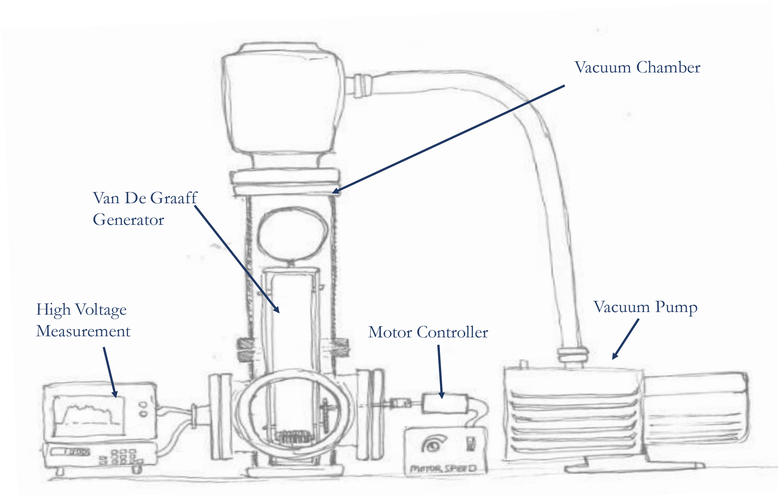
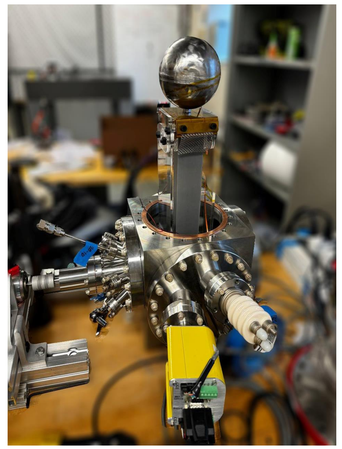
High-Voltage Generator for Fusion Energy

The Problem

Avalanche needs a compact high-voltage source for fusion energy generation. The fusion reaction occurs in high vacuum, so the issue is getting the high voltage into the vacuum chamber. The current solution involves a high-voltage feed-through, which is unreliable and doesn't function at the scale of high-voltage needed. Our task is to determine the feasibility and provide a recommendation for a method of generating compact high-voltage in vacuum.

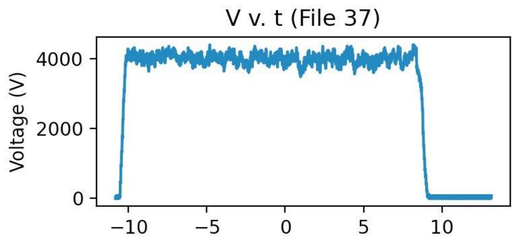




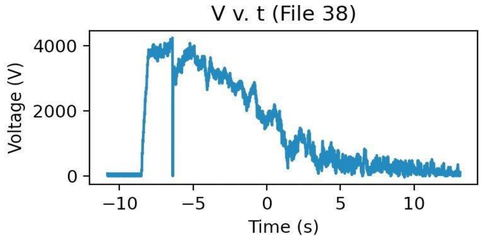
Van De Graaff Generator

The Process

To tackle the problem, we split our year into a research phase and an experimentation phase. The research phase investigated multiple types of electromechanical generators and resulted in the decision that the Van de Graaff generator was most feasible to continue with in our experimentation phase. We built a generator and conducted tests both in and out of vacuum to determine the viability of the Van de Graaff generator.



Generator voltage in air



Generator voltage as pressure drops

The Recommendation

Van de Graaff generators rely on air as a charge carrier and will not operate in vacuum. As such, we do not recommend that Avalanche pursue any generator that relies on these principles. We have compiled several deliverables for Avalanche: a catalog of evidence supporting our conclusion, best practices for building mechanical generators in vacuum, and proof of concept measurements on subsystems of other types of generators.

About Avalanche Energy

Avalanche Energy is working on creating a compact micro-fusion power pack that is ultra-small and lightweight. Compact fusion energy generators could be incorporated into a variety of consumer and industrial processes, which would decrease carbon emissions.

The Team

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