The āgna Museletter
May 2024

Quantum Computing & Beyond

Dear Reader,

Welcome to the very first edition of The Agna Museletter! We're excited to have you join us as we explore the fascinating intersection of Frontier Technologies and the vibrant East-West Corridor as our 'Muses'.

You might wonder why the name 'The Agna MuseLetter', on one fine Saturday morning call, we decided to revisit the name of the newsletter with a fresh approach, and lo and behold, the name got finalised, as Agna stands for 'perspective'- both sharing and exchanging. With 'The Agna Museletter', we aim to bring you 'Our Muses' – updates, insights, and perspectives on how the emerging markets are evolving into robust ecosystems, fueled by shifting West-to-East dynamics focused in frontier technologies in two themes – Data (including Blockchain/Web3, AI, Metaverse/Gaming) and Engineering (with sectors like Defence & Aerospace, and ClimateTech) – and their potential to drive growth in emerging markets, especially in the East.

MUSELETTER HIGHLIGHTS:

It is evident that the emerging markets are propelled by the shifting West-to-East dynamics, protectionism, disruptions in global supply chains, and geopolitical tensions that are witnessed in multiple flash points in the form of skirmishes and regional conflicts that have the potential to escalate into all-out wars. We are also observing certain players, such as India, and countries in the Middle East, such as UAE, KSA, etc., that are relatively neutral & stable forces in this highly chaotic world, presenting phenomenal opportunities to capture alpha. We have delved deeper into these developments in our recently published macro thesis.

Our proposed investment arm, Agna Capital, is currently giving shape to a global fund focused on emerging technologies and sectors. We seek to empower the most audacious founders, fueling innovation along the East-West Corridor and aiming to deliver supernormal returns to our investors.

Emerging markets x Emerging Technologies = α^2

With our extensive experience and expertise in understanding the complexities of navigating the evolving frontier technology ecosystems, we are rightly positioned to offer more than just financial support.

Through Agna Labs, we become your partner, providing strategic advice, market access, and legal & back-office support, among others.

We wish you to consider this newsletter your source for insights, analysis, recommendations, and conversations (*with us*) into the world of Frontier Technologies and the East-West Corridor. Through this newsletter, you shall have first-hand access to updates on Agna and its ecosystem where *we invite you to share your perspective with us and collaborate*.

Agna INSIGHTS

The year is 2100. Imagine expansive fleets of spacecraft armed with ultra-sensitive quantum accelerometers, gyroscopes, and clocks effortlessly navigating the solar system with unparalleled precision. Picture swarms of miniature SmallSats, each equipped with compact quantum sensors, collaborating to capture images of exoplanets, chart asteroids, and unveil the mysteries of dark matter. Visualise space telescopes leveraging quantum optics to gaze into the distant past of our universe with a level of clarity far exceeding current capabilities. Basically, a dream come true for a space buff!

Well well, let's come back to 2024 for a bit! True that Quantum Computing has been touted as one of the most transformative technological innovations that can revolutionise our lives across multiple domains such as finance, healthcare, logistics, etc. The relevance of this technology across space science is something that is expected to create unprecedented possibilities for humanity. This is more so because of "What can space offer quantum computers that Earth cannot?". But before we delve into this, let's define what quantum computing means for folks who are new to the topic:

"Quantum computing is a type of computing that uses quantum-mechanical phenomena, such as superposition and entanglement, to perform operations on data. In contrast to classical computers, which use binary digits (bits) to represent information, quantum computers use quantum bits (qubits). A qubit can be in a superposition of two states, which allows it to perform multiple computations simultaneously."

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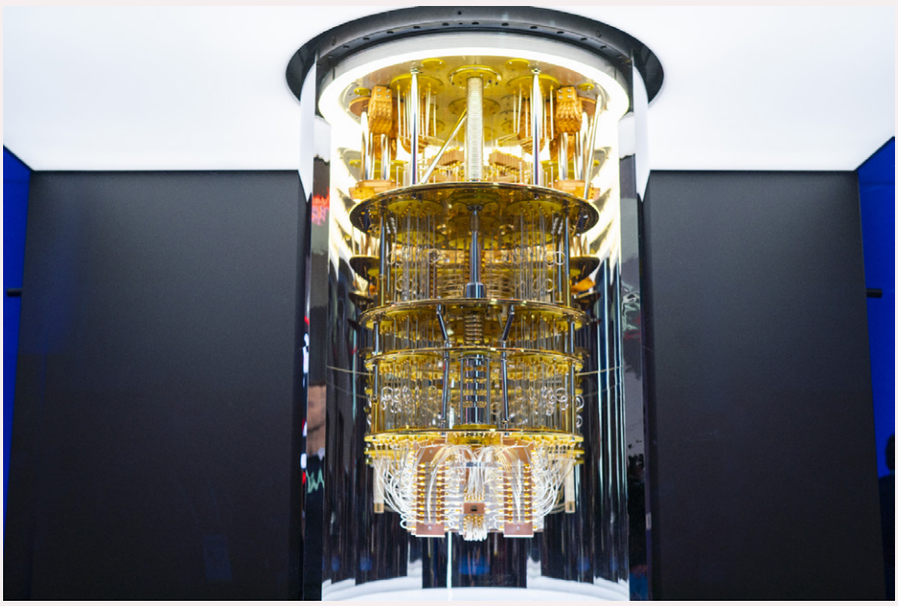
Learn more about the fundamentals of Quantum Computing here and here.



