

「小型加速器による小型高輝度X線源と イメージング基盤技術開発」

(スポーク型超伝導空洞開発に於ける
設計及び非破壊検査)

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H27年度の計画

- マルチパクター（MP）解析
- EBW治具開発
- 非破壊検査の設計検討

久保さんが休養中のため、MP解析は昨年度
参加していたエンリコさんに協力要請

Multipactor

Spoke cavity with elliptical corner

IPAC15の発表より

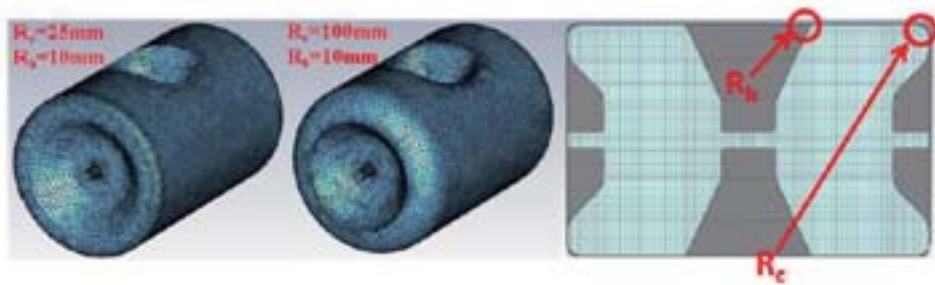


Figure 1: Examples of optimized cavity geometries. Both have optimized geometry and similar RF characteristics, but a detailed design (i.e., a corner radius of the end-plate in this example) is different from each other.

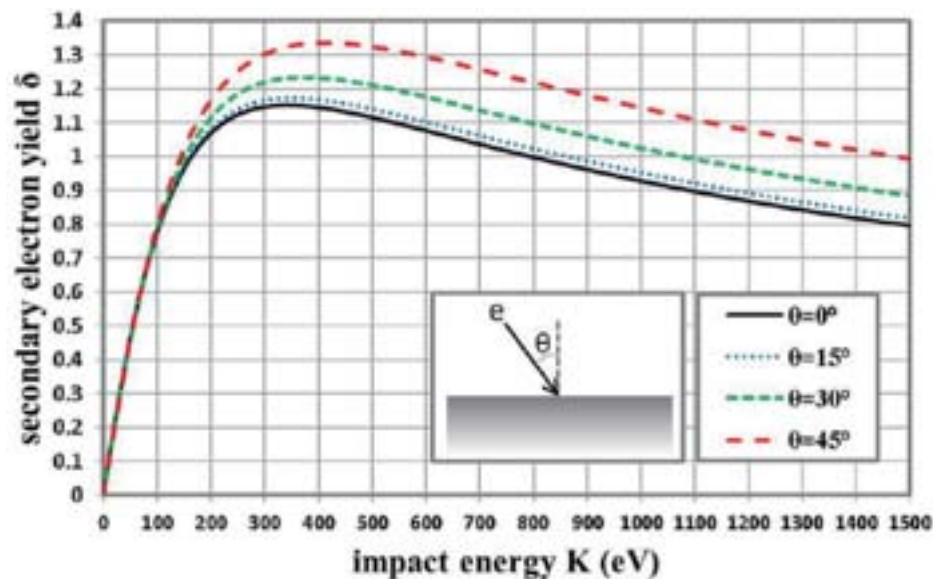


Figure 2: Furman model SEY as functions of impact energy. Each curve corresponds to an impact angle.

MULTIPACTOR SIMULATIONS IN 325MHZ SUPERCONDUCTING SPOKE CAVITY FOR AN ELECTRON ACCELERATOR

WE PMA 053

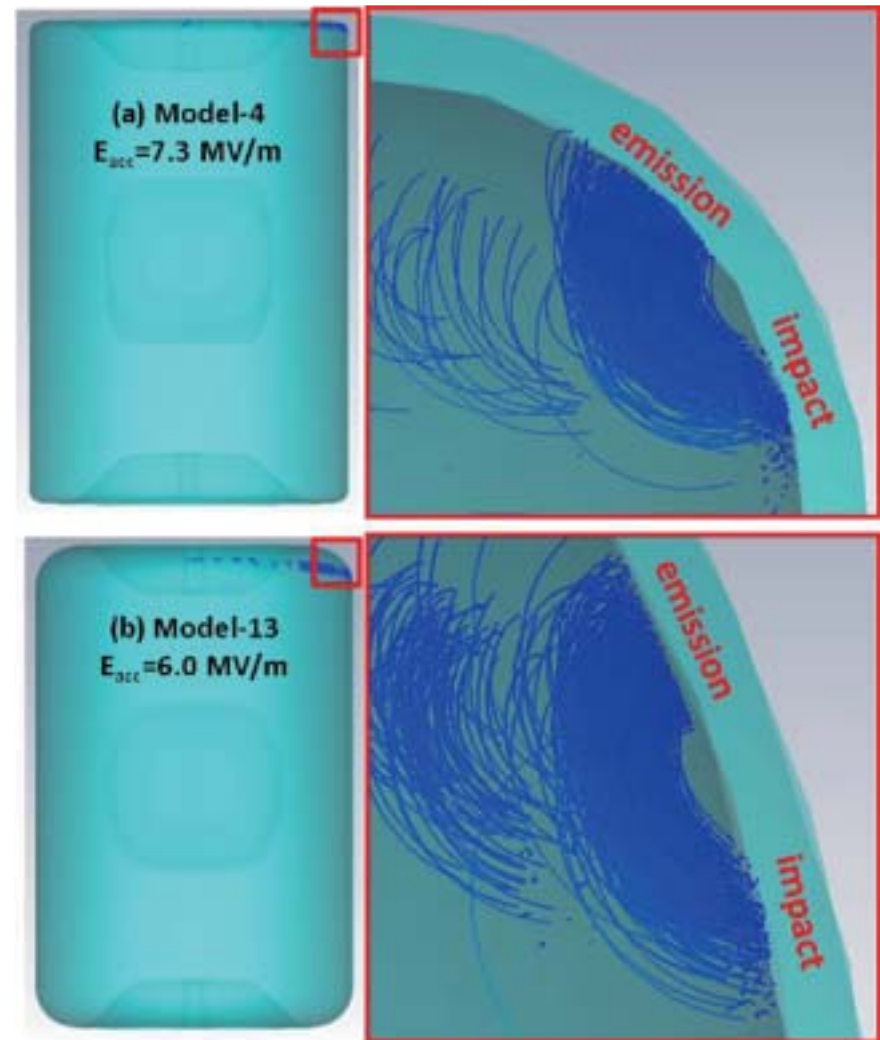


Figure 3: Examples of MP electron trajectories on end-plate corners.

