Decarbonization

a Fusion of Education & Innovation

Alpha Ring™
CLEAN ENERGY NOW

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We A.R. Alpha Ring

We are Alpha Ring, a team of scientists and visionaries tackling one of the most pressing issues of our time: **clean energy.**

In our world, energy is everything. It plays a role in practically every industry worldwide, and has untold impact upon the life of every individual. But as our population grows, the demands for enough energy for all are not being met and, worse still, in satisfying our needs we have neglected the planet we call home.

Our current methods of energy production are contributing to massive environmental changes – with the energy sector serving as the source of about three-quarters of greenhouse emissions – which will have disastrous results for both the planet's ecosystem and ourselves.

According to the United Nations, the global temperature increase must stop at 1.5°C above pre-industrial levels, or else climate change will be effectively unstoppable. We are already at 1.1°C.

In 2015, 70 countries signed the Paris Agreement to set a net-zero target. But in order to do that, there need to be fundamental changes to the way we produce energy. The obvious answer is nuclear fusion. At Alpha Ring, we are devoted to developing the fusion technology that could save the planet. But we have also gone one step further.

The world doesn't just need new energy technology, it needs a new generation of minds to understand it, develop it, and press it forward to new horizons.

Our Educational ION Beam System is the answer to this problem. This innovative piece of technology allows students to engage in their own experiments in nuclear fusion, enabling them to produce their own data and come to their own conclusions, and provides essential hands-on experience with the next step in energy innovation. It will nurture new ideas, new techniques and – most importantly – new thinkers.

No one can solve the climate crisis alone. The only real solution is to give as many people as possible a chance to understand and explore the world of fusion, so together we can build a better future.

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EPC
ION

The pIONeer

The ION Beam System is the pioneering and unique device that will allow thinkers and educators to safely conduct experiments in an accessible manner whilst incorporating all relevant nuclear fusion reactions.

This offers an unparalleled opportunity to provide educational facilities like universities and research institutions with a scientific tool that will allow students to apply theory to practice.

The System has been thoroughly tested in Alpha Ring's Laboratories in California and Taiwan, which have been pushing the boundaries of nuclear fusion technology.

The System is completely safe for use, emitting none of the harmful radiation we often associate with this kind of testing.

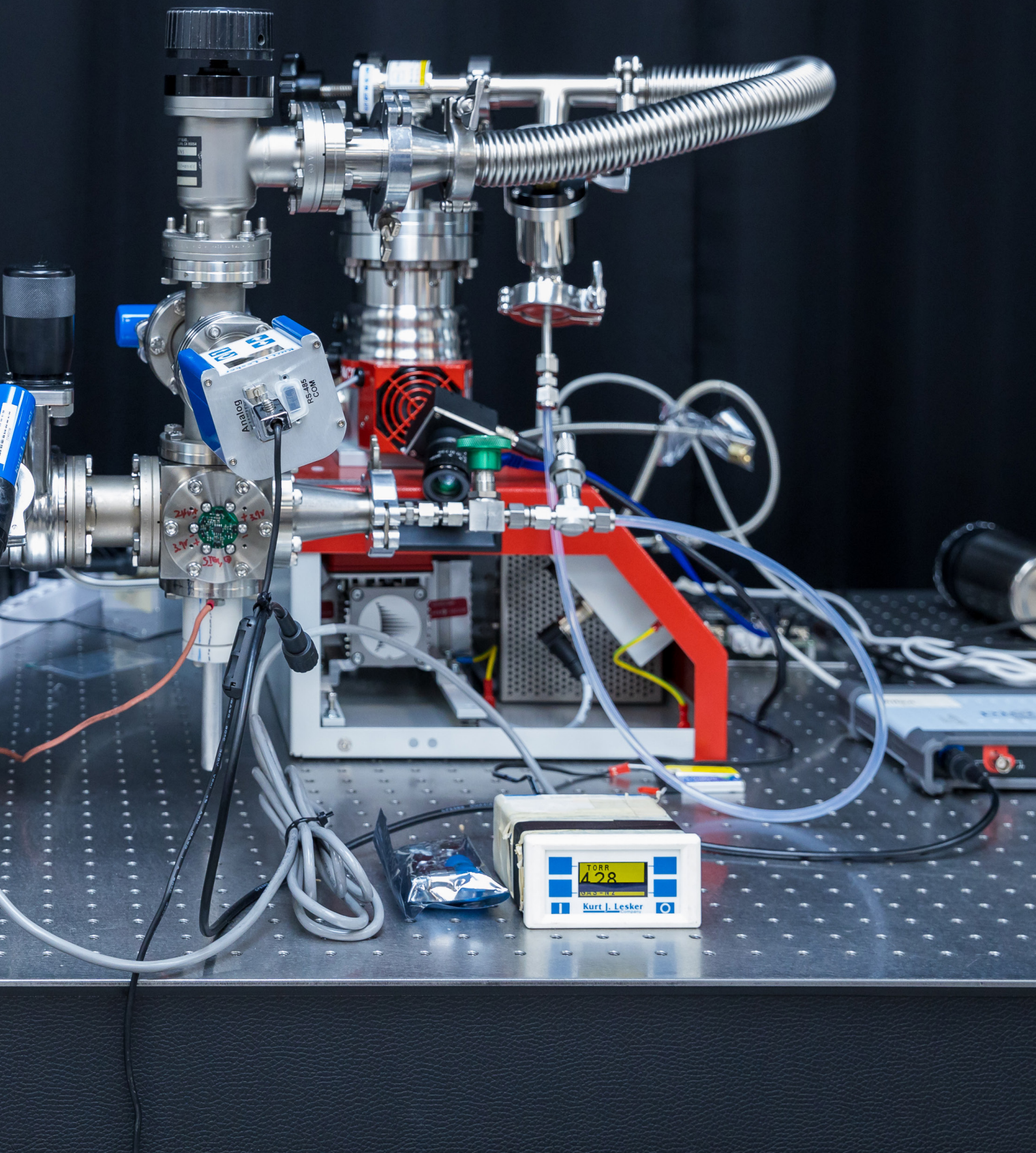
Whilst there are facilities that are currently in use to provide educational instruction on the emergence of workable nuclear fusion as a scientific reality to the youth of today, none of them can compare to the convenience and comprehensiveness of Alpha Ring's ION Beam System.

