High Power Tests of Brazeless Accelerating Structures

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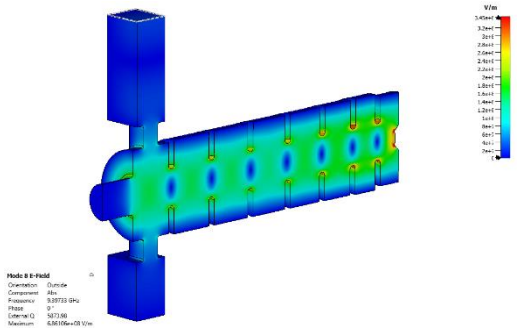
Collaborators: AWA (John Power) and SLAC (Valery Dolgashev)

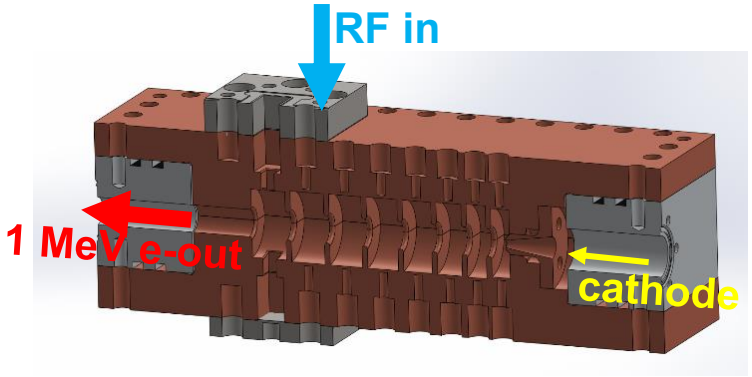
A typical accelerating structure is a set of copper resonators brazed together. This multi step process is expensive and time consuming. In an effort to optimize production process for rapid prototyping and overall reduction of accelerator cost we developed a split block brazeless accelerating structure. In such structure the vacuum is sealed by the use of knife edges, similar to an industry standard conflat technology.

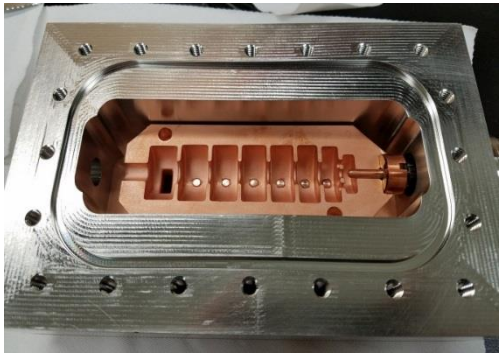
- **Fabrication simplification and Price reduction for accelerators**
- Originally based on Euclid's Patent US9913360B1
- Funding Source: DoE SBIR Grant #DE-SC0017749
- Tightly in collaborations with AWA (PoC: John Power) and SLAC (PoC: Valery Dolgashev)
- Three types of structure were tested in 2020-2021
  - 1 MeV low energy accelerators tested at Euclid
  - Short pulse high power wakefield power extractor tested at AWA
  - Side-coupled X-band accelerating cavities tested at SLAC