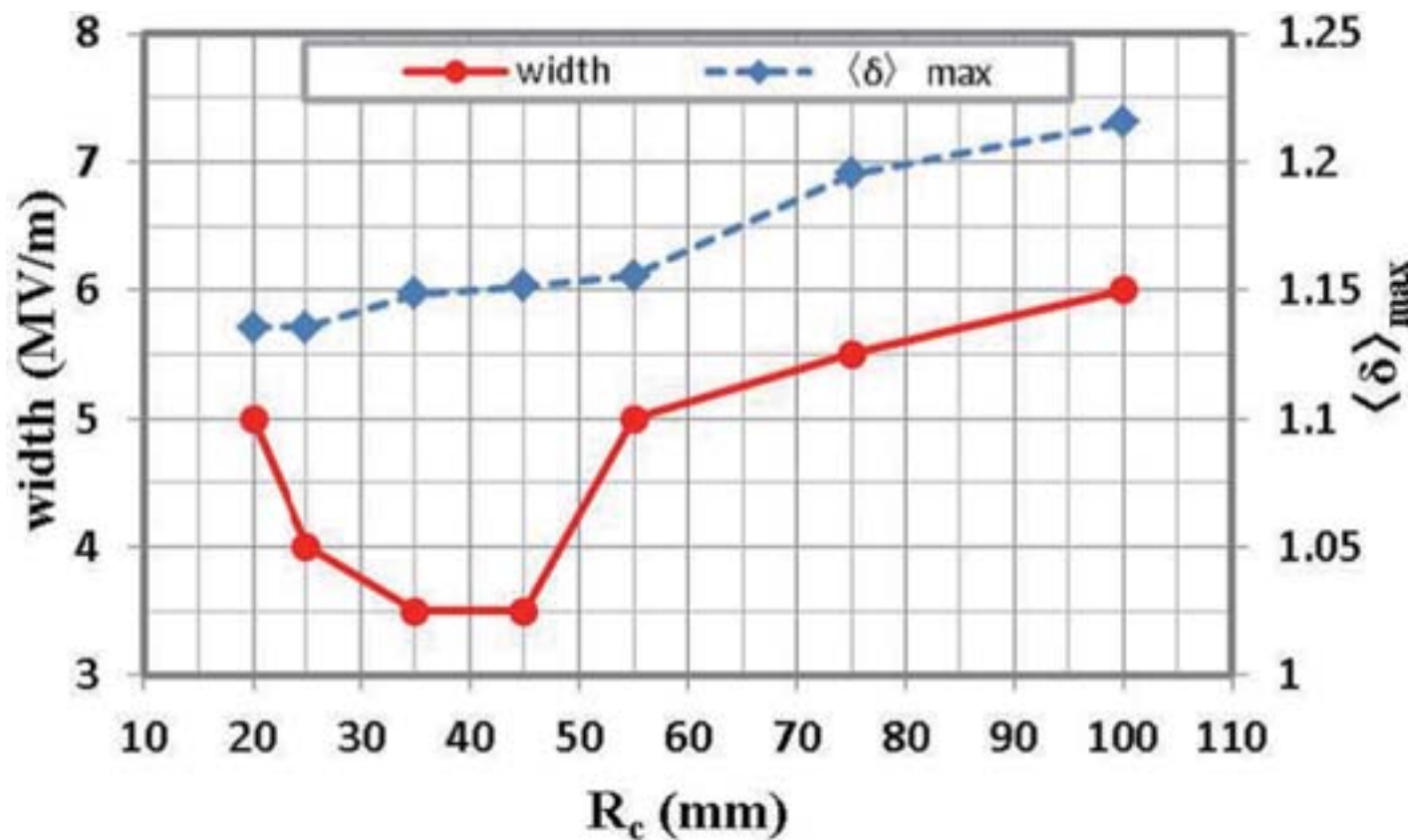
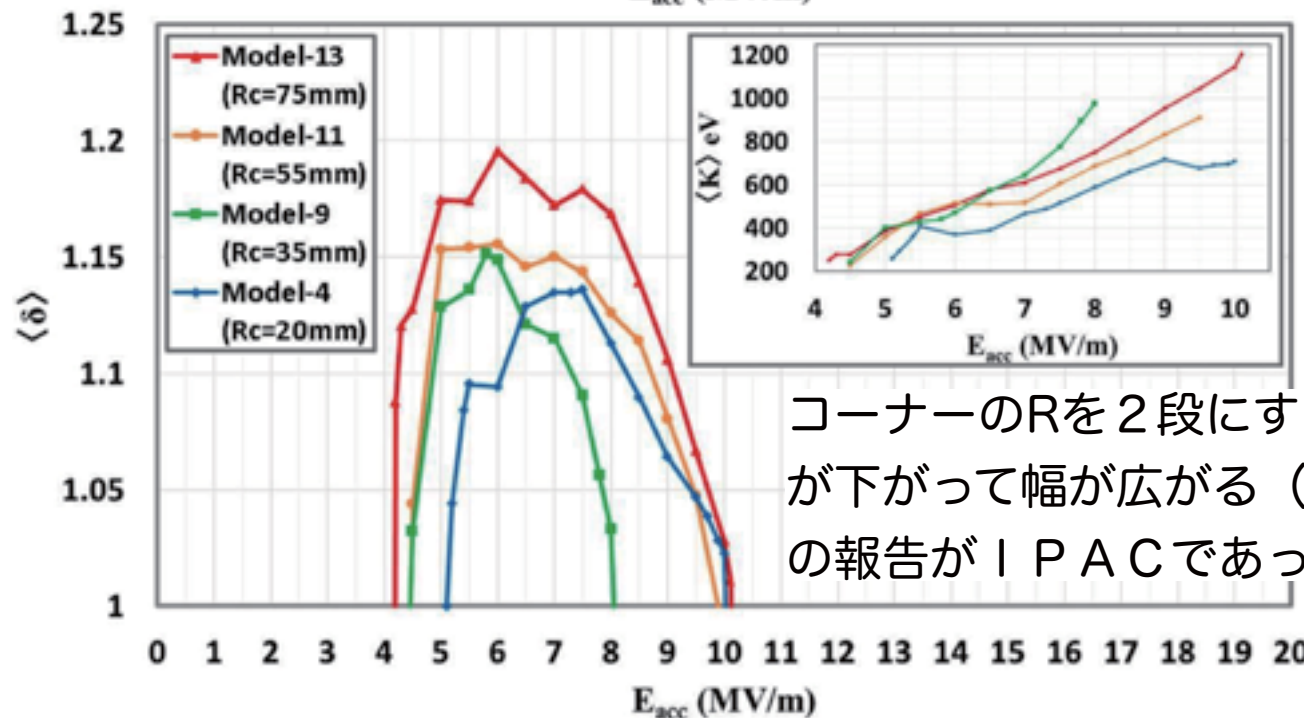
