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TUNING AND LOW POWER TEST OF THE 325 MHZ IH-DTL AT TSINGHUA UNIVERSITY

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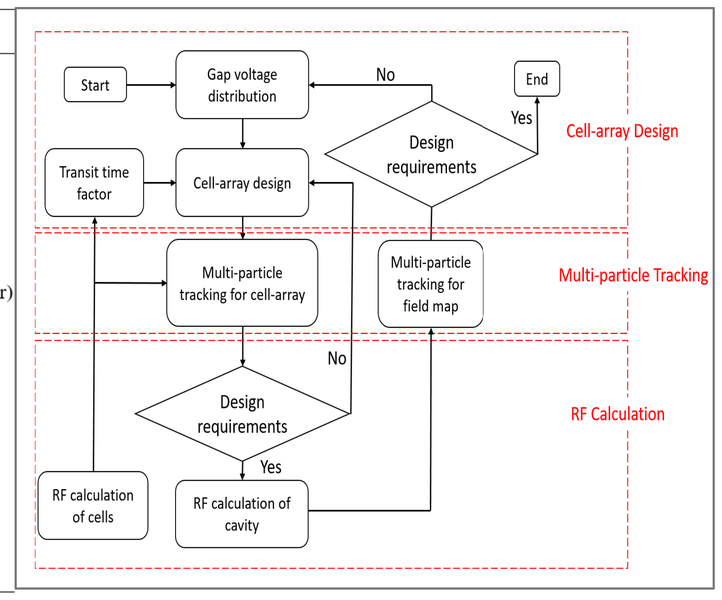
ABSTRACT

An interdigital H-mode drift tube linac (IH-DTL), which accelerates proton beam from 3 MeV to 7 MeV has been designed and assembled at Tsinghua University. There are 8 plungers in the 1 m tank and one co-axial coupler is used to feed the power. The frequency is tuned to 325MHz. The field distribution is measured by the bead perturbation measurement. The gap voltage error has been tuned to be smaller than ±3.0%, which satisfies the design requirement. Details of the low power test is presented.

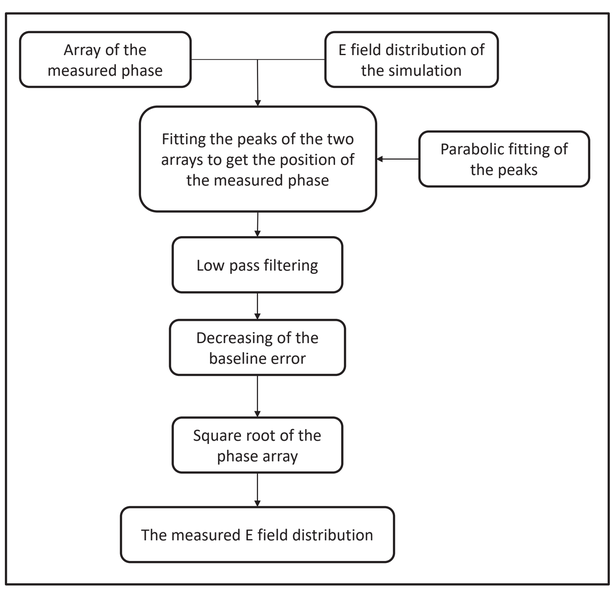
Design of the IH DTL

Parameters	Value
Frequency [MHz]	325
Injection energy [MeV]	3.0
Extraction energy [MeV]	7.0
Peak current [mA]	15
Pulse width [μs]	10–40
Energy spread	±0.6% (after debuncher)
Cavity length [m]	1.0
Cell number	21
Q0	11300
Power [kW]	151 (1.0×CST)
Z [MΩ/m]	193
ZTT*$cos^2(\phi)$ [MΩ/m]	107