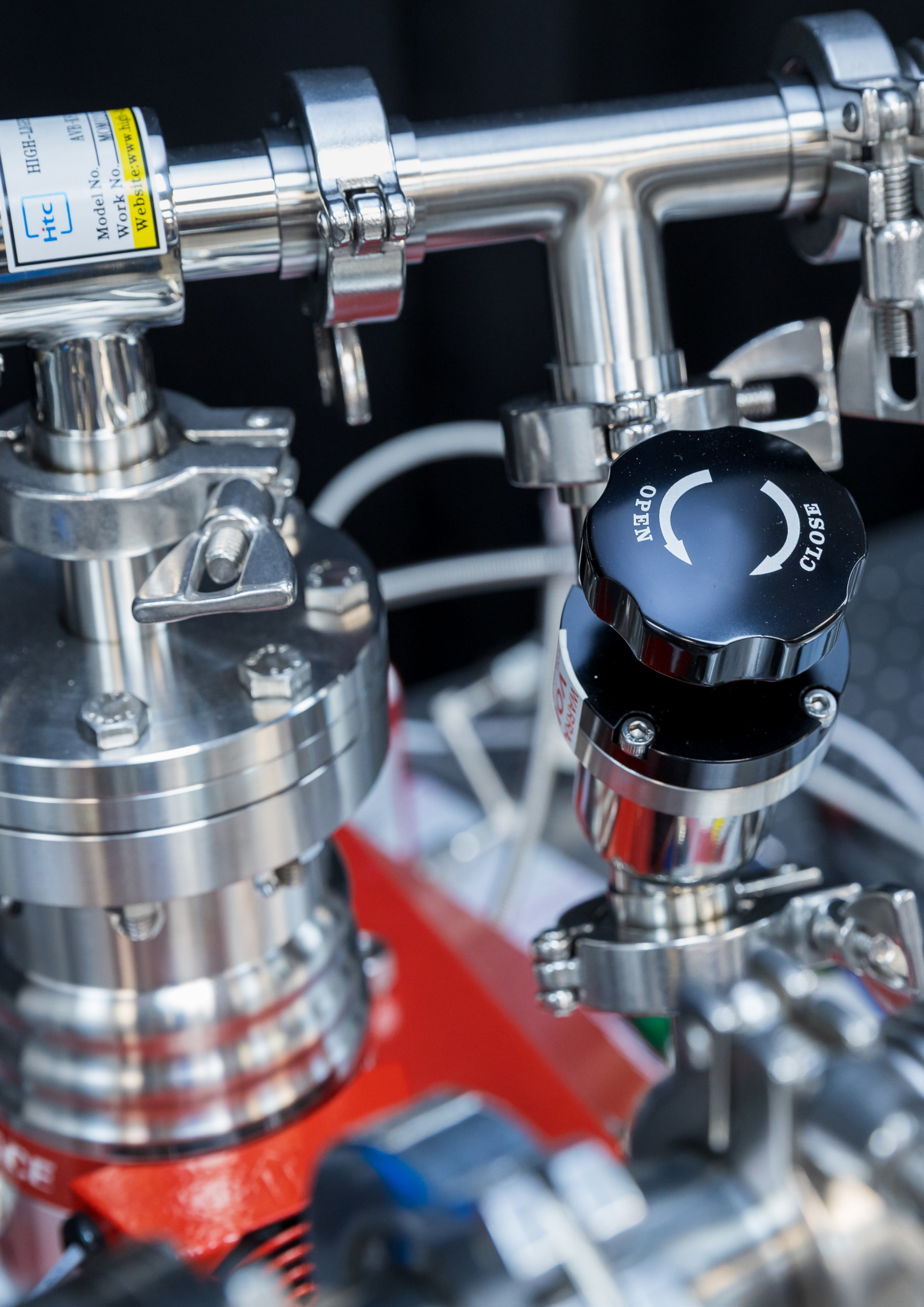
The following pages will illustrate just how we intend to help shape the minds of the future, and what you can do to help. Behind the sophisticated technology, there is a simple goal: by using the highest quality components and materials, all designed and produced by Alpha Ring International facilities, Alpha Ring wants to revolutionise the way we learn about nuclear fusion.

Through our ION Beam System, we are offering a long-term solution to an immediate problem.

Elevate Accelerate Share

- *Nurture future experts in clean energy*
- *Research tomorrow's solutions for today's problems*
- *Share opportunities to make a difference*




Model No.
Work No.
OPEN
CLOSE

Fusion Reaction

Nuclear fusion reactions, such as DD fusion that produces two distinct branches of products and pB fusion that produces ~100% alpha particles (ionized helium atoms), can be observed in our System.

Enhanced detection

Our patented sensors can distinguish and isolate neutron signals to analyse counts vs time and the energy spectrum of emitted neutrons, correlated with the detection of other fusion products.

Proton/Deuteron Acceleration

Our System reliably accelerates deuteron ions to kinetic energies where fusion events are easily detected.

Precision and Accuracy

Using miniscule foil targets and modular configuration flexibility, we minimize interference and maximize accuracy of measurements.

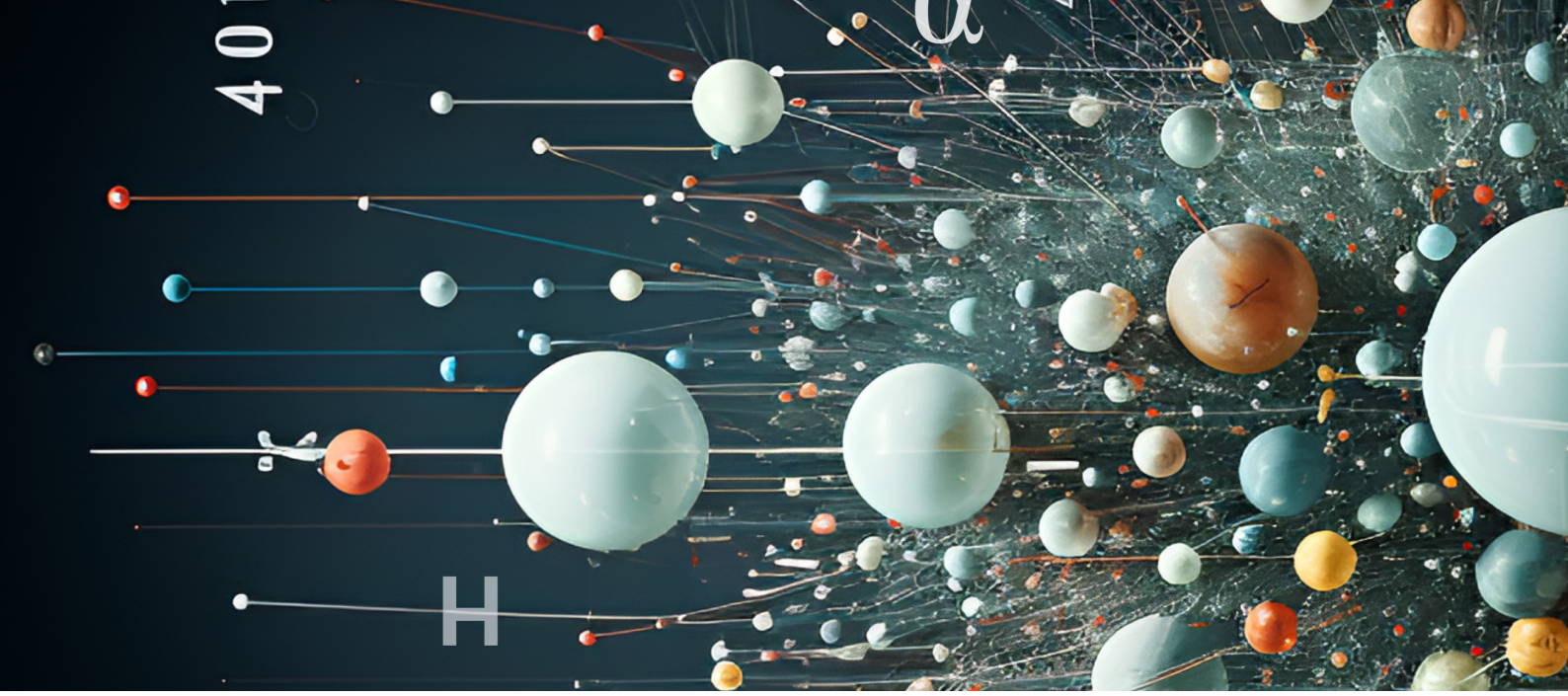
Safe and Compact

Our toolbox-sized demonstration device is convenient, user-friendly, and – most importantly – safe.

Ion Source Efficiency

The ion source that lies at the heart of this technology, ensures reliable plasma production, with consistent beam current density at relatively low input power.

For more information on the specifications of our ION Beam System, go to pages 36 - 39.



