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# Science Before System: The Hidden Physical Foundation Beneath Engineering and Artificial Intelligence

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## ABSTRACT

Physics is not just a discipline. It is the language foundational to everything engineers build and every system AI attempts to encapsulate. This paper argues that students pursuing STEM careers benefit greatly from grounding themselves in physics before specializing in engineering or artificial intelligence. Through in-depth interviews with eight professionals across aerospace engineering, enterprise technology leadership, AI consulting, and particle physics, combined with the author's own shift from a prospective engineer to an aspiring physics student, the study identifies recurring patterns linking foundational thinking to long-term professional impact.

Three recurring patterns defined in section Convergence emerged independently across these interviews: the Chain Reaction, in which physics grounds engineering and engineering grounds AI, forming a dependent sequence where removing any layer destabilizes those above it; the First Axiom, a shared professional instinct to understand why a system behaves as it does before attempting to operate or fix it; and the Conservation Law, the observation that foundational physics training persists across career transitions in the way physical quantities are conserved across transformations.

These patterns are corroborated by data from the American Institute of Physics, and together suggest that foundational thinking is not a prerequisite to check off, but the groundwork on which the rest is built.

## INTRODUCTION

I was eleven years old on a beach in Saint Martin, lying in the sand while the waves folded over each other behind me. The air was warm and still, and without the glow of a city skyline, the sky looked nothing like it did back home in Chicago. The night sky revealed what seemed like countless stars, as though I could see to the edge of the observable universe. For the first time, the universe didn't just feel like a concept. It felt like something of which I was a part. I was unsettled by the sheer scale above me.

Not in a way that frightened me, but in the way that led me to sit with questions longer than was comfortable. The universe is 13.8 billion years old (Planck Collaboration), and I'd consider myself lucky if I lived to be 90. And somehow, against every reasonable probability, I am here now, writing this paper, thinking about my place within it all.

The strangeness of that moment on the beach has never left me; instead, that wonder I felt then has sharpened over time. Space captivated me, but admiring it from the ground wasn't enough; I needed to contribute, to engineer for it. But that ambition raised a harder question: How could I claim that I want to build for a world I haven't put the effort into understanding? That question is what changed my direction entirely and eventually led me to write this paper. To authentically create anything in this world, I came to believe you must first understand the principles that order it. Understanding those principles is the art of physics.

The bond between knowledge and creation matters now more than ever. Physics, engineering, and artificial intelligence are no longer separate disciplines. The boundaries that once separated these fields have quietly dissolved, and the professionals navigating that convergence most effectively are those who understood the underlying science before they picked up the tools and began using them.

For students choosing a STEM path today, this convergence has real implications. The question is no longer simply what you want to build, but what you lose by building without the support of the foundational science beneath it. This paper explores that question through two lenses: the career trajectories of eight professionals across engineering, physics, and technology, four of whom are examined in depth, and my own evolving understanding of why physics must come before every other technological field.

## METHODOLOGY

The selected professionals were obtained through basic outreach. Originally, when I began this path of discovery, I felt stuck with nobody to ask. My parents reminded me that growing up in Chicago meant I was already surrounded by professionals embedded in technology. I did not realize it immediately, but there were many professionals in my field of interest all around me, and I just had to put myself out there. I contacted my neighbors, family friends, friends of friends, and then asked each of them who else I should talk to. This outreach snowballed, and before I knew it, I had an array of options to choose from.

Three criteria guided selection: demonstrated leadership experience, direct proximity to technology in a professional capacity, and career trajectories showing meaningful evolution over time. One interviewee, whose background centered on institutional leadership and law, provided valuable perspective on the broader implications of foundational thinking but fell outside the direct scope of this paper's argument.

