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Tolerance analysis of the 197 MHz prototype crab cavity for EIC

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The Electron-Ion Collider (EIC) at BNL requires several crabbing systems that will be operating at 197 MHz and 394 MHz, to compensate for the loss of luminosity due to the crossing angle of the colliding beams. Two 197 MHz crab cavity cryomodules containing two cavities each will be installed in the Hadron Storage Ring at the IP6 interaction region. Due to its large size compared to previously developed crabbing cavities, the 197 MHz crabbing cavity system was identified as one of the critical rf systems in the EIC. Therefore, a cavity has been designed including the ancillaries, and is in the fabrication process, in-house at Jefferson Lab. This cavity will be used to verify the required performance of the first 197 MHz crabbing cavity. Detailed tolerance analysis has been carried out considering cavity operating frequency and HOMs. This paper presents the results from the study in comparison with the achieved tolerances during the fabrication of cavity components.

Footnotes

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