IBM Quantum Computer

Now, answering the critical question of why Space for Quantum Computing! Here are the three reasons:

1. **Extreme Cold:**
   Subzero temperatures are optimal for quantum computers

2. **Abundant Free Flowing Data:**
   Space offers quantum computers access to massive amounts of information they require

3. **Interference-Free Environment:**
   The controlled, vacuum-like conditions in space ensure minimal interference, allowing quantum computers to operate with maximum efficiency

Quantum computing's ability to simulate complex phenomena at the atomic and subatomic levels unlocks a treasure trove of insights into celestial mechanics, material science, and fundamental physics. By simulating the behaviour of exotic materials in zero-gravity environments or modelling the dynamics of black holes, quantum computing could help us push the boundaries of human understanding and technological possibility.

In the following section, we intend to highlight certain key technological innovations that could be brought to life courtesy of the fusion of quantum computing and our space exploration endeavours.

1. **More Efficient Propulsion Systems:**
   Quantum computing holds the potential to simulate and analyse atomic-level behaviour, aiding in the development of more efficient propulsion systems. By exploring materials and components at the quantum level, engineers can identify novel designs and materials that offer enhanced efficiency and durability, revolutionising spacecraft propulsion systems.

   Companies such as IBM and D-Wave Systems are well poised to develop these, courtesy of their initiatives to explore applications of quantum computers in various fields, including material science.

2. **Orbital Debris Detection and Tracking:**
   Quantum navigation technology, integrated with quantum sensors, can contribute to the detection and tracking of space debris. Enhanced space situational awareness (SSA) through quantum technology can enable better tracking of orbital debris, forecasting collision risks, and devising effective mitigation strategies to safeguard satellites and space infrastructure.

   Australian quantum sensing startup Q-CTRL is developing quantum sensor and control systems that could enhance our SSA capabilities.

3. **Climate Action and Net-zero Goals:**
   Quantum computing emerges as a catalyst for transformative change in this endeavour. Its integration with Earth Observation (EO) data enables scientists to model climate scenarios, predict ecosystem changes, and develop sustainable solutions with unprecedented accuracy. From optimising energy-efficient spacecraft designs to simulating carbon sequestration strategies, quantum computing empowers space agencies and environmentalists alike to chart a course toward a greener and more sustainable future.

4. **Improved Communication Systems even for deep-space applications:**
   Traditional radio communication faces limitations in transmitting large volumes of data over vast distances, leading to delays and signal degradation. Quantum communication offers a solution by leveraging quantum entanglement to instantaneously transmit information across interstellar distances. This breakthrough could enable real-time communication with spacecraft exploring the far reaches of our solar system and beyond, ushering in a new era of interstellar connectivity. Added to this are the secure encrypted communication capabilities that can be enabled through Quantum Key Distribution.

   Examples of companies: Xanadu, a Canadian

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startup focused on quantum photonic processors and quantum computing could aid us in this as they are exploring the use of quantum computing for optimising communication networks, including optical communication systems for space applications.

ID Quantique, a Swiss company that is a pioneer in the field of quantum key distribution (QKD), has been exploring the potential of QKD for secure satellite communication, while their primary focus is terrestrial communication.

5. **Space-based Manufacturing and Resource Utilisation:**
   By simulating complex material properties and optimising manufacturing processes at the quantum level, scientists and engineers can develop lightweight yet durable materials for spacecraft construction, enhance 3D printing techniques in microgravity environments, and explore novel methods for extracting resources from asteroids and other celestial bodies. These advancements pave the way for sustainable space exploration and colonisation efforts, reducing reliance on Earth-bound resources and opening new frontiers for human civilisation. As mentioned earlier, the developments made by IBM and D-Wave Systems will be relevant in progressing this domain.

6. **Space-based Data Analytics & ML Applications:**
   By processing vast volumes of satellite data with quantum algorithms, researchers can extract actionable insights into climate patterns, environmental changes, and natural disaster risks. Quantum machine learning algorithms enhance spacecraft autonomy and decision-making capabilities, enabling adaptive mission planning, anomaly detection, and predictive maintenance in space missions. These advancements drive efficiency, reliability, and innovation across the space industry, accelerating scientific discoveries and commercial opportunities in space exploration.

7. **Complex Problem-Solving in Cosmology & Astrophysics:**
   The integration of quantum technologies with space science also holds promise for advancing fundamental research in cosmology and astrophysics. Quantum simulations allow scientists to model the behavior of extreme astrophysical phenomena, such as supernova explosions, neutron star mergers, and black hole accretion disks, with unprecedented accuracy. These simulations not only deepen our understanding of the universe's most enigmatic phenomena but also provide valuable insights into the nature of space-time, gravity, and the quantum realm on cosmic scales.