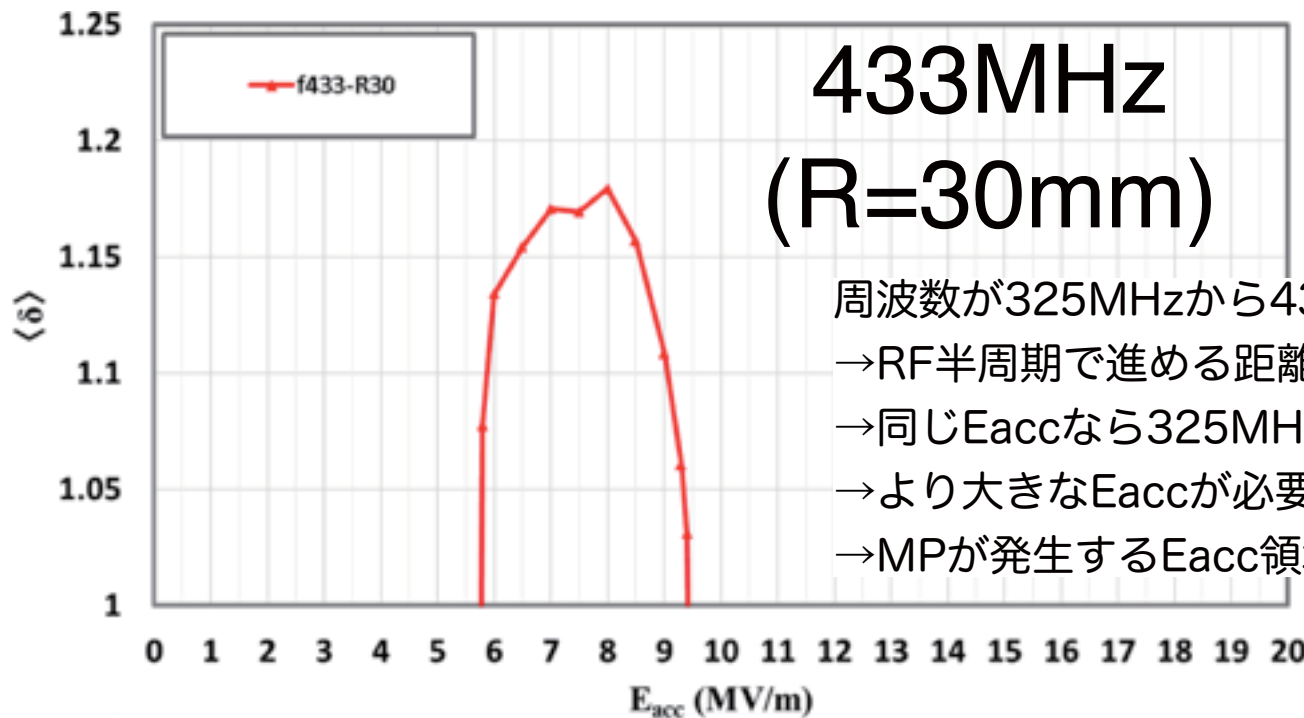


