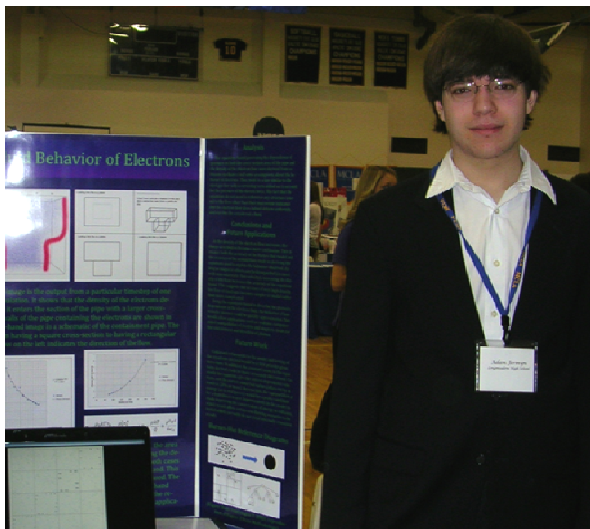




2010

MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; www.theforesightproject.org



Region I: Western Massachusetts

Adam Jermyn: Longmeadow High School, Longmeadow

*Climate Science Award (tie):
"The Fluid Behavior of
Constrained Charged
Particles"*

About Me:

I am a junior at Longmeadow High School, south of Springfield. This was the first year I participated in the Region I Science Fair. I am very pleased and excited to be going on to the State Science Fair at MIT.

I live in Longmeadow, MA with my parents; I have an older sister and brother. I enjoy math, physics, cosmology, and computer science. I'm on the school's math team and also a member of the Springfield STARS, an amateur astronomy club. This summer I will be doing an internship in nanotechnology at Johns Hopkins University in materials science; before I worked on cluster computing in the Johns Hopkins University Department of Biostatistics in the School of Public Health. I hope to study physics in college.

Aside from math, physics, and computer science, my interests include photography, Sherlock Holmes novels, astronomy, chemistry, politics, video games, and swimming.

My Project:

I wrote a computer program to simulate the flow of electrons through a containment pipe. The program calculated the pressure and energy of the system and I used this data to create a mathematical model for the flow of low-density electron plasmas in such a mechanically constrained situation. This model was based on a set of balance laws that consider the plasma as a continuum rather than as large number of discrete particles, and include assumptions derived from the charged nature of electrons. The model showed that the flow could be analyzed by the same continuum mechanics rules that apply to standard fluid systems. After a correction for the electric field, assuming uniform flow under uniform conditions, the ideal gas law still applies.

Future applications may include modeling and dynamic computer-aided manipulation of low-density plasmas and water-based chemical solutions for industrial and research purposes. [Editor's note: Such mathematical modeling is one of the basic tools to understanding our climate and weather patterns.]