As quantum technologies continue to mature and integrate into space science and exploration, the possibilities for transformative breakthroughs are boundless.

Our journey through quantum technologies in space leaves us with a question: are we observers of the universe, or are we intertwined with its very fabric through quantum entanglement? As we seek answers, let's remember that every discovery unveils new layers of cosmic truth, just like Interstellar!

Agna PERSPECTIVE

Market Entry in the UAE:

Navigating the UAE's startup landscape requires a strategic approach. Leverage its regional gateway status, tailor your investor pitch, and tap into government support while building local networks for long-term success.
Read more

Global landscape of AI:

AI is transforming industries globally, led by innovation from the US, China, and Europe, with emerging hubs in India, UAE, and Saudi Arabia. Ethical, economic, and hardware innovations drive global collaboration for responsible AI development.
Read more

2024 Global Risks | A summary:

The top risks identified by leaders at WEF 2024 makes us draw your attention to the first principle that underpins our core thesis at Agna – "Action is sustainably shifting from the West to East", which is being driven by 3 key emerging themes 1.) Obsolescence of old development models, 2.) Protectionism & Polarisation, 3.) Technological Renaissance. How we navigate this transition will define the future for generations to come.
Read more

Emerging Managers (VC) = Value Creators for Family Offices:

While direct investment in startups is a viable strategy, many forward-thinking family offices are recognising a less explored yet powerful avenue: investing in emerging venture capital fund managers.
Read more

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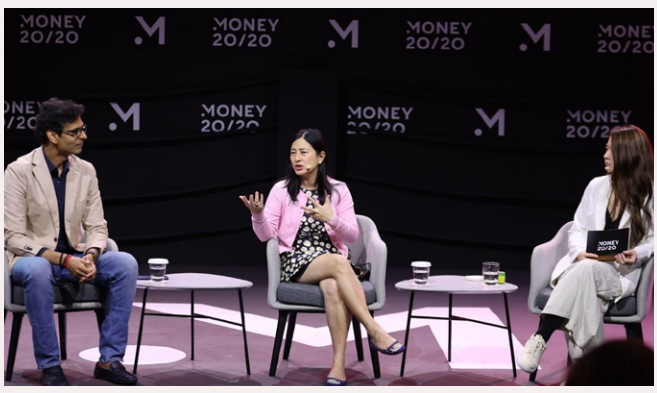
TEAM ENGAGEMENT



ONCHAIN 2024

ONCHAIN 2024, a dynamic one-day conference focused on the convergence of traditional finance, fintech, and Web3, is where our Founder, Pranav Sharma, was one of the key participants in a dialogue exploring the institutional investor's opportunity in tokenized private credit.

Strategic outreach

Our Partner & COO, Indrajeet Sirsikar, recently had on-ground interactions with founders, researchers, and management of multiple defence companies and associations where he exchanged perspectives on industry trends & potential. He plans to extend this initiative with a Pan India roadshow in May/June, engaging with industry veterans and early-stage founders. Meetings with SIDM, NDIA, and similar organisations are a priority on the agenda.

Money20/20 Asia

Money20/20 Asia brought together a diverse ecosystem, including banks, payments, startups, retailers, fintech, and regulators, where our Founder Pranav Sharma participated in a dialogue emphasising the shift towards operator-driven, mid-size VC funds and the collaborative dynamics reshaping Asia's fintech landscape.

VC Mixer

Our Research and Investments Lead, Rahul Nagaraj, was part of the VC Mixer hosted by Recur Club in Bengaluru. This event was a melting pot of investors from the ecosystem, and it presented an opportunity to exchange perspectives on the latest developments happening in frontier tech and the broader startup ecosystem in India.

On the 'FRONT'IER TECH

Digantara

An Indian space tech startup, launched Asia's first commercial Space Domain Awareness Command and Control Centre in Bengaluru. It will track satellites, manage space traffic, and facilitate satellite assembly and testing. Digantara plans to launch a constellation of 40 surveillance satellites, with the first satellite equipped with the SCOT sensor set to launch in July.
Read More

Re: wild

A collective that protects and restores the wild, and Colossal Biosciences, the de-extinction company, are collaborating to pioneer the fusion of conservation and cutting-edge technology, leveraging de-extinction tools to safeguard Critically Endangered species and vital ecosystems for a sustainable future.
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Agna RECOMMENDS

Racing against time: How to survive the cash vs. product crush

The article discusses the critical challenge faced by startups, particularly in the climate tech sector, and the importance of reaching milestones and generating traction to secure additional funding, highlighting strategies such as cost-cutting, raising equity, applying for grants, and increasing revenue.
Read more

Are we living in a variable universe?!

DESI's recent findings suggest that dark energy, thought to be a constant force, might actually vary over time, challenging our current understanding of the universe's expansion and raising new questions about its evolution.
Read more

Questions? Feedback? Different perspective?
We invite you to engage with us and collaborate.

Warm Regards,
Team Agna

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