The Future of Fusion is Here

Alpha Ring's ION Beam System has been developed with the goal of fostering learning, and its expansive capabilities mean a range of students and researchers will be able to benefit from their training.

Our device will revolutionise how the next generation will learn about nuclear fusion, and every business should be thinking how best to foster this kind of educational advancement, for both themselves and the planet.

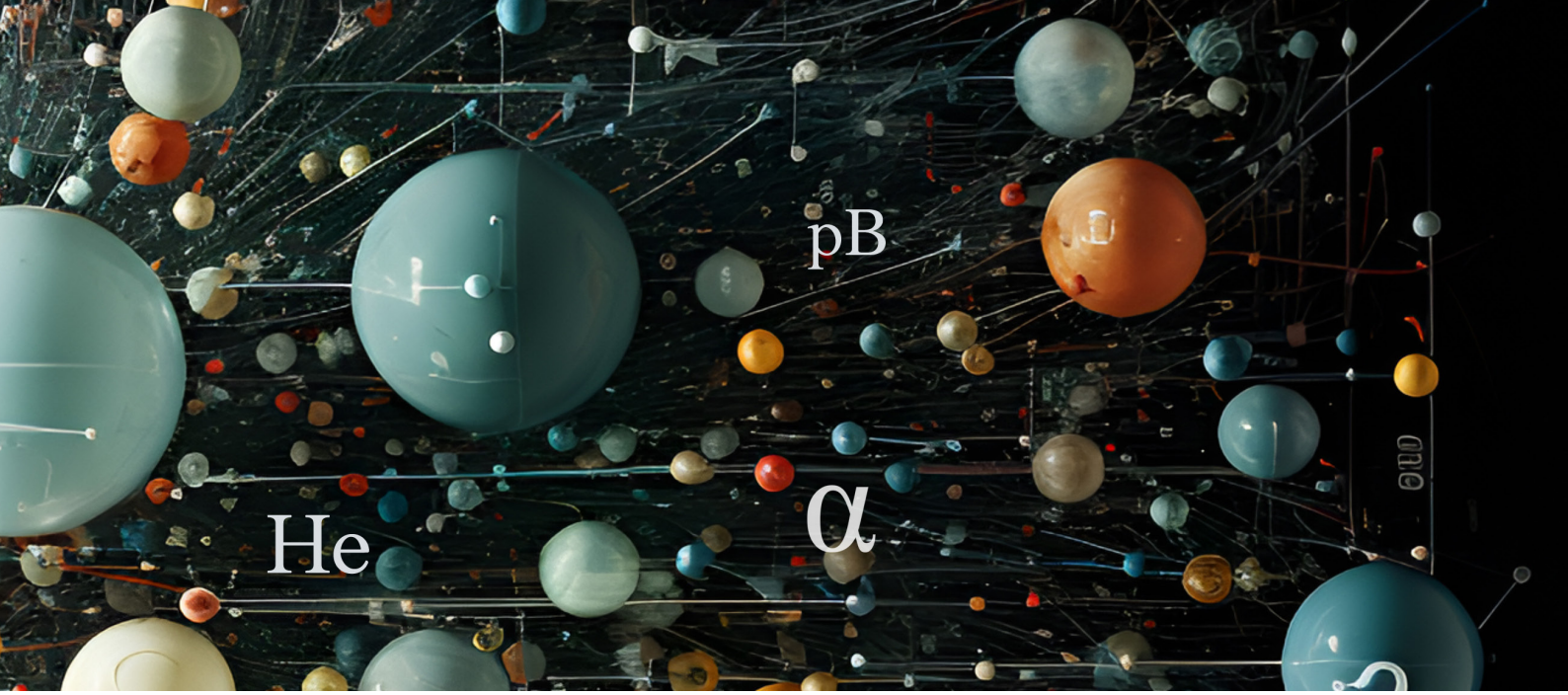
At Alpha Ring, we are working towards a greener future, having already made substantial leaps toward a workable future in fusion. So why is it that we have focused so much effort on creating educational technologies?

And, perhaps more importantly, why should you care?

At a basic level, education is key to instilling the drive within future generations to effect change and achieve energy and environmental goals. When problems seem too great to deal with, people tend to ignore those problems, or feel helpless in the face of them. If nuclear fusion is to be the future, it needs to be accessible.

It is here we are faced with a large problem – quite literally. Centres of fusion research are scarce, and the facilities are often enormous, requiring vast amounts of energy, other resources and constant maintenance.

Students who are facing scientific problems head on and diving into the world of fusion energy production have little or no ready access to the technology we currently have available.



If we are to reach net-zero, we will need experts, researchers, leaders and visionaries. We need a generation of thinkers that understand nuclear fusion, and who have the opportunity to develop the hands-on experience to push it towards new horizons.

The answer to our energy needs is not just huge, expensive and rare machinery, but scalable, usable fusion technology that can be incorporated into curriculums without sacrificing space.

The goal of Alpha Ring's ION Beam System is to expand the pool of experienced scientists and engineers, letting them face the future head on, and understand that meaningful change is achievable. The climate crisis is not insurmountable, we just need as many minds on the job as possible.

Literacy in environmental issues and accessible research into sustainable energy production is good for the planet, good for communities, and – vitally – good for business.

If you aren't convinced yet, we have an additional list of reasons why you should be...


ESG
ESG
ESG

ESG: Set the Standards

Environmental, Social and Governance, or ESG, are not merely a set of boxes to be ticked. Rather, it encapsulates the criteria that will build a better future for everyone.

Global ESG assets may reach $53 trillion by 2025[1]

ESG are a moral imperative in a rapidly changing world, and pays dividends to the companies that embrace these standards outside of merely capital or success.

With the technology that Alpha Ring presents, a broad range of businesses and institutions can solidify and enhance their commitment to their ESG goals.

We offer an opportunity to advance sustainable practices and energy production, allow companies to incorporate lasting social programmes which will have profound effects on our future, and ensure that transparent metrics will be available to signal to shareholders and investors that a business is taking ESG seriously.

By investing in education, everyone wins.

1. Bloomberg Professional Services, Research and Analysis: ESG assets may hit $53 trillion by 2025, a third of global AUM, 23 February 2021.

Sustainability

A fairer, greener world.

One of the pillars of ESG is Sustainability. Businesses need to seek sustainable solutions and take a stand on environmental issues, and help lead the global community that is pushing for a better future.

We strongly believe that nuclear fusion energy production is the only plausible way to approach net-zero emissions, and to deal with the problems of pollution, waste and sustainability associated with the energy production sector.

By fusing two nuclei to form a single, heavier nucleus, the process of nuclear fusion energy production replicates that of our Sun.

Our technology is working towards making fusion on our planet a reality, which has several benefits...

Clean

Fusion energy production processes emit no greenhouse gas emissions.

Globally, coal, oil and gas are the most common sources of energy, with the Environmental and Energy Study Institute estimating that fossil fuels are used to satisfy around 80% of the world's energy needs.[2]

This is understandable: they can be found across the globe, and are generally cheap and easy to find and produce. However, their use pumps CO_2 and other greenhouse gasses into our atmosphere, where they trap the Sun's heat and affect Earth's delicate balance. The United States Environmental Protection Agency estimates that 6,340 million metric tons of CO_2 and CO_2 equivalents were released by the USA in 2021 alone.[3]

Fusion, on the other hand, produces no greenhouse gasses whatsoever. Imagine the change in our planet's wellbeing if we removed coal from the equation?

