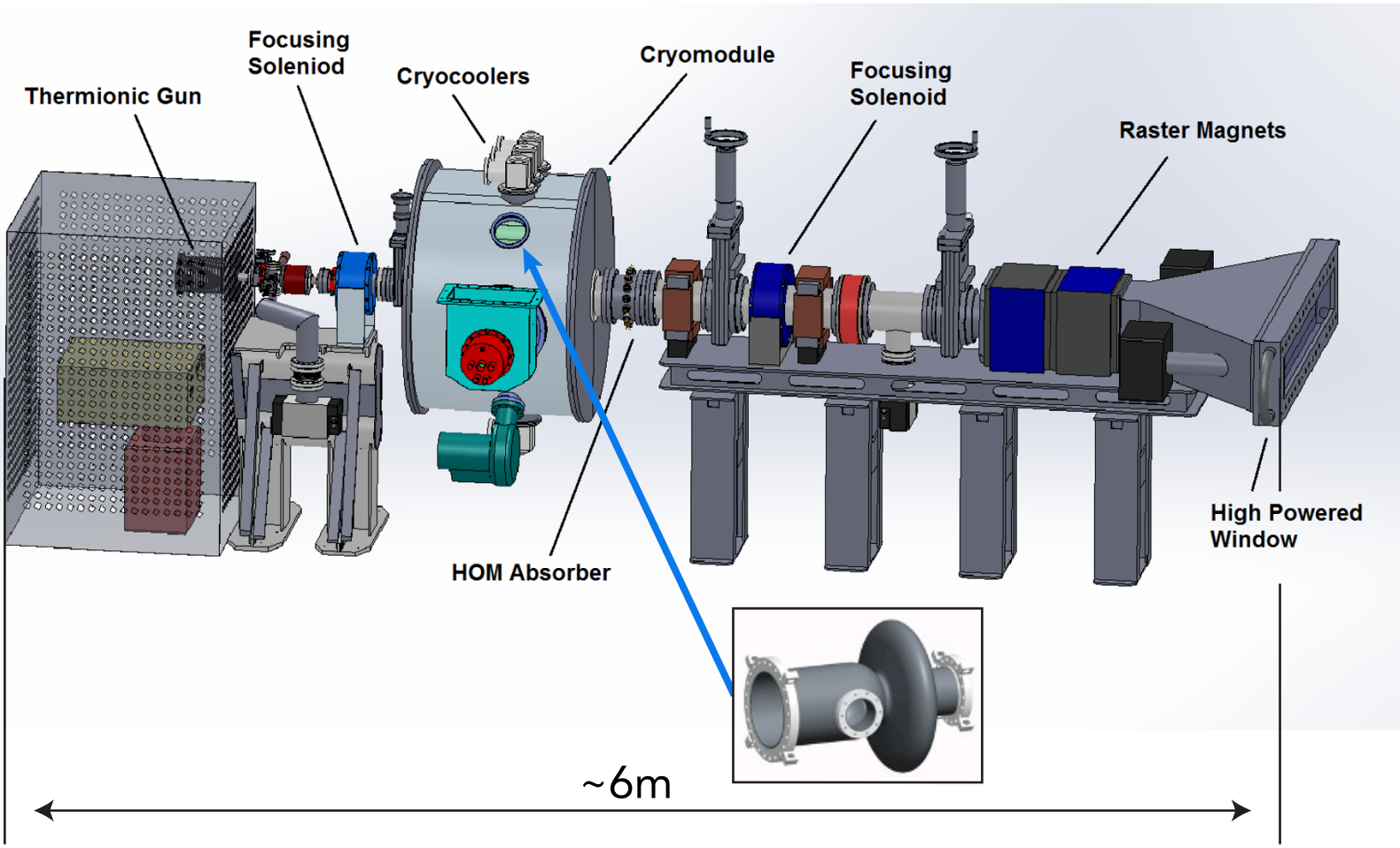
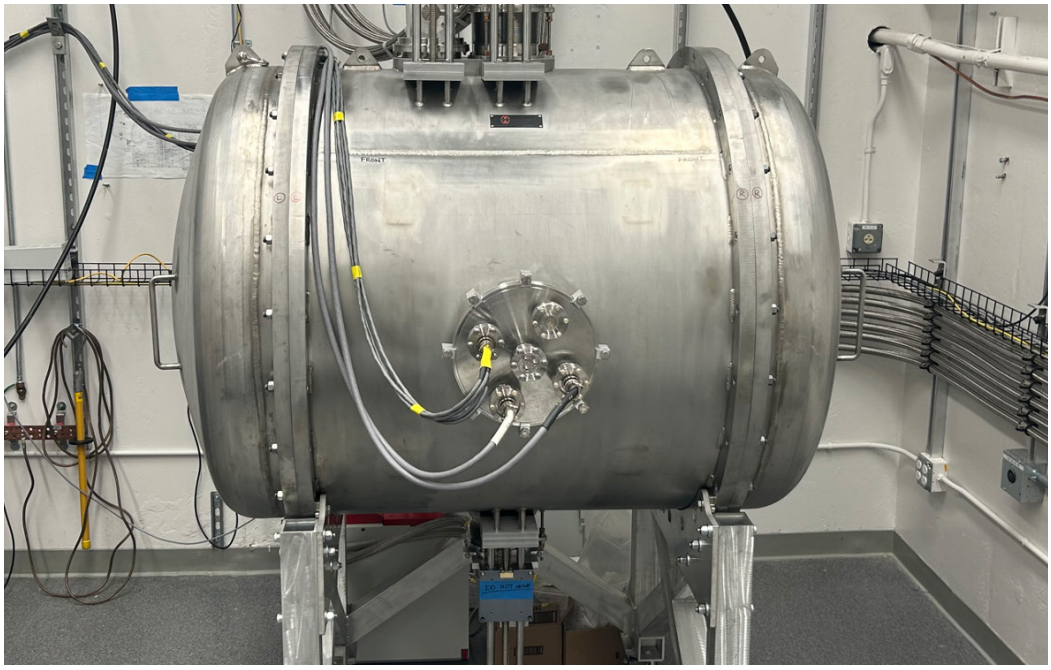
COMPACT SUPERCONDUCTING RADIO-FREQUENCY ACCELERATORS FOR ENVIRONMENTAL APPLICATIONS