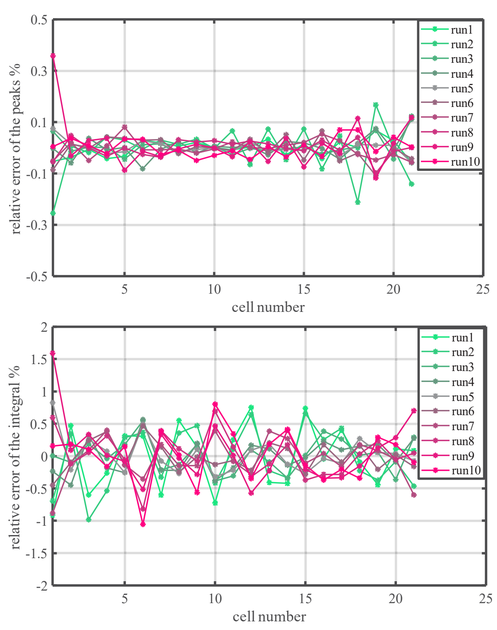


Results of low power test and tuning

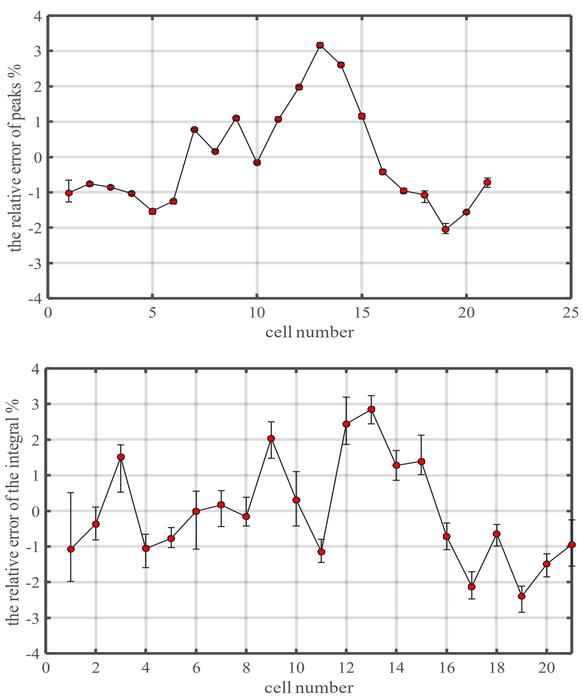
The date processing



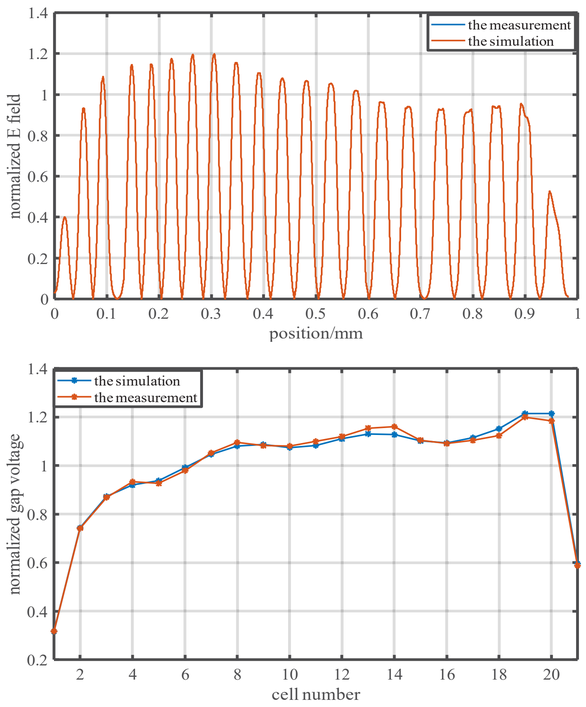
The repeatability of measurement



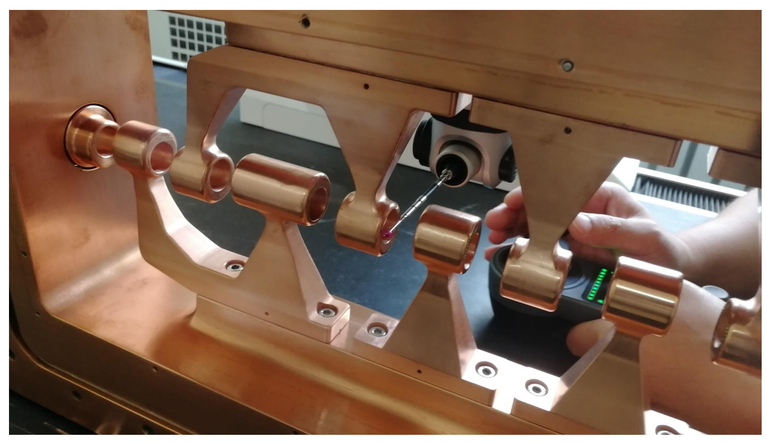
The error of E field after the tuning

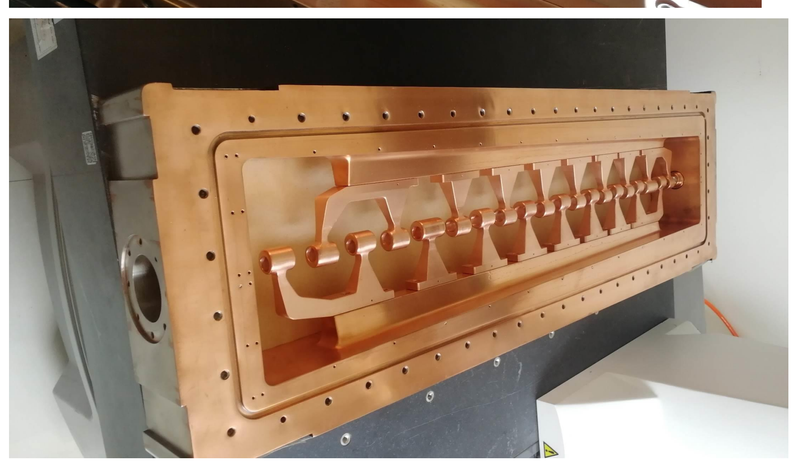


The measured field distribution after the tuning



Assembly and alignment





Low power test platform

CONCLUSION

The fabrication and assembly of the 325 MHz IH DTL have been done. The tuning and the low power test are finished. A bead perturbation method has been adopted to measure the E field distribution on the axis. The relative error between the measurement and the design is smaller than ±3.0% in the majority of the cells which satisfies the design requirement. The Q_0 is bigger than 7000 and the power dissipation is smaller than 244 kW.

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