2. Environmental and Energy Study Institute, Fossil Fuels, 22 July 2021 - eesi.org/topics/fossil-fuels/
3. United States Environmental Protection Agency, Sources of Greenhouse Gas Emissions, 2023 - epa.gov/ghgemissions/sources-greenhouse-gas-emissions

Abundant

The resources required for producing energy through nuclear fusion are both virtually inexhaustible and accessible.

Unlike the use of fossil fuels, harnessing natural phenomena like wind and sunlight does not result in the release of harmful chemicals.

Solar energy harnesses sunlight, wind farms use the kinetic energy of the air, geothermal energy utilises heat from within the earth, and hydropower uses the flow of water.

However, it is becoming increasingly obvious that renewable energy sources are not on their own the answer to our current crisis. Their energy conversion efficiency can be comparatively low, they take up a massive amount of space, and simple bad weather will lower their production capacities. Additionally, they require somewhere to store energy, due to their dependence on the vicissitudes of nature. Lighting the streets at night involves using solar energy stored during the day.

This necessitates **rare earth mining** to create batteries and storage solutions, a dependency that our planet cannot sustain indefinitely and that is vulnerable to geopolitical tensions.

Much like renewable energy technologies, nuclear fusion utilises materials we have in abundance, and which we can access easily.

However, fusion produces a much higher baseload of energy – much more than we can ever hope to attain from renewable resource technology, even with the capital investment and technological advancement the sector is currently seeing. Renewables are subject to limitations that fusion technology is simply not.

Controlled

Proton-Boron reactions pose no risk of runaway reactions.

Fission technology is often touted as the only viable alternative to fossil fuels and renewable energy sources. However, the world has seen the very real dangers of nuclear fission technology.

Chernobyl, Three Mile Island, and Fukushima are merely some of the better known incidents where fission technology posed serious safety risks or caused adverse health outcomes to both nearby communities and the global population.

Additionally, it produces waste that has to be stored for thousands of years before it becomes safe.

Fission can create the energy we need, but at what cost. Fusion technology, on the other hand, poses no risk of meltdown.

As we have seen historically, nuclear fusion is hard to harness, where the reaction needed to produce is difficult to initiate and even more challenging to maintain.

More importantly, nuclear fission is a chain reaction that can self-amplify, whilst nuclear fusion is not.

As such, it is never going to lead to the kind of unrestrained, uncontrollable reactions through mechanical or human error that would present any danger to the public.

If we have this kind of technology, why would we settle for an outdated mode of energy production?

Our Answer

Educat/ION Beam

Current technology is simply not enough.

Not even nuclear fusion technology as it is currently available: produced by machinery that is massive, unwieldy, and limited to governments and institutions that can afford the space, money and minds.

But what does this all mean for a company or institution wishing to fulfil the Environment criteria of their ESG brief?

It means investing in technologies and educational resources that can work towards a greener future.

There are only so many trees to be planted and bulbs to be switched before something more meaningful has to be done.

Fusion technology needs to be **available and accessible**, and Alpha Ring is looking to provide a solution to both of these issues.

It provides an educational device that is comprehensive enough to provide the experience and training that a future in fusion requires, and compact enough to be available to as many people as possible.

Continuity & Transparency

The metrics of the Social and Governance elements in ESG can be hard to quantify, compared to environmental factors that can be measured in capital, waste and emissions.

Social contributions are often made up of short-term projects that have a limited impact on communities, rather than making any systemic and sustained contribution to society.

Governance, on the other hand, is addressed on with transparency and reporting – which is not always easy.

The pioneering paper *Who Cares Wins: Connecting Financial Markets to a Changing World*, issued by a joint initiative of financial institutions in association with the United Nations, states that "companies with the best track record in terms of social responsibility and a long-term vision about a low-carbon future also dominate the market share of strategic projects, which is seen as a key determinant of business success".[4]

So how does an institution or corporation establish long-term goals regarding social responsibility, and how does it do so in a way that provides measurable outcomes that can be disclosed to investors and the public?

A key, often underestimated strategy that provides both of these outcomes is investing in education. **Education is not merely an ethical imperative, it is good for business,** and the social progress that results can be quantitatively measured and tracked.

Take for example the findings of the Global Business Coalition For Education's report *Unlocking Potential & Performance: Recognising Education's Position at the Core of ESG.*[5]

It states that "by positioning education as the central thrust of the social dimension of ESG, companies have the unique benefit of generating wide-ranging impacts based on decades of evidence and documentation", and in doing so can also recruit new talent, identify new markets for expansion, and build diverse workforces.

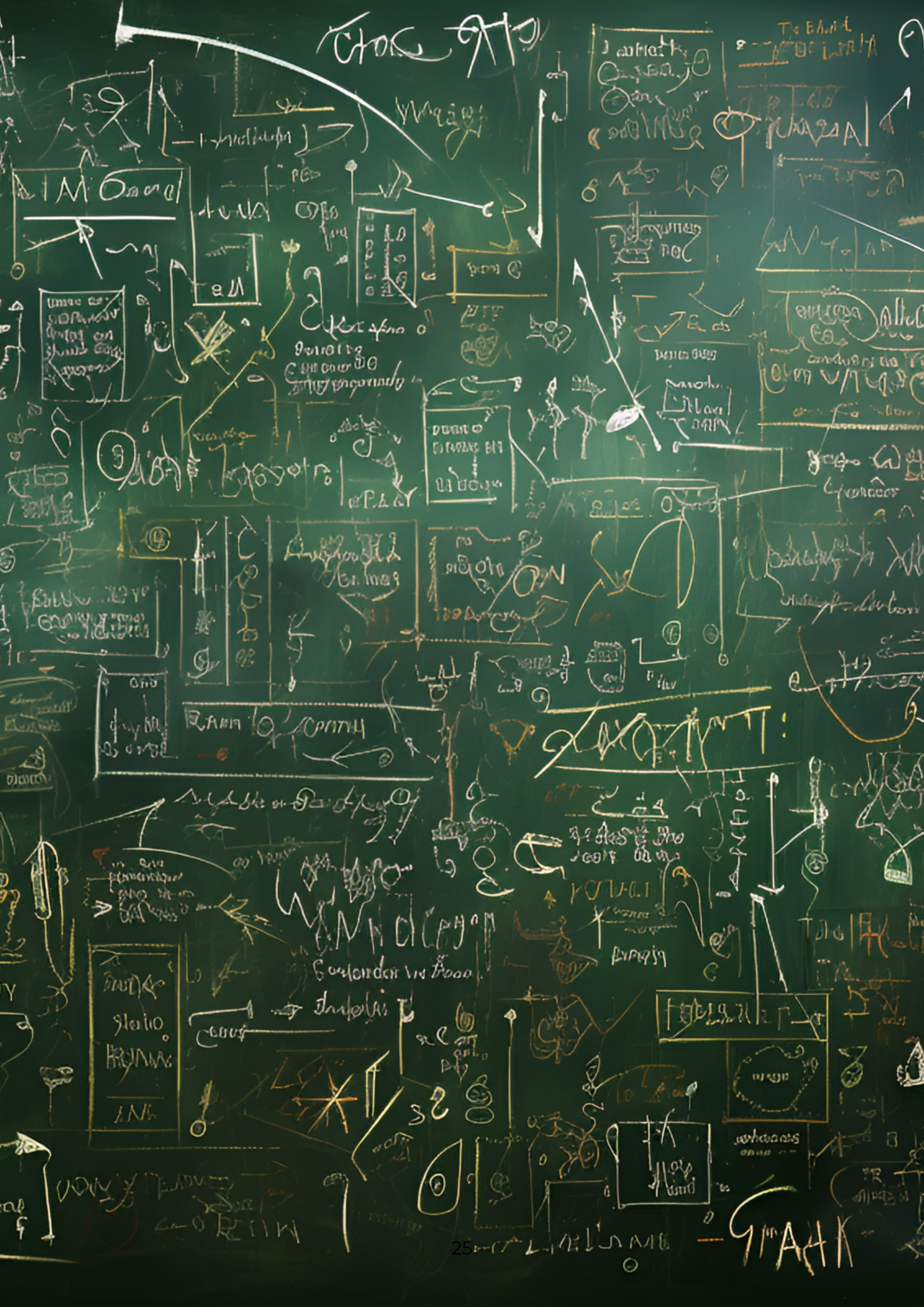
According to the report, it is as elementary as "identifying material issues", developing evidence-based actions rooted in education and training, and monitoring their impact.

