

High Q and high gradient performance of the first medium-temperature baking 1.3 GHz cryomodule

Monday 26 August 2024 16:00 (2 hours)

The world's first 1.3 GHz cryomodule containing eight 9-cell superconducting radio-frequency (RF) cavities treated by medium-temperature furnace baking (mid-T bake) was developed, assembled and tested at the Institute of High Energy Physics (IHEP), Chinese Academy of Sciences for the Dalian Advanced Light Source (DALs). The 9-cell cavities in the cryomodule achieved an unprecedented high average intrinsic quality factor (Q_0) of $3.8E10$ at 16 MV/m and $3.6E10$ at 21 MV/m in the horizontal test. The cryomodule can operate stably up to a total continuous wave (CW) RF voltage greater than 191 MV, with an average cavity usable accelerating gradient of more than 23 MV/m. The results significantly exceed the specifications of DALs and the other high repetition rate free electron laser facilities (LCLS-II, LCLS-II-HE, SHINE, S3FEL etc.). This paper reviews the cryomodule performance and discusses some important issues in cryomodule assembly and testing.

Footnotes

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Primary author: Prof. ZHAI, Jiyuan (Institute of High Energy Physics)

Co-authors: HE, Feisi (Institute of High Energy Physics); LIN, Haiying (Institute of High Energy Physics); SHA, Peng (Institute of High Energy Physics); WANG, Qun Yao (Institute of High Energy Physics); GE, Rui (Institute of High Energy Physics); HAN, Ruixiong (Institute of High Energy Physics); JIN, Song (Institute of High Energy Physics); PAN, Weimin (Chinese Academy of Sciences); MI, Zheng (Chinese Academy of Sciences)

Presenter: Prof. ZHAI, Jiyuan (Institute of High Energy Physics)

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