

William Zhao - Junior at Dougherty Valley High School

Hobbies: pull ups, math, poker, Kurzgesagt music, cooking

Clubs: physics club, math club, YEA (Youth Euclid Association), Math Advance!, team Doors

Awards and honors: USAPhO camp (2024) and silver (2023); Harker Physics Invitational winner (2023); USAMO Bronze (2024) and USAJMO winner (2022, 2023); PRIMES-USA (2024); Best of SNO (2023)

My adventures in physics began before I knew it did.

Just a few months ago, I unearthed a time capsule a family friend had left me when I was a child. In a small glass jar I discovered a battery, a little neodymium magnet, a rusty wire bent into a loop, and a neat schematic, labeled “Homopolar Motor, To William”. I must have known the words “Lorentz force” back then, but without interest in comprehending them. So, for a decade, I left dust to settle on that jar.

The first time I learned any physics was with building Pinewood Derby Cars. A local church offered an annual Derby car race, and I scoured the internet for advice on building the fastest car. I happened to find Mark Rober’s video on the subject explaining basic topics in mechanics, like friction and energy conservation. Despite never winning any Derby car races, I now reminisce on rewatching that video dozens of times and begging my parents to buy me materials. I’ve watched every Mark Rober video since (I’m an OG Mark Rober fan!) and gained reverence for his ability to take hard scientific concepts and turn them into fun engineering projects.

When the pandemic rolled around, my dad suggested that I put my time to use and learn physics from a textbook (Halliday and Resnick). At first, I really didn’t enjoy it. In fact, I was immensely bored: kinematics was mind-numbing and Newton’s Laws felt obvious. I had curiosity that was piqued by real applications of physics but subdued by mathematical rigor. But my dad promised me that at some point, things would pick up and get exciting.

Of course, he was right: the physics I learned opened the doors to more applications. I was hooked by the explanations of gyroscopes and eddy currents and the Blackbird car and LEDs and Kapitza pendulums. More importantly, I saw the proof that what I was learning really worked. I began to appreciate rigor, too, for its ability to create exact predictions.

It was incredibly fitting that I recently rediscovered that homopolar motor gift. I found a profound beauty in seeing that spinning wire on my desk, now with the knowledge to figure out how it worked. That moment reminded me of why I study physics—to see and learn about its uses in action. I hope that this summer, I will discover many more reasons to love physics, along with the rest of the team.

The people who got me here: I owe everything to my parents, who always support me in pursuing my hobbies. I thank Kevin Zhou for his comprehensive guidance in physics. I’m indebted to Mr. Li, who sparked my lifelong journey in academics. I thank Ms. McConnell and Ms. Hannachi for giving me free rein in physics class and club. Lastly, I’m infinitely grateful for Elisa and David for always pushing me to do better. I couldn’t have come this far without you!