By investing in educational resources, companies and institutions can not only make a positive impact on their communities, but can overtly and measurably demonstrate their commitment to ESG goals, and in the process encourage **public trust.**

Given that energy consumption and emissions are almost universal in their effects on businesses and the people they serve, it seems a straightforward decision to throw support behind educational advances that will have fundamental effects on how we produce energy.

4. Who Cares Wins: Connecting Financial Markets to a Changing World, 2004.
5. Unlocking Potential and Performance: Recognising Education's Position at the Core of ESG, September 2022.


Thinking Ahead: Be Better Prepared for a Future in Fusion.



Nur-turing Future Talent

Solve Tomorrow's Problems Today

Skilled workers are already proving scarce in many sectors, and the problem is only going to get worse. In 2022, a survey found that 75% of companies have reported talent shortages and difficulty hiring for high-skill jobs, and 77% of CEOs stated they struggled to find staff with the creativity and innovation skills they desired.[6]

It is imperative then that both businesses and universities make creating a diverse and energetic talent pool for the future a priority, particularly in areas in considerable demand.

The world is changing, and it is to the benefit of every community that top leaders, thinkers and educators anticipate changes to the way we live and work and plan ahead accordingly.

Nuclear fusion is on its way, and it is only a matter of time before it is part of everyday life. It is imperative then that future specialists are given the best opportunity to acquire the relevant skills to prepare for this change.

Alpha Ring's ION Beam System provides what most current universities and research institutions currently cannot: consistent, accessible, hands-on experience.

With better training, and more of it, provided earlier in educational development, students will come into the workforce better prepared.

They will need less time and less capital invested in them to get them up to speed with working with fusion technology.

Moreover, one cannot understate the importance of expanding opportunities for students early in their educational journey.

Young people have an endless ability to think outside the box, and set goals that are far beyond those we can currently dream of. By providing direct experience with nuclear fusion research and technology, we can expect greater innovation, and better prospects for our planet's future.

"It's vital to create an agile and flexible skills system that can respond quickly to the needs of an evolving workplace, where increased digitalisation, automation, AI and Net-Zero priorities are creating the need for different knowledge and skills, and new ways of working."

Shevaun Haviland,
Director General, British Chambers of Commerce

6. Unlocking Potential and Performance, as above.

Choosing Change

When world-defining technology is invented, demand for experts soon follows. The Internet was invented in 1989, and by 2022 more than 3.12 million people are employed in the IT industry in the USA alone.[7]

Artificial Intelligence has only just begun to explode onto the scene, and yet the UK Government already estimates that expenditure on Artificial Intelligence related labour in the country will sit between £80 billion and £103.2 billion by 2025.[8] This is stratospheric growth that will generate a corres-ponding surge in demand for skilled workers.

It follows then that fusion, as a world-changing and highly anticipated technological leap, will also require a huge leap in the number and quality of educated professionals.

Nuclear fusion research is intrin-sically multidisciplinary in nature: you need experts in nuclear phy-sics, plasma physics, electrical engineering, and much more.

A tool which will be of use to a wide range of specialities will be invaluable to any institution that wants to keep up with what future students will demand.

Alpha Ring's ION Beam System empowers universities and research facilities, providing better education – it will give students experience with the practicalities of fusion research and mechanics, not just the theory behind it. This will produce more well-rounded and well-trained experts in their fields.

Of course, investors and donors will want to know their money will be spent wisely, achieving the best possible outcomes for their chosen institution.

More importantly however, the young people of today are well aware that the professional world is competitive.

They will be looking for institutions that will give them the edge, and provide them with the best education on offer in their field.

Direct experience with the latest technology will be a key decider for many, and universities need to stay up to date to appeal to an ambitious and motivated new generation.

"The fastest-growing roles relative to their size today are driven by technology, digitalisation and sustainability"

World Economic Forum: The Future of Jobs Report 2023

7. *Statistica Research Department, Employment in the IT industry: Statistics & Facts, July 2023.*
8. *The United Kingdom Department for Digital, Culture, Media & Sport, Office for Artificial Intelligence, AI activity in UK businesses: Executive Summary, January 2022.*

Choosing Green

Countless people from every walk of life are choosing greener alternatives – in everything from their diet and clothing to their choice of investments.

It makes sense then that more and more students are including sustainability and attitudes to environmental concerns as factors when choosing where to study.

You can now check how green a university is online, with People & Planet's 'University League' measuring everything from carbon management to ethical investment and ethical careers when ranking UK universities.[9]

Universities are already responding to this. Harvard University in the USA has a Sustainability Action Plan readily available on its website, while Australia's University of Sydney includes 'Sustainability at Sydney' in its 'Visions and Values'.

Oxford University in the UK has a strategy to achieve net-zero carbon by 2035 and its own 'sustainability mailing list'. Japan's University of Tokyo launched the 'University of Tokyo Sustainable Campus Project (TSCP)' in 2008, and South Africa's University of Cape Town is a signatory of the ISCN/GULF Sustainable Campus Charter. These are just a few amongst many examples.

It is clear then that universities are acutely aware of the value and appeal of being environmentally friendly when it comes to attracting students and staff, and are implementing sustainable practices across their campuses and curriculums.

But the fact is that once buildings are made energy efficient and waste is disposed thoughtfully of, and once trees have been planted and charities have been supported, they have covered only the basics. To go further and, vitally, stay ahead of the rest, universities will have to do more. They will have to build curriculums that further the cause of sustainability, and put resources into making viable and long lasting change.

By incorporating effective nuclear fusion research into their programs of study, universities will be making a statement about their priorities. Institutions do not need massive facilities to be making strides toward a better future, they need **practical experience for their students.**

They need to make a statement about their priorities, and their investment in technology like the ION Beam System signals to students their sustainability goals are broader, more substantive and more radical than switching to energy efficient lightbulbs.

9. peopleandplanet.org/university-league

Opportunity knocks

In an increasingly globalised world, emerging markets are proving big players on an international scale. They are changing the landscape of investing, pushing technological advancements, and defining world-wide economic trends.

Additionally, they are hotbeds of entrepreneurship, a key factor in upping the pace of economic growth. But in order to keep up with developed economies, they need to keep innovating and stay ahead of their competitors.

Emerging economies need to be more agile than their competitors, and in this they have a distinct advantage: they are able to take part in 'leapfrog innovation'.

While developed nations are bogged down in old technology, existing infrastructure and increasingly out-dated systems, emerging markets can bypass these in favour of those that address contemporary needs. They can look to the future without being encumbered by the past, and invest in innovation.

Many countries are already preparing themselves for disruptive technolo-gies, and have set up guidance and incentives for progressive businesses.

India established the Small Industries Development Bank of India (SIDBI Startup Mitra) via an Act of Parliament in 1990, and China, which set itself a goal of becoming "the world's primary AI innovation centre" by 2030 as set out in its New Generation Artificial Intelligence Development Plan (AIDP) from 2017, has a plethora of state-backed funds that are investing in AI research.