Figure 5: Width of range of E_{acc} inducing MP and the maximum value of $\langle \delta \rangle$ as functions of the corner radius of the end-plate, R_c , for the case that MP occurs near the end-plate corner.

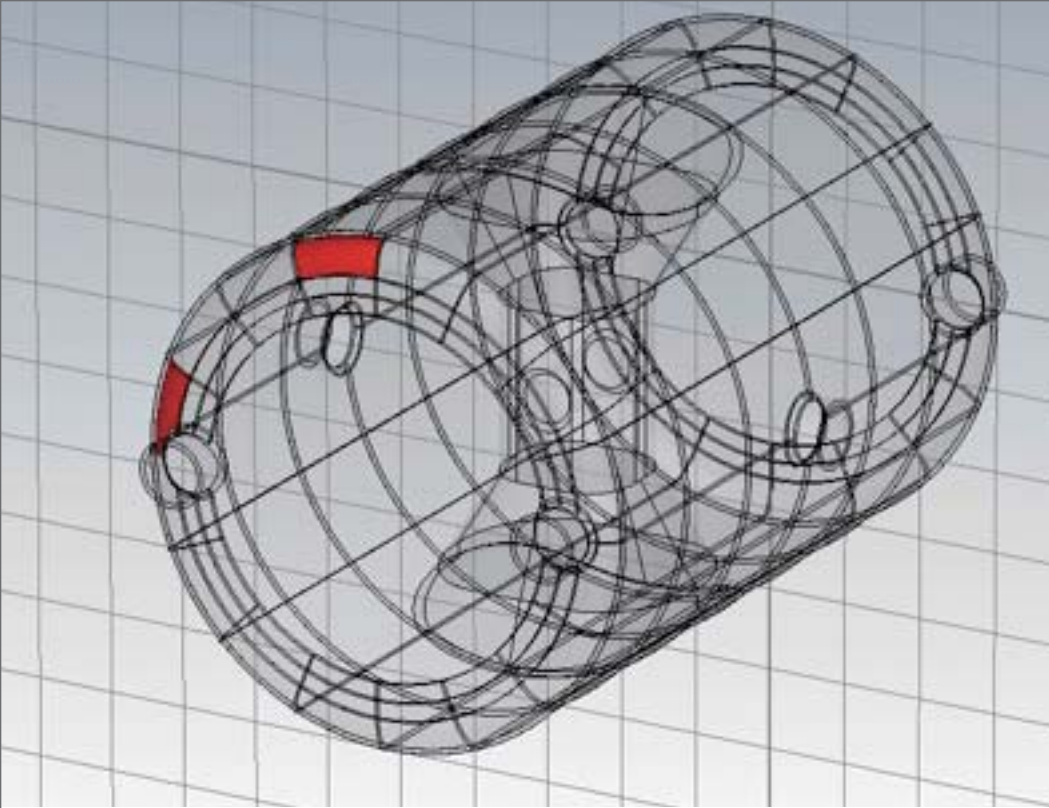
2015.5.11 久保

30x433/325
=40mm相当

433MHz (R=30mm)

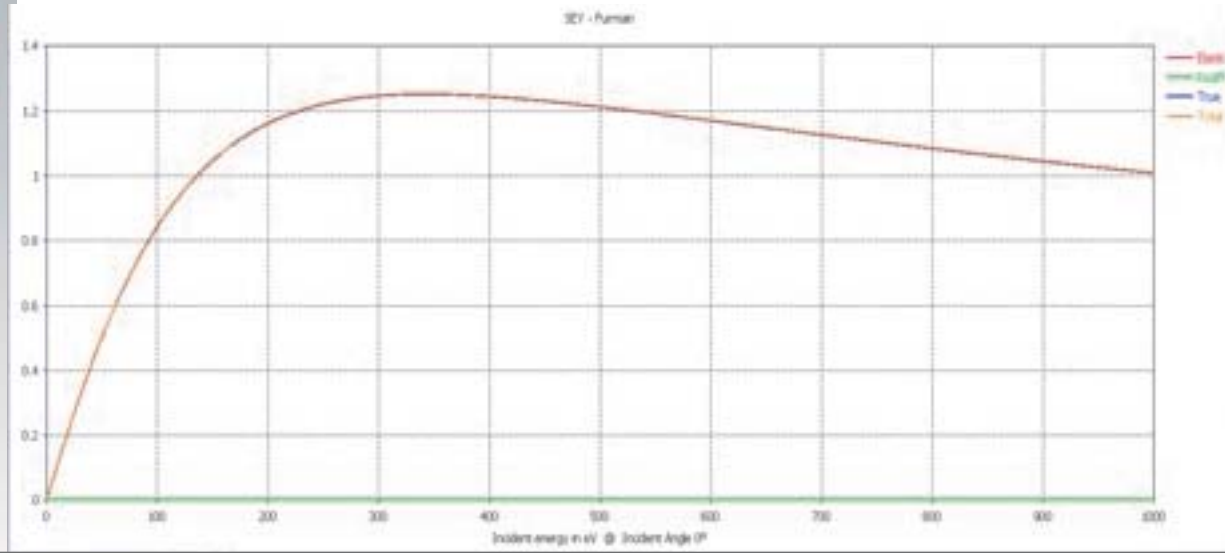
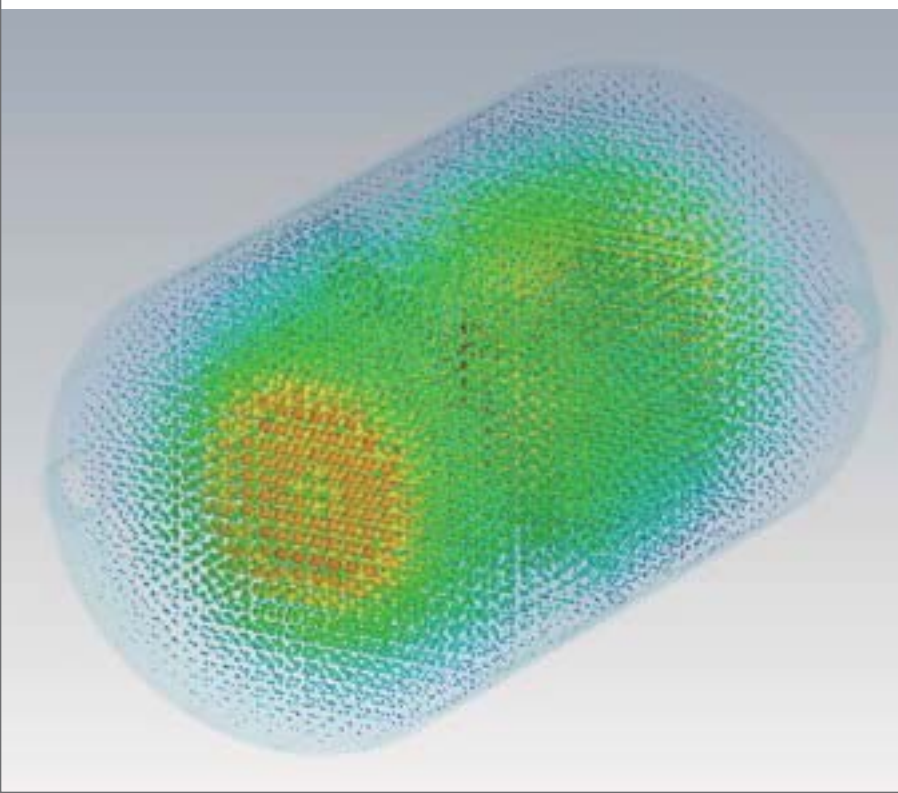