This study employs an exploratory qualitative design, drawing on semi-structured interviews to surface patterns across professional experience rather than to produce statistically generalizable findings. I chose to focus on technology, engineering, and AI because they evolve alongside society's needs, always pushing toward what comes next. Professionals who demonstrate the three qualities I chose as criteria for my interviewees are the ones operating at the front of that curve, not reacting to it. I wanted to learn from people already there. Rather than following a fixed set of questions, I prepared thematic areas for each conversation and allowed the interview to develop naturally from there. The core themes I brought into each conversation centered on foundational thinking, career evolution, and the relationship between physics, engineering, and AI. As you would expect from a sixteen-year-old, my early interviews were rough; however, I got comfortable diving deeper, letting conversations move well beyond my prepared themes. The question that naturally emerged and consistently forced the longest silence was quite simple: if you boiled your profession down into one word, what would it be? Again and again, the answers pointed in one direction. Not innovation. Not creativity. Foundational thinking. I did not set out looking directly for physics; it revealed itself as the answer for which I had been searching.

This study draws on interviews with eight professionals, a sample that is necessarily modest in scope. The professionals included in this study are largely connected through overlapping networks in the Chicago area, and a few share ties to a single company. This is a limitation worth acknowledging: the sample is geographically concentrated and connected through referral chains, which may bias the findings. A broader sample across more regions, industries, and career stages could surface different patterns or challenge the ones identified here. Additionally, as an exploratory qualitative study, this research prioritizes depth of insight over breadth of sample, and my own perspective as a high school student inevitably shapes the interpretation of these conversations. But the convergence of foundational thinking was never truly prompted by any of my questions. It emerged independently, across different industries, roles, and generations, which suggests the pattern is worth examining even within a limited sample.

## THE THEORETICAL FOUNDATION

Physics is not a specialization. It is the practice of understanding how the world operates at its most basic level. Where other disciplines teach you to use tools, physics teaches you why those tools work, and more importantly, why they sometimes do not. Most professionals in technology understand their everyday workflow. They know how to run the software, follow the process, and execute the task. But when something breaks unexpectedly, when a system behaves in a way that was not predicted, the person who understands the underlying science is the one who can diagnose the problem. Physics itself trains you to sit with a problem you do not yet understand, break it apart, and reason through it from the ground up. That process, what this paper calls foundational thinking, the instinct to understand why a system behaves as it does before attempting to operate or fix it, is not just a skill. It is a way of seeing.

Consider a simple example. An engineer running a simulation gets an unexpected result. If that engineer understands the underlying physics, they can immediately sense what is wrong because it violates a principle they understand intuitively. That intuition is not a guess. It is the product of deep foundational training.

This claim is not limited to the circumstantial evidence gathered in this study. A longitudinal survey conducted by the American Institute of Physics examined the career experiences of 1,407 PhD physicists ten years after graduation. Among all success factors reported, problem-solving skills were the second most frequently cited, and respondents consistently credited their physics education for providing foundational training in research, analytical reasoning, and the ability to take on technical challenges across disciplines (Porter). The study also found that physicists who demonstrated a willingness to work in fields where they had no prior experience reported greater career success, suggesting that the transferability of physics training is not merely theoretical but empirically observable at scale.

It is worth acknowledging that physics may not be the only path to this kind of foundational thinking. Rigorous training in mathematics, philosophy, or other disciplines that demand first-principles reasoning could build similar instincts. What distinguishes physics specifically is that it applies foundational reasoning directly to the physical world, the same world that engineering manipulates and that AI attempts to model. For students whose ambitions lie in technology, that specificity matters. The foundation is not abstract. It is the ground beneath everything they intend to build.

## FROM PARTICLES TO PEOPLE

*Interviewee: David Morgan*

David Morgan did not arrive at physics by default. His brother pursued electrical engineering, and Morgan considered the same path. But something pulled him in a different direction. As he described it, "I wanted to understand how things actually work at the most fundamental level, not just the surface behavior, but what's really governing it underneath."