Actions such as these demonstrate a fundamental understanding of what can push an emerging market towards success, focusing on dynamism in order to maintain **sustained growth** and a commitment to innovation.

"Sustainable growth is fundamentally dependent on continuous upgrading and innovation".[10]

Innovation does not just encompass technology, it also involves the drivers of change – the youth of today.

There are 154 countries classified as emerging or developing by the International Monetary Fund, which are home to an estimated 6.75 billion people. On top of this, PwC estimates that almost 90% of people aged under 30 live in an emerging economy.

More than anyone, it is young people who are most likely to embrace change and, given the right educational opportunities, have the capacity to change the world. Emerging economies have an unparalleled opportunity to advance on a global stage, should they invest in the motivated and resourceful generation that will define our future.

Alpha Ring's ION Beam System is the key to providing the latest technology to the hungriest of minds, and could revolutionise the communities which they serve.

10. Jaideep Anand, Gerald McDermott, Ram Mudambi & Rajneesh Narula, Innovation in and from emerging economies: New insights and lessons for international business research, Journal of International Business Studies, 2021.

EDUCATION:

All you need to know about Alpha Ring's ION Beam System

An affordable, compact & safe to use device.

Alpha Ring has developed an unprecedented technologic device, and it's totally safe.

Our ION Beam System is designed for future scientists and thinkers, and is sized to suit any university or research institution.

In the creation of this System, Alpha Ring has developed an unprecedented scientific device that is completely safe.

Our system uses advanced detectors, including PN detectors and fast neutron scintillators, to accurately analyse fusion reactions and measure all branches of fusion products.

The fast neutron scintillator uses pulse shape discrimination to separate neutron signals from gamma signals as well as obtain timing information.

Efficient ion source and plasma chamber design.

At the heart of our system lies an ion source that utilizes microwave technology in the Electron Cyclotron Resonance (ECR) condition.

This unique setup ensures efficient plasma production and high current density, enabling low accelerating potentials while maintaining a reasonable fusion reaction yield.

Furthermore, our system allows users to control the plasma in a variety of ways, thus studying the impact of different parameters on the fusion reaction.

Students can study all relevant fusion reactions.

Experience with the realities of nuclear fusion will be relevant for a vast array of specialities and disciplines, from scientists to engineers and further afield.

The ION Beam System is capable of producing all relevant fusion reactions, such as Deuterium-Deuterium (DD), Deuterium-Tritium (DT), and proton-Boron (pB).

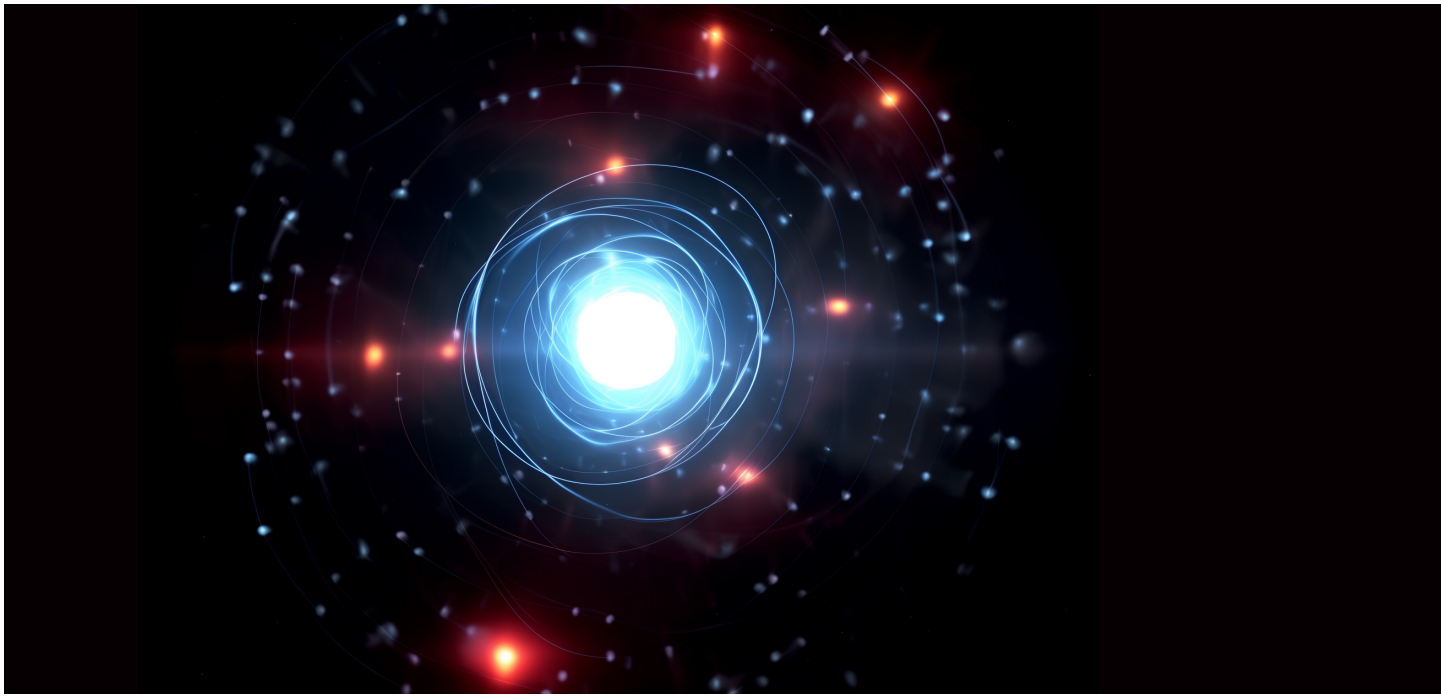
DD Fusion.

Our ION Beam System accelerates deuterons from a deuterium plasma to tens of keV. These highly energetic ions then bombard a thin aluminium foil target and become lodged into the metal lattice.

Subsequent deuterons strike the deuterium in the target to initiate DD fusion. The DD fusion reaction produces two distinct branches, each with its own unique particles and energy outputs. One branch results in the creation of Helium-3 (0.82MeV) and a neutron (2.45MeV), while the other generates a proton (3.02MeV) and a triton (1.01MeV).

pB Fusion.

By changing the target to one that contains boron and starting with a hydrogen plasma, pB fusion can also be studied and the energy spectrum of fusion product alpha particles (3–8 MeV) can be observed. Since the target reactant is already present, there is no preliminary loading step.



Proprietary sensor technology and enhanced detection capabilities.

Our ION Beam System utilises Alpha Ring's ultra-sensitive sensors, allowing the device to run reactions at low energies, whilst still obtaining statistically significant readings.

This capacity to utilise low energies is key to the device's ability to teach energetic reactions like DD fusion in a safe manner.

