liquid helium production [1] was installed and commissioned in Q4'2013. It provides 4 K liquid helium to one injector and one accelerator cryomodule that were installed and tested in 2014 [2]. The 4 K to 2 K liquid helium transition is achieved onboard of each cryomodule. The cryoplant, LHe and LN2 distributions, sub-atmospheric (S/A) system and cryomodule were successfully commissioned and integrated into the e-linac cryogenic system. Required pressure regulation for both: 4 K cryoplant in the Dewar and 2 K with the S/A system was achieved under simulated load. Final integration tests confirmed overall stable performance of the cryogenic system with two cryomodule installed. The paper presents details of the cryogenic system commissioning tests as well as highlights of the initial operational experience.

### References

1. A. Koveshnikov et al. "Overview of the Cryogenic System for the ARIEL e-LINAC at TRIUMF", in *Advances in Cryogenic Engineering 57*, edited by J. G. Weisend II, et al., AIP Press, 2012, pp.1432-1439.
2. A. Koveshnikov et al. "Integration and Commissioning of the ARIEL e-linac Cryogenic System at TRIUMF", in *Proceedings of International Cryogenic Engineering Conference*, Enschede, Netherlands, 2014.

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