That decision carried him from a PhD in physics at Northwestern to an MBA at Kellogg and eventually to his current role as Senior Vice President at AHEAD, one of the leading technology services firms in the country. On paper, that trajectory looks like a series of sharp turns: physics to business to enterprise technology leadership. But Morgan does not see it that way. For him, the thinking never changed. "That instinct, wanting to get to the root of something before you try to do anything with it, is what physics really trains you for. And honestly, that's what I still do every day, just in a completely different context."
What makes Morgan's path particularly relevant to the argument that physics provides a transferable foundation is the flexibility it reveals. His brother chose engineering, a focused and practical path, while Morgan chose physics, a broader and more foundational one. That breadth is what allowed him to move across disciplines without having to rebuild his foundation with each transition. He did not need to relearn how to think when he shifted from a research-oriented major to business and leadership in technology. The foundation was already transferable.

Morgan also noted that his physics training shaped how he works with people, not just systems. Understanding what is really happening beneath the surface is not only a physics skill. It is a leadership skill. The same instinct that drives a physicist to look past surface behavior and find what governs it beneath translates directly to reading the room, diagnosing a team dynamic, or identifying the real problem beneath the one presented.

## THE CONSTANT VARIABLE

*Interviewee: Don Ljung*

Don Ljung studied physics at the University of Wisconsin-Madison in the 1960s, a time when the discipline was rapidly expanding into new territory. From there, his career moved through some of the most demanding environments in American science and technology. He contributed to research at Fermilab, one of the most significant particle physics laboratories in the world. He worked as a technical manager at Lucent Technologies during the rise of modern telecommunications. And he eventually moved into science education, passing foundational thinking on to the next generation.

Those are three vastly different industries. But when asked to describe the thread connecting them, Ljung did not hesitate. "Every system has an underlying logic. Most people reach for the solution first. Physics trains you to find the logic first. Once that's in you, you can solve problems in any industry."

That single distinction, solution first versus logic first, cuts to the core of what this paper argues. Reaching for a solution before understanding the logic beneath a problem is efficient in the short term. It gets things moving. But it also means that when the problem shifts or deepens, the person who skipped the logic has nothing to fall back on. The person trained in physics does.

Ljung's career is proof of that durability. Particle physics, telecommunications, and education do not share a skill set. They do not share a vocabulary. What they share is complexity. Each one is a system with layers that reward the person willing to understand the logic before attempting the solution. That willingness is what physics instilled in Ljung, and it is what allowed a single foundation to support an entire career of reinvention.

It is also worth noting that Ljung's son, Michael Ljung, now serves as Senior Vice President at Thoughtworks, leading large-scale technology transformation with a degree in computer science from Yale University. The foundational thinking Ljung describes did not stay in one career. It carried across generations.

## WHAT LIES BENEATH OUR SYSTEMS

*Interviewee: Alexander Lutz*

Alexander Lutz's background is rooted in electrical engineering. He earned his bachelor's degree from the University of Iowa, his master's from Colorado State, and interned at Lockheed Martin, working on radar systems before joining Northrop Grumman Space Systems as a systems engineer. But his path through engineering did not move away from physics. It moved toward it. Over time, Lutz gravitated toward the electrical physics side of his discipline, drawn to the deeper principles governing the systems he was building.

When asked about what separates routine problem-solving from the moments that truly test him, Lutz pointed somewhere deeper than his engineering training. "Every so often, you run into a problem that the standard engineering frameworks can't fully resolve, and that's when the underlying physics becomes the conversation."

That distinction matters. Lutz is not describing a career built on physics. He is describing a career in engineering that depends on physics at its most critical moments. The daily work runs on frameworks and processes. But when those frameworks reach their limit, when a problem resists the standard approach, the conversation shifts to fundamentals. “Having a deep understanding of the underlying physics is paramount in maintaining the healthy amount of intuition needed to solve the most difficult problems. In aerospace and defense, that happens more than people might expect."