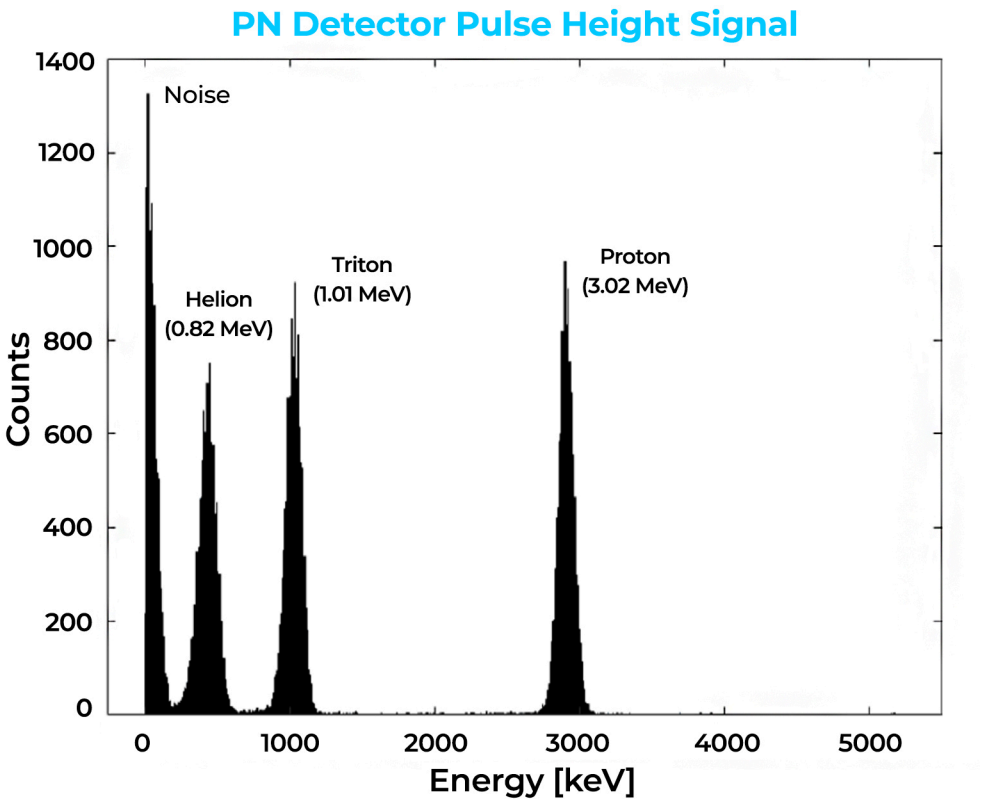
Educational Curriculum.

What Alpha Ring provides goes beyond merely equipping you with the tools to teach, it also provides an educational curriculum that can be adopted or adapted to suit the needs of the institution.

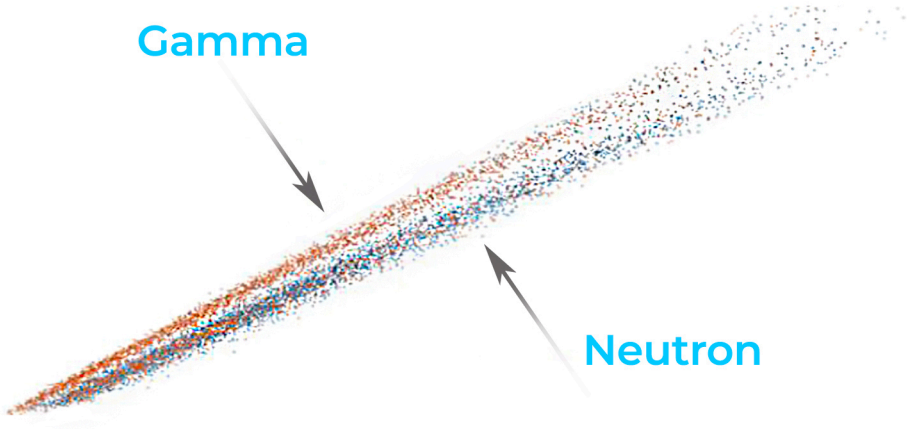
The curriculum included has been painstakingly constructed so that it contains everything a student will need to enter the field of nuclear fusion. This involves understanding the instrument, including setting up the hardware and software, as well as the theory and physics behind the experiments the ION Beam System is able to run.

From plasma to DD reactions, cross-sections to coherent fusion reactions, it conveys a core understanding of the various processes of nuclear experimentation. It also provides experiments that can be run on the machine, how to do them, and how to read the results, giving students the hands-on training they need.

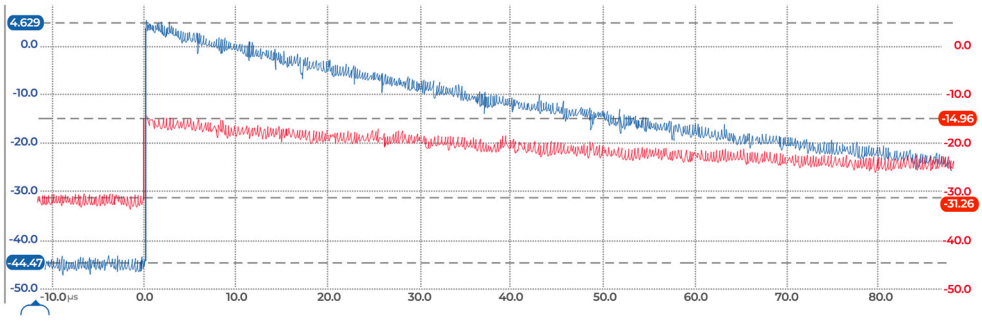
Finally, it also seeks to expand their horizons, showing them the various ways such technology can revolutionise our world – whether it is to transform mining, enhance security, advance medical sciences – paving the road to ideas that no one has even thought of yet.



Charged particle detectors showing the spectrum of DD fusion reaction



Fast neutron scintillator data showing both the gamma and neutron tails after pulse shape discrimination of the signal.



Charged particle pulses on two PN-diode detectors placed at 180-degrees apart. The blue curve shows the proton signal and the red curve shows the triton signal.

Frequently Asked Questions:

Q: What are the count rates for "D+D" charged particles at different energies using the same ion source & a different target?
A: The count rates for the "D+D" charged particles, obtained using the ECR ion source and a different target, are as follows:

Energy [kev]	55	45	35	25	15	10
Yield [CPM]	873.0	717.5	630.3	39.0	11.0	2.239

Q: What is the yield vs. energy curve for the p + B > 3α reaction using our ION Beam System?
A: The yield vs. energy curve for the "p + B" > 3α reaction, based on our particular ion source plasma and extraction parameters, is approximately as follows:

Energy [kev]	70	65	60	50	45	42	40
Yield [CPM]	21.6	18.5	4.6	0.9	0.3	0.2	0.07

Q: What are the advantages of using ECR microwave excitation for the ion source?
A: ECR microwave excitation offers several advantages for the ion source. Firstly, it enables the production of high current density ion beams with good atomic species (H^+/D^+). High atomic species are necessary for initiating fusion reactions with minimal required energy. Secondly, ECR microwave excitation is known for its high power efficiency. It allows for the effective conversion of input power into ion beam generation, minimizing energy loss and reducing operational costs. Additionally, with the advancements in 4G and 5G technologies, solid-state microwave amplifiers have become widely available and reliable. This has facilitated the adoption of solid-state microwave generation in creating compact and efficient ion sources. By utilizing ECR microwave excitation, we can achieve a compact ion source design that delivers high current density, good species selectivity, high power efficiency, and takes advantage of reliable solid-state microwave amplifiers.

Q: How does your PN detector data turn into binned energy counts?
A: A representative signal is shown in the figure on the left. The heights correspond to the energy of each single detection event. After obtaining all of the signals, the pulse heights are binned into a histogram showing an energy spectrum of the fusion particles. The right-bottom plot shows the energy spectrum for a typical "D+D" reaction with the 3 labelled peaks with equal areas under the curve as required by theory.

