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Mechanical design and 3-D coupled RF, thermal-structural analysis of the quarter wave stub for 197 MHz crab cavity

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Two distinct crab cavities are planned to compensate the luminosity loss of the 25 mrad crossing angle at the Electron Ion Collider (EIC) interaction point. The crab cavity systems being developed will operate at either 197 MHz or 394 MHz and the 197 MHz system will provide up to 11.5 MV of transverse voltage with up to 60 kW of fundamental mode power with a coaxial coupler. The 197 MHz crab cavity fields and high power transmission characteristics of the coaxial coupler require water cooling of the inner conductor. To introduce water into the inner conductor a coaxial tee with a quarter-wavelength stub is proposed with the water supply/return located at the zero voltage plane. This paper provides an overview of the current design, electromagnetic, thermal and structural analyses for the Quarter Wave Stub.

Footnotes

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