Lutz also offered a way of understanding how that foundational thinking works in practice. In his view, the problems worth solving, whether in aerospace, technology, or life itself, are rarely small enough to resolve in one pass. They have to be broken down into their most simplified pieces, each one worked through individually with focus and precision. Less scope means less room for error. And once each piece has been understood on its own terms, they can be reassembled to address the larger problem at hand. The difference is that now the structure holds weight because it was built piece by piece on solid ground.

What makes Lutz's perspective uniquely valuable to this argument is where it comes from. Morgan chose physics and built a career on its flexibility. Ljung lived inside physics and carried its logic across industries. But Lutz chose engineering and still found himself pulled back toward physics as his career deepened. He did not start with the foundation. He discovered he needed it. That realization, coming from inside engineering rather than outside it, may be the most compelling evidence that physics is not optional. It is where the hardest problems eventually lead you, whether you planned for it or not.

## WHERE IT ALL CONNECTS

*Interviewee: Nick Rubino*

Nick Rubino grew up in Chicago with a mind wired for STEM. He excelled in math and science throughout high school, drawn to courses that asked him to figure out how things worked rather than memorize what they were. That instinct led him to mechanical engineering at North Central College, where the focus on forces, systems, and physical constraints gave structure to the curiosity he had carried since childhood.

After college, Rubino interned at AHEAD and moved into a role as a mechanical engineer at International Motors. But the next step in his career was one he did not see coming. He transitioned into AI technology consulting, a field that on the surface shares very little with mechanical engineering. The shift surprised even him. But the more he examined it, the more the connection revealed itself.

"Mechanical engineering trains you to model systems, to think about forces and tradeoffs and constraints, and that turns out to be exactly the kind of thinking AI consulting demands. The physics grounded the engineering, and the engineering grounded the AI work."

What Rubino found in AI consulting was that the job is not primarily about code. It is about understanding a client's problem before reaching for any technology. What does this system need to do? What are the constraints? Where are the tradeoffs? Those are engineering questions before they are AI questions, and they are physics questions before they are engineering questions. Rubino's background gave him an edge over peers who came from pure computer science because he had spent years thinking in systems and constraints before he ever touched an AI model.

Rubino’s career trajectory is the chain reaction at the heart of this paper. Physics grounds engineering. Engineering grounds AI. Each layer depends on the one beneath it. Rubino's career is that argument in motion. He did not plan for his mechanical engineering degree to lead him into artificial intelligence. But because his training was rooted in physical reasoning, the transition was not a leap. It was a continuation.

## CONVERGENCE

Across eight professionals spanning vastly different industries and career stages, three recurring patterns emerged. These patterns were not prompted. They surfaced independently, across different industries, career stages, and generations. That consistency is what makes them difficult to dismiss.

### ***The Chain Reaction***

The most visible pattern is structural. In physics, a chain reaction occurs when one event triggers the next in a self-sustaining sequence. Each stage depends on the one before it and fuels the one after. The same structure appeared across these careers. Physics does not exist in isolation from engineering, and engineering does not exist in isolation from AI. They form a sequence. Physics provides the principles that engineering applies, and engineering provides the systems thinking that AI demands. This chain reaction appeared most clearly in Rubino's trajectory from mechanical engineering to AI consulting, and surfaced across the remaining interviews as well. For example, Madison Cooper, Partner Solutions Architect at AHEAD, and Noelle Ossenkop, Senior Software Engineer at Collins Aerospace, both build systems that rest on physical and computational principles they had to understand before they could apply them.

No professional described their field as self-contained. Each one, whether explicitly or not, pointed to something beneath their discipline that made it work. That something, again and again, was physics or the thinking that physics produces. Remove one link in the chain, and the sequence breaks. The reaction stops.