Q: How do you detect neutrons from the ION Beam System?
A: We employ a fast neutron detection system based on a plastic scintillator. This detection method relies on the principle of proton recoil, where energetic particles interacting with the scintillator material generate recoil protons. The plastic scintillator emits scintillation light upon interaction with these energetic particles, and this light is then captured by a photomultiplier tube (PMT) and converted into an electrical pulse signal. To differentiate between neutrons and gamma rays, we utilize a technique called pulse-shape discrimination (PSD). By analysing the decay characteristics of the electrical pulse, we can determine whether the detected particle is a neutron or a gamma ray. The plot below demonstrates a typical PSD separation between gamma rays and neutrons.

Q: Are there any X-ray radiation emitted from the ION Beam System?
A: At this energy, although some bremsstrahlung radiation is produced, the amount of stainless steel around the ion source basically attenuates the X-ray emission to background levels. If higher voltage operation is required, some lead shielding can be placed around certain areas to reduce the X-ray emission.

Q: What is the nominal operating voltage and current of the ION Beam System?
A: For the "p + B" reaction, our ion source will typically operate around 50-60keV and for "D+D" reaction, around 20-30keV. Higher operating voltage will provide greater fusion particle count rates but also increase the X-ray emission due to back-streaming electrons.

Conclusions:

It is clear that, as a global community, we must be prepared for the future we are currently faced with.

We have a burgeoning population which needs an ever-increasing amount of energy to survive and thrive, a climate crisis that continues to grow more pressing, and a rapidly changing business landscape.

Consumers expect more from the industries that serve them, and younger generations have greater demands than the guiding institutions that will set them on their way currently have to offer.
There is a growing voice for change, and solutions need to be found.

To reach net-zero emissions, we need to have an energy revolution. Fossil fuels, renewables and nuclear fission are simply not up to the task at hand, using scarce materials and burdening the environment for future generations.

To Stephen Hawkings, one of the greatest minds of our age, the answer is obvious.

At Alpha Ring, we see nuclear fusion as the way forward. But we dream bigger than merely battling away at the problem ourselves.
We see a whole generation that is hungry for solutions, eager to learn, and passionate about a brighter future for our planet.

The ION Beam System is our contribution to the next great minds. We will need scholars, thinkers, scientists, engineers, technicians, and specialities that we cannot yet even comprehend if we are to make lasting change.

We are investing in the future, and designing technologies that will prepare the students of today for the needs of tomorrow.

Education is the way forward, but understanding theory is not enough. We need hands-on experience for our students, and achievable solutions for universities and research facilities that look to the future as we do.

Alpha Ring is ready for tomorrow, are you?

"I would like nuclear fusion to become a practical power source. It would provide an inexhaustible supply of energy, without pollution or global warming."

Stephen Hawking

10 Questions for Stephen Hawking, Time Magazine, November 2010.

Call to Action

It is not just the responsibility of universities and governments to advance the prospects of future generations. Businesses are equally compelled to act, and not just on moral principles.

This guide is intended to outline how investing in educational technologies and sustainable practices brings inherent value and opportunities to businesses. These choices could be made to support ESG goals – and reap the rewards of consumer trust, reputational enhancement and the invested capital that goes along with them – or solve increasing skills shortages, or to prepare for changes to the economy and society at large, rather than get left behind.

There are simply a plethora of reasons to invest in education, and education in nuclear fusion in particular.

We all must play a part in changing our world for the better. We all want a brighter future, and Alpha Ring is offering the best pathway to achieving it.

At Alpha Ring, we are looking for forward thinkers to help fund this and future projects. Whilst we have accrued a growing community of investors whose ideas align with our vision, we need as many business experts and entrepreneurs working with us as possible if we are to make sustainable and lasting change. There are many ways towards a net-zero future, and we need your help to get us there.

If you wish to join us, the time is now.

For answers to any questions you may have, or advice on how to take steps towards a future in fusion, please contact us:

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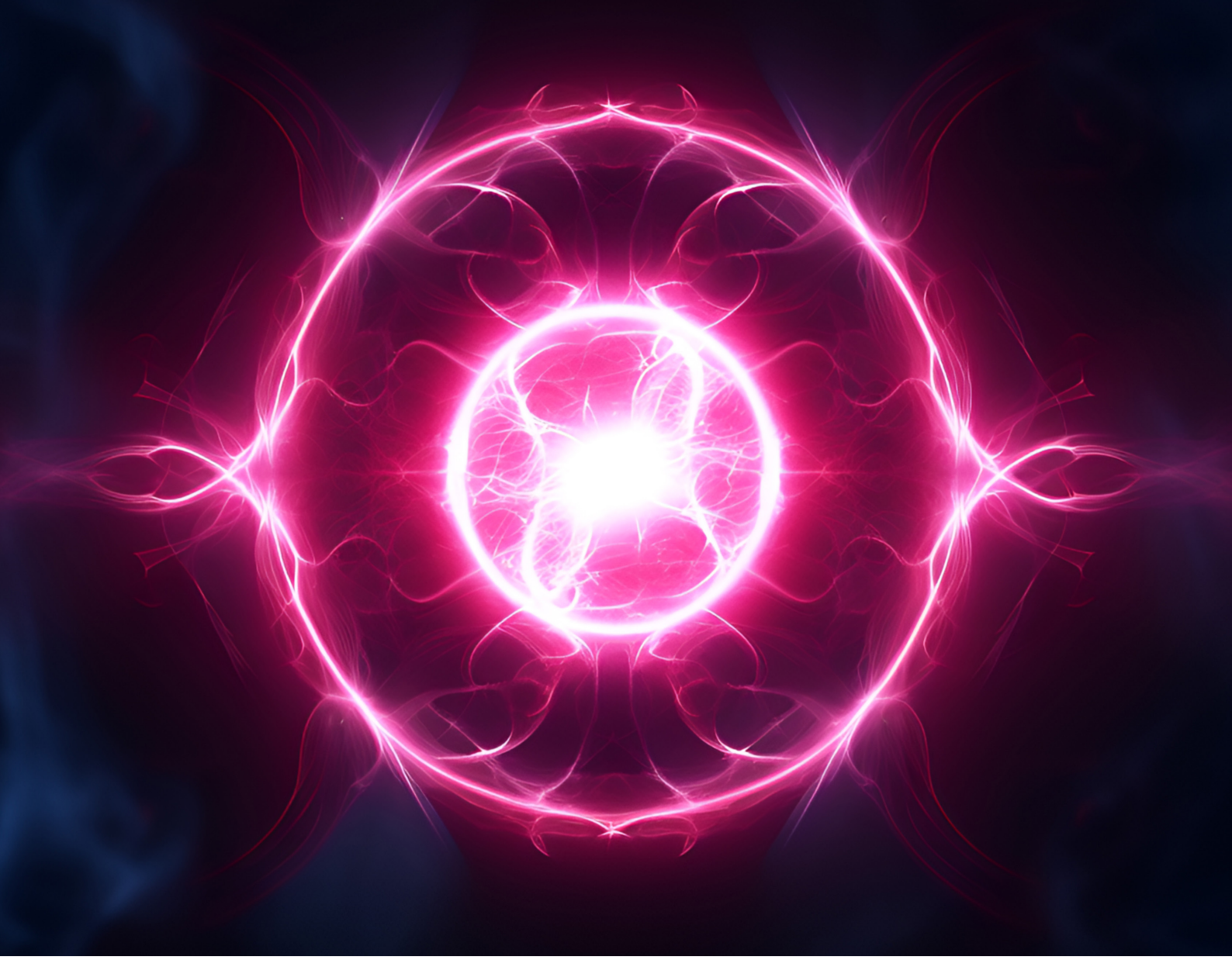

Alpha Ring's Technology

- ION Beam Educational System
- Linear Micro Fusion Machine
- Rotational Micro Fusion Machine
- Nanofusion
- CH4 Hydrogen on Demand

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