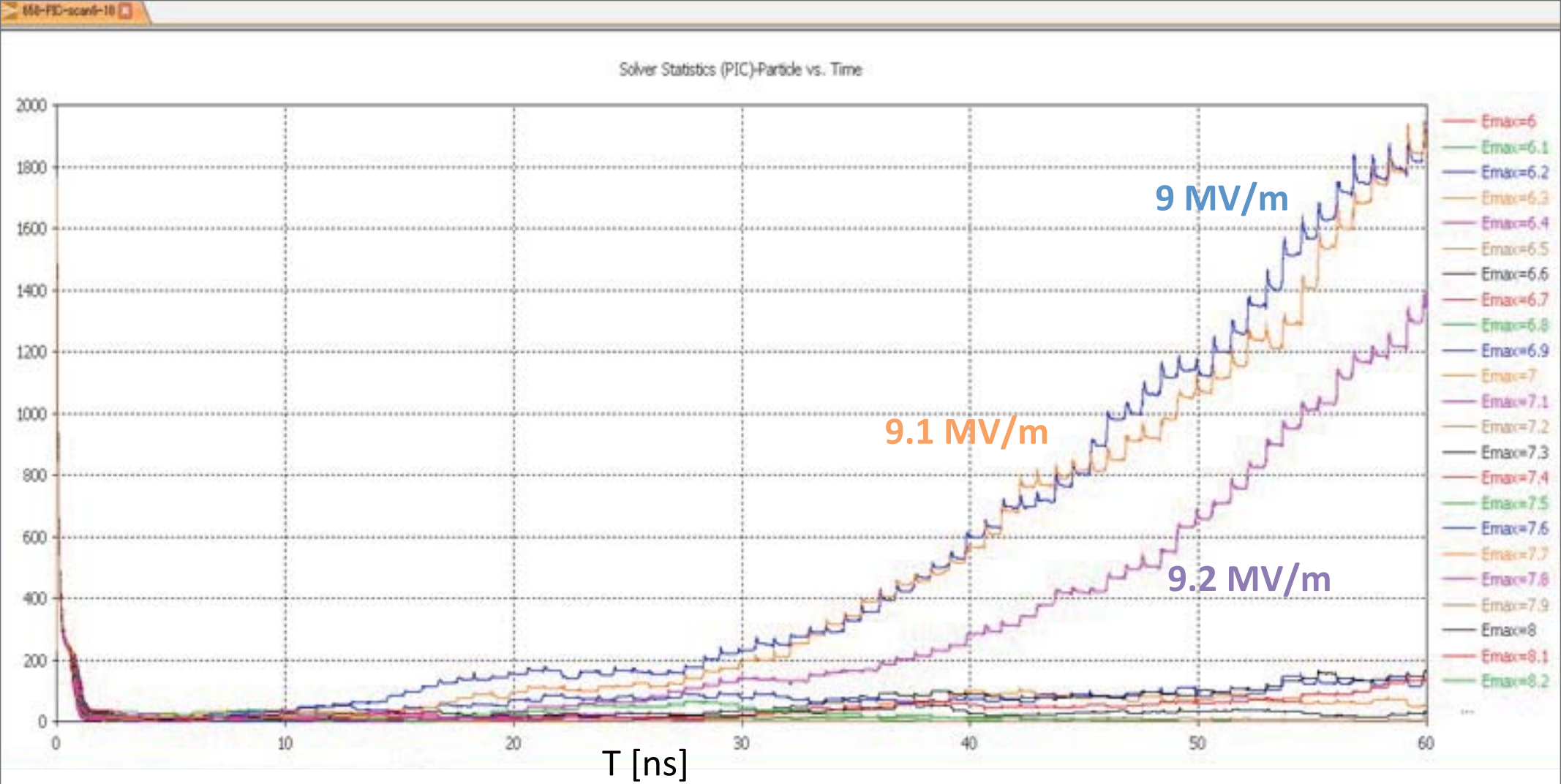
325MHz (Fig.4)



PIC model

- 2.7×10^6 mesh cells
- 2 regions for electron sources:
 - One close to the input port
 - One on the spoke meridian
- Simulation time 60ns
- Resonant mode: 649MHz
- Initial electron emission: 1800 particles
- The niobium surface is considered as Ar cleaned, SEY curve for normal incident electron is shown below.
- The corner parameters are as defined by Sawamura-san: $R_{\text{corner}}=20\text{mm}$
 $\text{ellipse_ratio}=0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0$