### ***The First Axiom***

The second pattern is a shared mindset. In mathematics and physics, an axiom is a truth accepted before anything else can be proven. Across these interviews, a similar principle emerged. Every professional, regardless of title or industry, placed a higher value on understanding why something works than on knowing how to operate it. Morgan described it as wanting to understand "what's really governing it underneath." Lutz described the moment when "the underlying physics becomes the conversation." Ljung put it most directly: "Most people reach for the solution first. Physics trains you to find the logic first." Understanding the structure of a problem before acting on it was not a physics-specific habit. Yet across these interviews, it was the instinct that surfaced most consistently among those with foundational physics training.

### ***The Law of Conservation***

The third pattern is about longevity and mobility. In physics, conservation laws describe quantities that persist no matter how a system changes. Energy is conserved. Momentum is conserved. The form may change, but the substance endures. The same principle appeared across these careers. The professionals with the deepest foundational training were the ones who moved most fluidly across industries and roles. Morgan went from a physics PhD to an MBA to enterprise technology leadership. Ljung moved from Fermilab to telecommunications to education. Lutz's engineering career curved back toward physics rather than away from it. In each case, the specialization was not what carried them. It was the foundation of physics that proved critical to their success. When industries shifted, when roles changed, when new technologies emerged, the professionals who understood the underlying principles adapted. The ones who only knew the tools of a single field would have had to start over. A foundation in physics does not lock you into physics. It is the quantity that is conserved, the thing that remains no matter how many times the system around it transforms.

This pattern is corroborated by employment data. According to the American Institute of Physics, physics bachelor’s degree holders from the classes of 2021 and 2022 entered careers across a wide range of sectors: 60% in the private sector, 11% in colleges and universities, 9% in civilian government, and the remainder spread across education, military, and other fields. Among those employed, 27% worked in engineering and 16% in computer software (Pold and Mulvey). This cross-sector distribution supports the claim that physics training produces professionals who are not confined to a single industry but are equipped to move across them.

## MY SHIFT IN DIRECTION

Before this project, I believed my path was engineering. I have always excelled in STEM, drawn to every math and science course I have been able to take. But my true passion lies in space. Whenever I look at the night sky, I think about its vastness and how small I feel in comparison. I figured that to chase that feeling, it would be best to build a career in engineering, a field where I could work in an environment I love while building something tangible within it.

That changed my sophomore summer, during a program at Harvard University titled Advanced Physics: Relativity and Black Holes (PHYS P-17230). Over the course of that program, something shifted in how I thought about the world. It was not a single moment but a gradual realization. The concept that struck me deepest was relativity itself, the idea that time is not the constant variable it appears to be. Everything I had assumed about one of the most basic elements of existence turned out to be wrong. That the universe operates on principles far deeper than what appears on the surface prompted my epiphany that understanding the principles of physics felt requisite to do meaningful work in a world governed by those principles. Engineering is the machinery that surrounds our lives. Physics is the ore from which that machinery is mined. I decided I needed to go mining.

The interviews that followed confirmed what my time at Harvard had started. Talking to eight professionals across vastly different careers showed me that a physics degree does not narrow your options. It expands them. It builds the computational, philosophical, and analytical parts of your thinking all at once. But I would not have arrived at that understanding on my own. It took conversations with professionals to make it tangible. And the most valuable lesson I learned from this entire project is a simple one: reach out. Take the step. That simple act of reaching out is what led me to find this path of excitement and interest that I had been searching for without knowing where to look.

I now believe that physics is the most flexible and permanent foundation a student interested in STEM fields can choose. The industries around STEM will shift. The technologies will change. Companies may die out. But the core principles that physics teaches, foundational reasoning, physical intuition, the instinct to ask why before how, do not expire. They are what run our reality. And I would rather spend my life understanding that reality than blindly building on top of it.
I still look at the night sky. I still feel small. But physics has taught me that sometimes the smallest things in the universe happen to be the things that govern everything else.

## COUNTERARGUMENTS AND LIMITATIONS

Returning to the broader argument, this paper's claim that physics should precede engineering and AI invites several objections worth addressing directly. The following are the most common challenges to this argument and the responses this research supports.