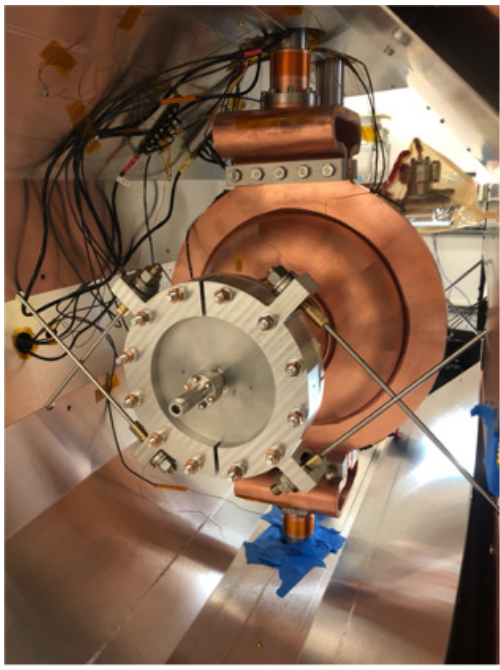
High-Power Solutions for a Cleaner World



Benefits:

- Cost-effective solutions for industrial and environmental remediation applications
- Efficient destruction of a wide range of organic chemicals, viruses, and bacteria from wastewater
- Reduction of sulfur and nitrous oxide emissions from coal-fired power plants
- Destruction of "forever chemicals" such as per- and polyfluoroalkyl substances (PFASs)





WHAT IT IS

Compact superconducting radio frequency accelerators use highly specialized materials and components to accelerate charged particles, such as electrons or protons, to very high energies from a very small footprint. Up to 1 MW of beam power in the energy range of 1-10 MeV.

WHAT IT DOES

The technology utilizes electron-beam irradiation to destructively reduce or eliminate a wide variety of contaminants by breaking down molecular bonds. By physically destroying contaminants, the cost and risk of transporting and storing hazardous materials is eliminated.

Technology Highlights:

- Successful demonstration of Nb3Sn SRF accelerating cavity cooled by commercial cryocoolers up to a gradient of 12.4 MV/m.

- Proposing the development of a 4 MeV, 20 kW prototype as a first accelerator demonstrator unit.

- Size and power may be scaled according to available source frequencies; higher energies may be obtained using pulsed operation or by stacking additional modules in series.

- Ongoing study on the effect of electron-beam irradiation on "forever chemicals" such as 1,4-dioxane and PFAS, using an existing multi-purpose 10 MeV, low-power, CW SRF linac at Jefferson Lab.

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