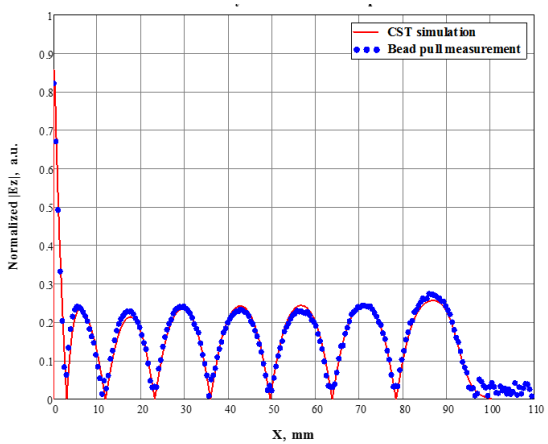
Poster 1208, IPAC2021

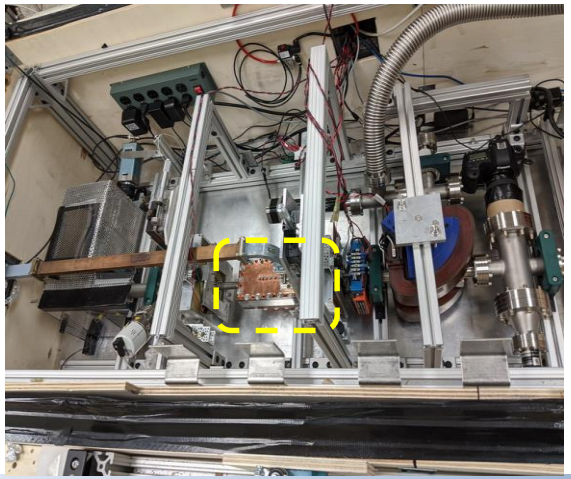
A Prototype: 1 MeV, 50W beam power

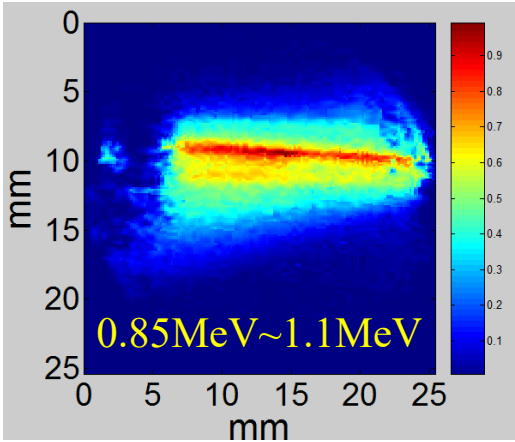






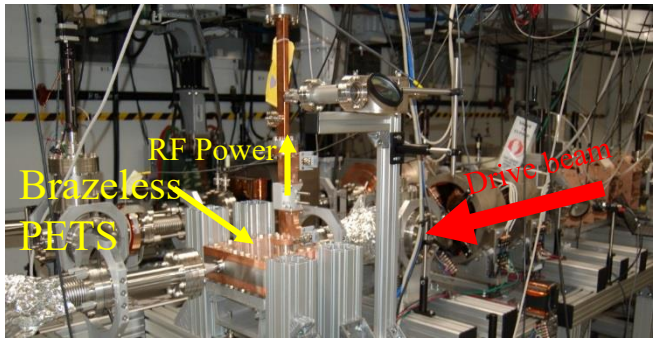


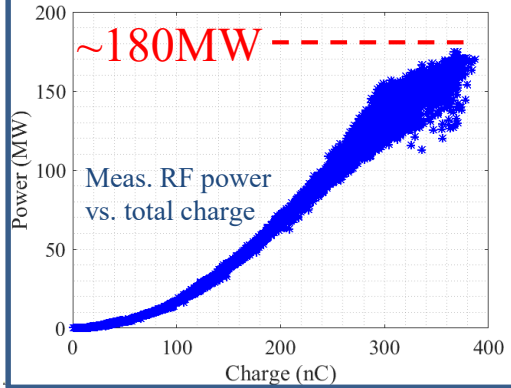


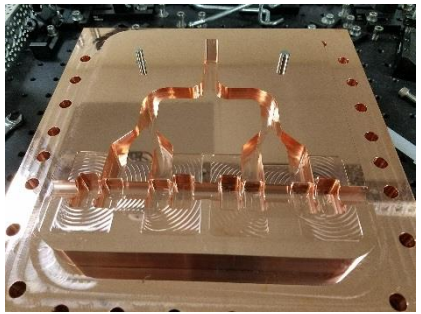


Technology can be scaled up for higher energy and power

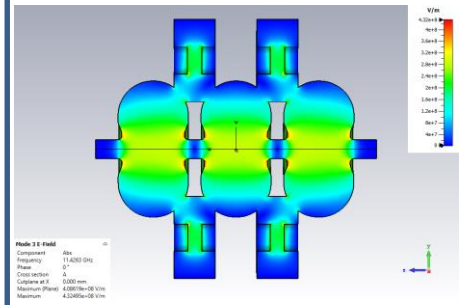
Example I: microwave generation at Argonne Wakefield Accelerator Facility

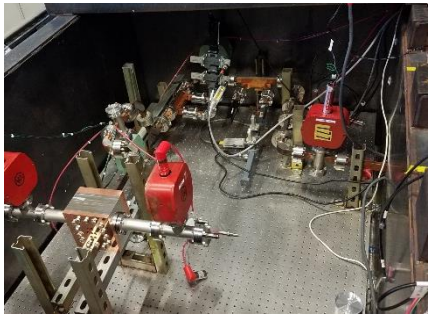


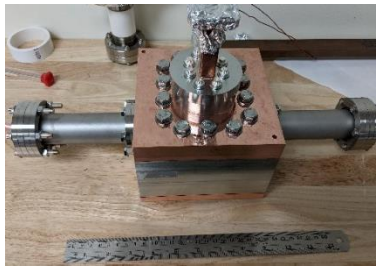


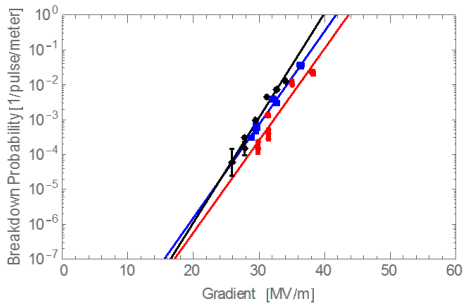


Example II: Side-coupled accelerating structure tested at Stanford Linear Accelerator Center









Details Refer to Poster 3205

Remarks

- Three types of structures using the similar brazeless fabrication process were built and tested in the past 12 months. It shows its advantages in terms of short fabrication period and ease of tolerances, in particular for the low energy accelerators.
- Short pulse (~10ns) operation seems not be a problem for 100s MW power (need to be confirmed after the examination).
- The side-coupled cavities require special attention to the high magnetic fields; need to avoid the sharp edge of the coupling cell.