The first objection is that engineering itself helps you understand physics. There is truth to this idea. Engineering applies physical principles, and working through real-world problems can deepen the understanding of the science behind them. But there is a difference between encountering physics through engineering and understanding physics on its own terms. An engineer may notice that a system behaves a certain way under stress. A physicist understands why at a fundamental level. Engineering can reveal physics, but it cannot replace the training that teaches you to reason through problems from the ground up. Lutz's own experience speaks to that distinction.

The second objection is that most of the professionals in this study do not hold physics degrees. This is true, and it is worth addressing directly. Only Morgan and Ljung have formal physics backgrounds. But this observation actually strengthens the argument rather than weakening it. The fact that professionals trained in engineering, computer science, and other fields independently arrived at the value of foundational, physics-based thinking suggests that the need for it is real, regardless of whether one holds a degree in physics. Those who did not specialize in physics did not have the formal training, but they still recognized it as essential. The question this raises is not whether physics matters but how much further these professionals might have gone if they had started with a physics foundation.

The third objection is practical. The principles of physics can be learned when a problem demands it. Why start with a foundation in physics? The answer lies in what this paper calls the first axiom. Understanding why must come before understanding how. Learning physics reactively, only when a problem necessitates it, puts one in a position of playing catch-up. A person’s knowledge gap appears only after they have found themselves swallowed by it. The professionals in this study who had foundational physics training did not need to go back and learn it. They carried it with them. The ones who did not have such training described moments where they wished they had.

The fourth objection is about career practicality. Engineering degrees lead to clearer job pipelines, higher starting salaries, and more immediate employment opportunities. This is a fair point and one this paper does not attempt to dismiss. Physics degrees do require more intentionality in career planning. It is also worth noting that the Porter study found that some PhD physicists in the private sector encountered employer bias, with companies viewing physics graduates as overqualified or too narrowly academic, and in some cases being told they had "no useful skills" for industry. These are real frictions that physics graduates can face early in their careers. But this study suggests that the long-term return on a physics foundation outweighs the short-term clarity of an engineering pipeline and the early-career resistance that some graduates encounter. Morgan's career did not follow a straight line, but it reached a height that few engineering-only paths achieve. For a student willing to think beyond the first job and toward the arc of an entire career, physics is not the slower path. It is the path with the strongest upward trajectory.

A fifth objection concerns the nature of the professionals themselves. It is worth asking whether the people in this study share a common intellectual disposition, a tendency toward foundational thinking, that preceded their education and shaped both their career trajectories and their perspectives on physics. If so, physics may be less the cause of their success than a natural expression of how they already thought. This is a genuine limitation. The data here is correlational, not causal. What can be said is that across eight professionals spanning different industries, generations, and educational backgrounds, the same instinct surfaced independently: understand the logic before reaching for the solution. Whether physics produced that instinct or attracted people who already had it, the pattern is consistent. And for a student deciding what to study today, the practical implication is the same either way. The foundation matters.

## CONCLUSION

The fields that students rush toward today are often the ones built on the most unstable ground. A programming language that dominates the industry now may be obsolete in a decade. A framework that defines modern AI development may be replaced before a student finishes their degree. These fields are not unimportant; in fact, they are innovative, exciting, and necessary. But they are temporary by nature and are built to be replaced by the next improved iteration.

Physics is not temporary. The laws of thermodynamics do not get updated with a new release cycle. Relativity does not become obsolete when a new technology emerges. The principles that govern the natural world have remained constant since before humanity existed to study them, and they will remain constant long after any specific tool or framework has been forgotten. That permanence is what separates a field rooted in nature from a field rooted in innovation. Innovation cycles. Nature endures. And unlike the technologies built on top of them, the laws of physics were not invented. They were discovered. They have existed since the beginning of time, waiting to be recognized. Engineers build. Programmers write. Physicists discover the foundational thinking that makes both possible.