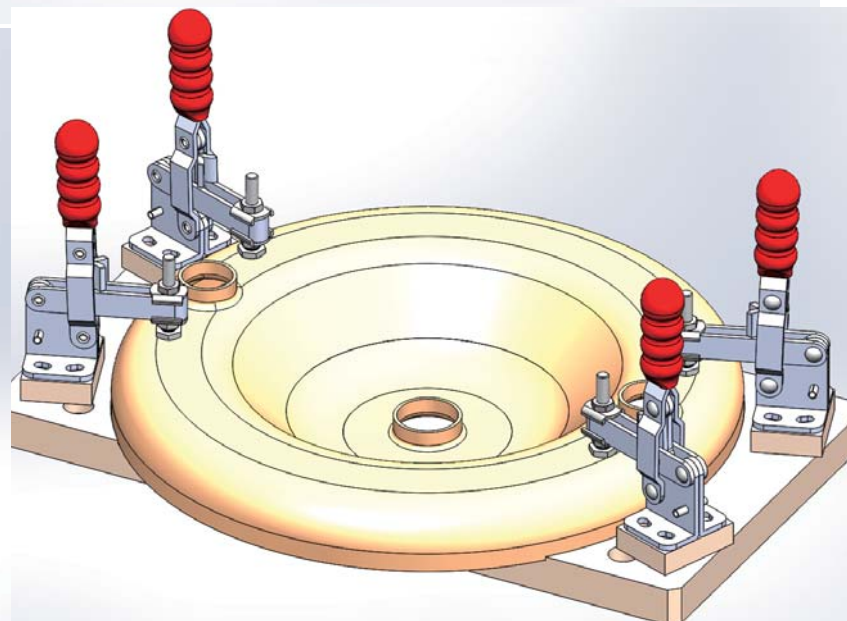
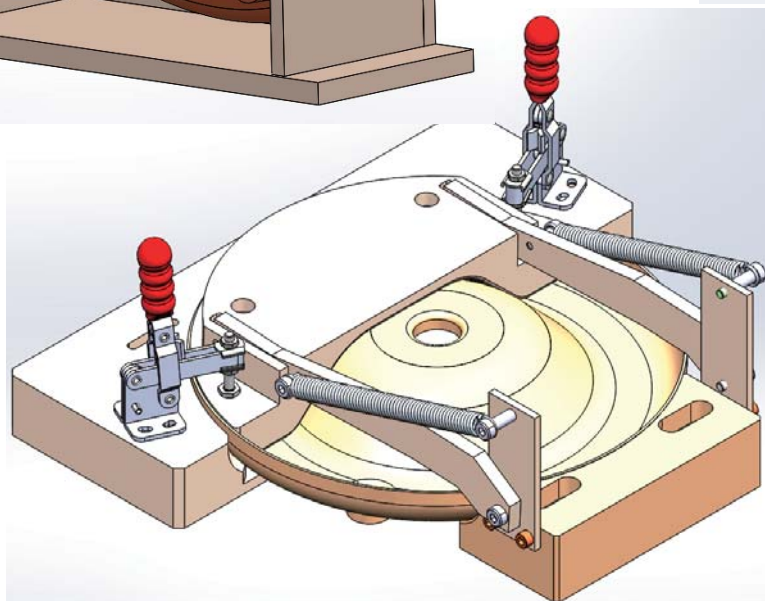
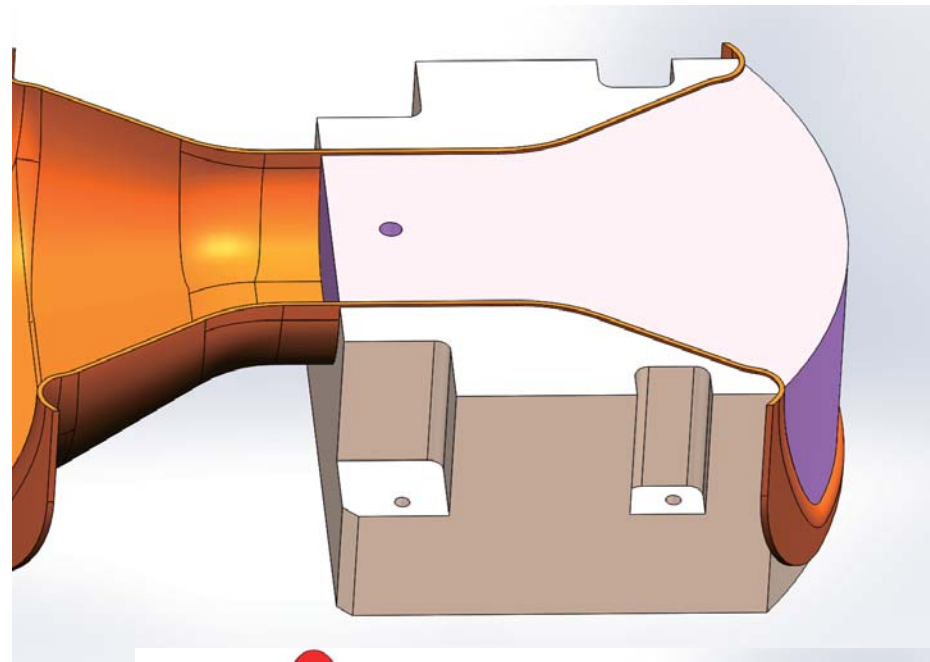
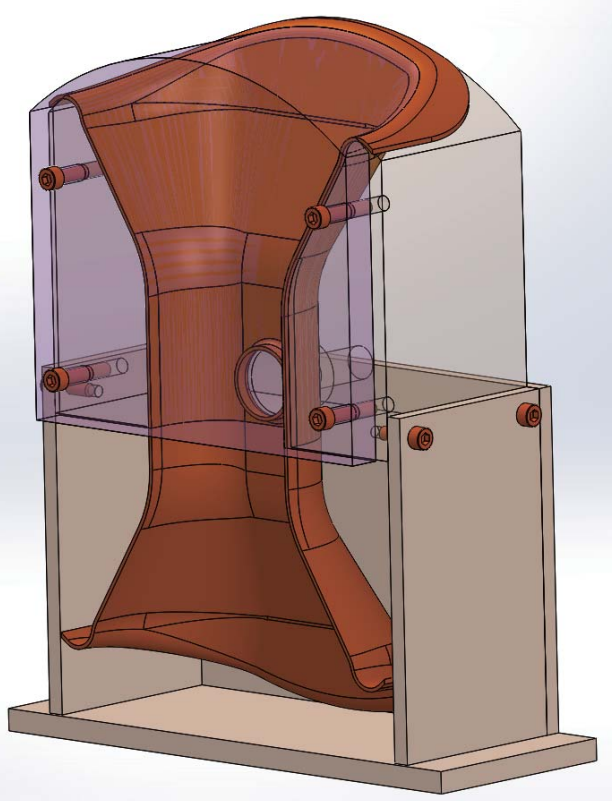