This argument does not mean students should avoid computer science, engineering, or AI. Rather, it means they should understand what sits beneath those fields before they commit to building on top of them. A computer science degree teaches you how to write code. A finance degree teaches you how to move capital. A physics degree teaches you how the world works. The first two prepare you for a career. The third prepares you for any career.
Every professional in this study, whether they held a physics degree or not, arrived at the same realization. The foundation matters more than the specialization. Physics does not limit your options. It is the reason your options stay open.

This paper began with a question that unsettled me. If I want to build things for the physical world, should I not first understand the physics that governs it? After eight interviews, a summer at Harvard, and months of research, I no longer find that question unsettling. For me, the answer became clear. Physics comes first. Not because it is the most prestigious or the most practical path, but because it is the most honest one. I was eleven years old when the universe first asked me a question I could not answer. The boy on that beach did not know it then, but that question was the same one that has driven every physicist, every engineer, every builder who ever looked at the world and refused to accept the surface of it. This paper is my attempt to begin answering it.

*"I learned very early the difference between knowing the name of something and knowing something."*
— Richard Feynman

## APPENDIX: INTERVIEWED PROFESSIONALS

**Larry Kramer**
Current Role: President & Vice Chancellor, London School of Economics (LSE)
Previous: President, William and Flora Hewlett Foundation; Dean, Stanford Law School
Education: Brown University (B.A.); University of Chicago (J.D.)
Field: Constitutional Law, Institutional Leadership
**Madison Cooper**
Current Role: Partner Solutions Architect, AHEAD
Previous: Technical Consultant, AHEAD; Software Engineer, BAE Systems
Education: University of Iowa (B.S., Electrical & Computer Engineering)
Field: Cloud Architecture, Enterprise Systems Engineering
**Alexander Lutz**
Current Role: Systems Engineer, Northrop Grumman Space Systems
Previous: Associate Systems Engineer, Northrop Grumman; Radar Engineering Intern, Lockheed Martin
Education: Colorado State University (M.S., Electrical Engineering); University of Iowa (B.S.E., Electrical Engineering)
Field: Aerospace Systems, Radar & Defense Technologies
**Noelle Ossenkop**
Current Role: Senior Software Engineer, Collins Aerospace
Previous: Software Engineer, Collins Aerospace; Software Engineer, Raytheon Technologies
Education: University of Iowa (B.S.E., Computer Science & Engineering)
Field: Aerospace Software, Mission-Critical Systems
**Michael Ljung**
Current Role: Senior Vice President, Thoughtworks
Previous: Technology & Systems Leadership, Accenture
Education: Yale University (B.S., Computer Science); Northwestern University–Kellogg School of Management (Executive M.B.A.)
Field: Technology Strategy, Large-Scale Systems Transformation
**Don Ljung**
Current Role: Retired. Science Educator; Technical Manager, Lucent Technologies; Contributor, Fermilab
Education: Carleton (B.A. Physics); University of Wisconsin–Madison (Ph.D. Physics)
Field: Elementary Particle Physics, Science Education, Telecommunications Systems
**Nick Rubino**
Current Role: Senior Associate, AI Technology Consulting, AHEAD
Previous: Mechanical Engineer, International Motors; Cloud Solutions Architect Intern, AHEAD
Education: North Central College (B.E., Mechanical Engineering)
Field: AI Consulting, Applied Engineering Systems
**David Morgan**
Current Role: Senior Vice President, AHEAD
Previous: General Manager & Senior Director, ServiceNow; Senior Director, NetApp; Director, IBM
Education: Northwestern University (Ph.D., Physics); Northwestern University–Kellogg School of Management (M.B.A.)
Field: Physics, Enterprise Technology Strategy, Organizational Leadership

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## ABOUT THE AUTHOR

Landry Silvers is a high school junior at Latin School of Chicago in Chicago, Illinois. He takes interest in math, physics and aerospace engineering, hoping to learn and explore the wonders of the universe. He plans to study physics in college, with an eventual focus on engineering and applied technology.