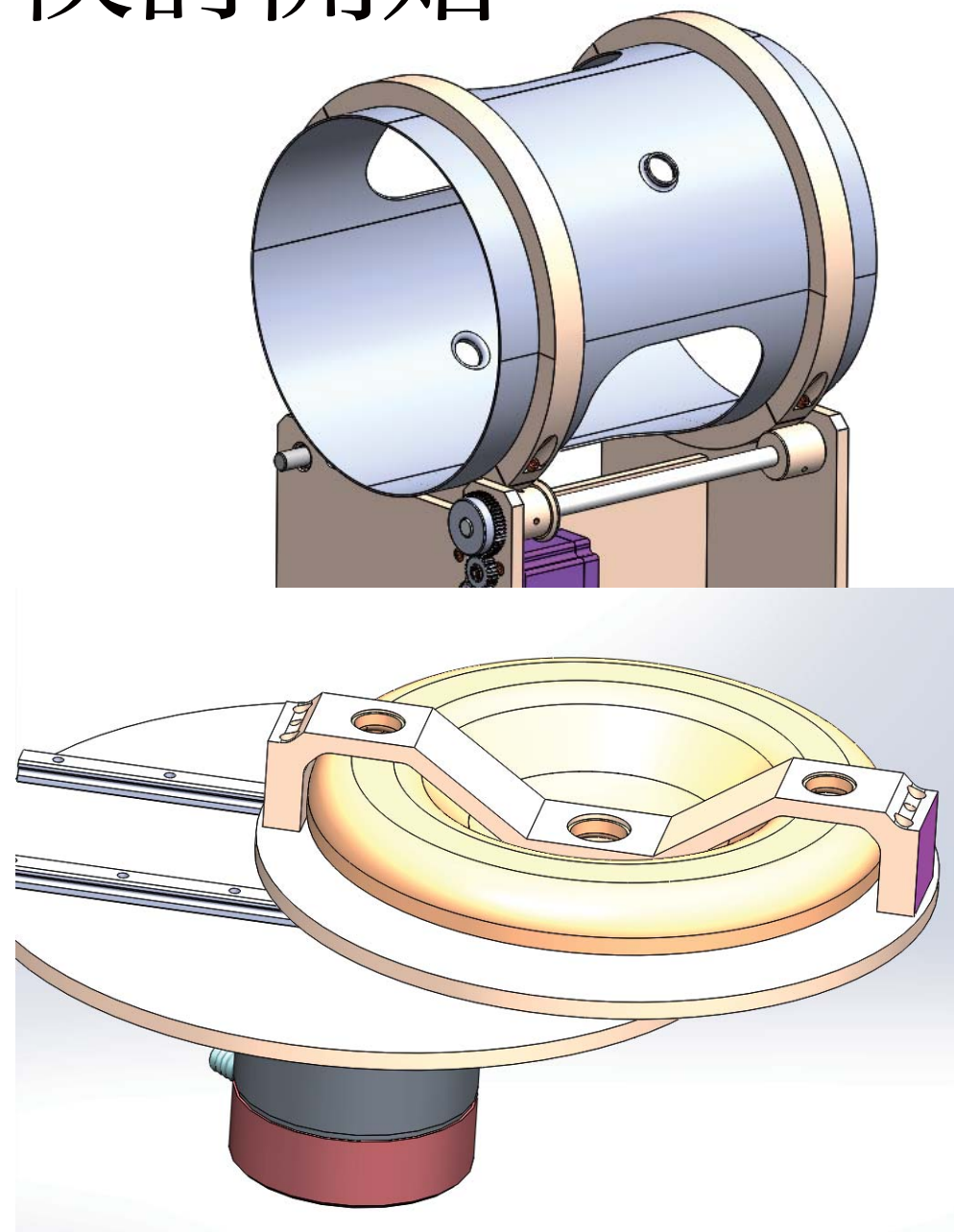
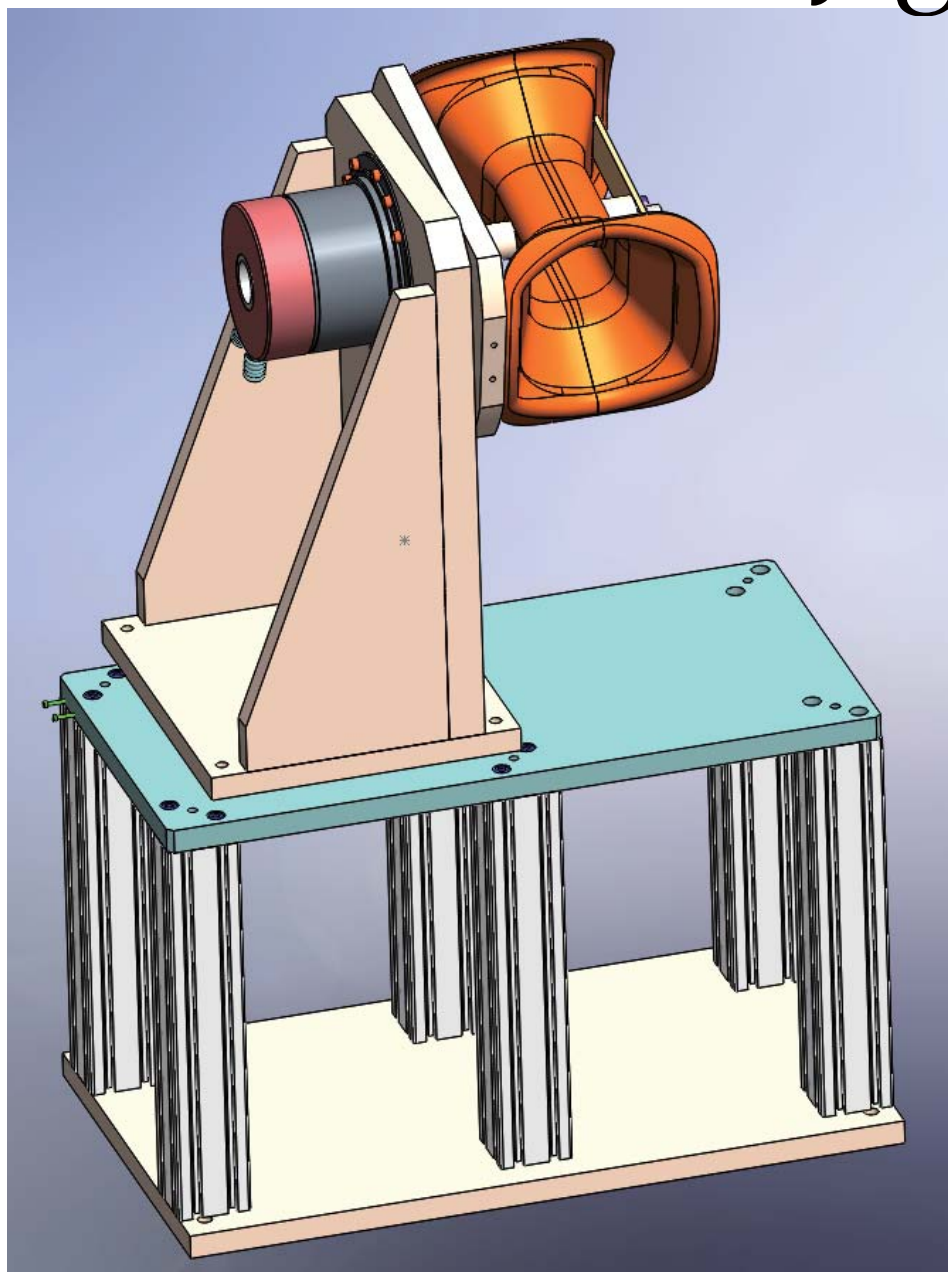
Accelerating field scan from 6MV/m to 10 MV/m every 0.1MV/m.
It shows multipacting between 9 and 9.2 MV/m.

EBW治具検討

Trimming Jig 検討開始



EBW Jig 検討開始



非破壊検査

周波数変更によりサイズ減

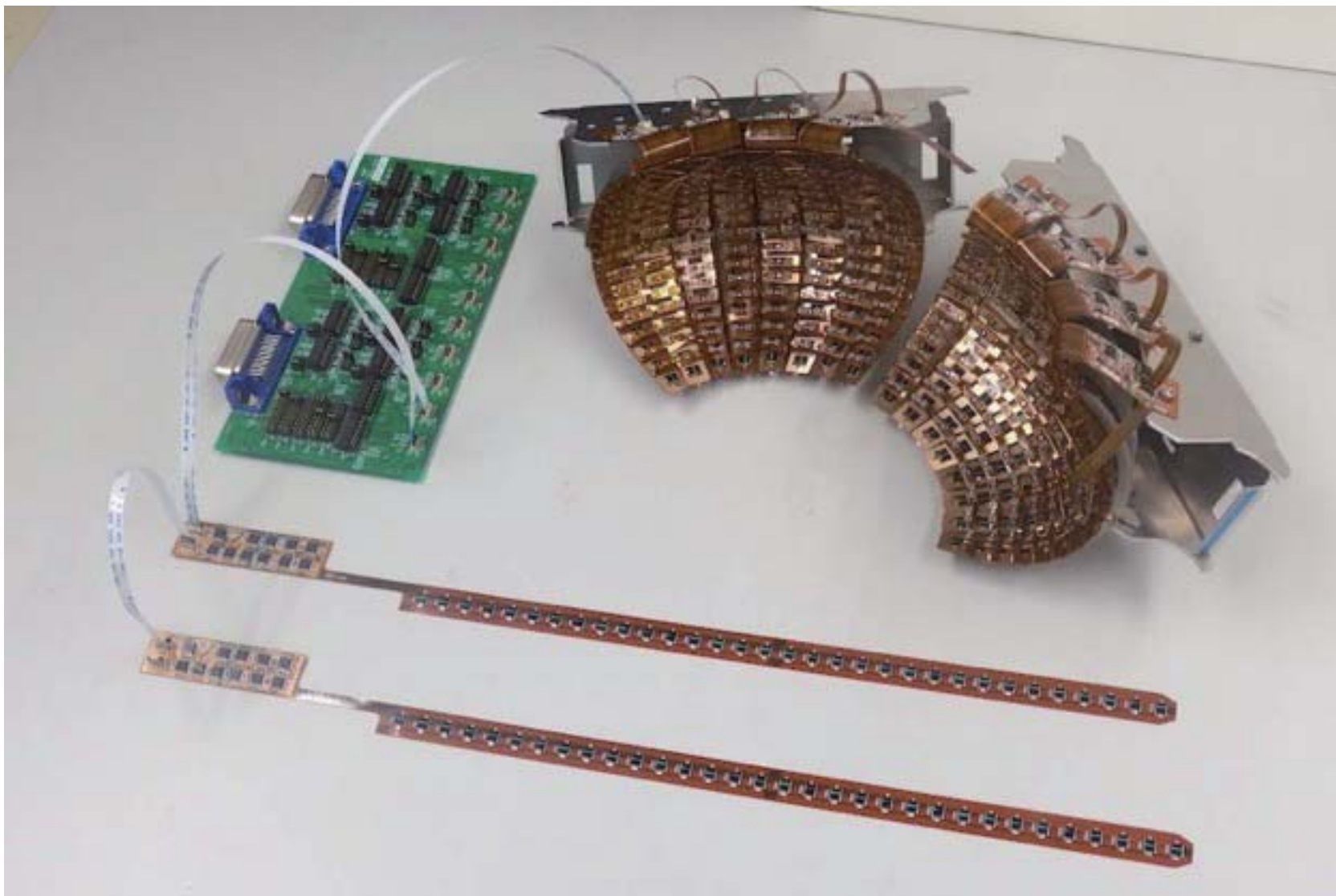
→ビームボア径が減ったので、カメラ挿入が困難。

再検討中

X, Tマップ

→センサー(大量に実装するチップ抵抗)の絶縁方法の改良

楕円空洞用のXTmap



チップ抵抗の絶縁

