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The Black Swan of Semiconductors: Strategic Implications of China's Technological Breakthrough in Extreme Lithography

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Abstract:

In early 2025, the unveiling of a working prototype of extreme ultraviolet (EUV) lithography in Shenzhen, led by former ASML scientist Lin Nan, has brought about the "Black Swan" that Western intelligence considered unlikely in the short term. This article analyses how China, under a state-run "Manhattan Project" scheme, has managed to circumvent the technological sanctions embargo through alternative physical routes (solid-state lasers/SSMB) rather than mere replication.

Keywords:

Economic Security, EUV Lithography, Semiconductors, China, Dual-Use Technologies, Strategic Autonomy, SSMB, National Security.

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Introduction. The black swan theory in current geopolitics.

The history of military strategy and international relations is full of events that, once they materialise, instantly rewrite the rules of the game. The year 2025 will go down in the annals of technological history not only as the year China announced its operational capability in extreme ultraviolet (EUV) lithography, but also as the moment when the failure of the containment architecture designed by the West over the last decade became apparent.

To understand the magnitude of this event, it is imperative to refer to the theory formulated by Nassim Nicholas Taleb at the beginning of the century. A "Black Swan" is defined by three fundamental attributes. First, it is a rarity that exists outside the realm of normal expectations, as nothing in the past convincingly points to its possibility. Second, it has an extreme impact. Third, and perhaps most relevant to the analysis at hand, human nature pushes us to invent explanations for its occurrence after the fact, making it explainable and predictable[1] .

Until early 2025, the Western intelligence community and semiconductor market analysts operated under a security paradigm that considered EUV lithography to be the ultimate "moat." The widespread belief was that the complexity of these machines, composed of more than 100,000 parts and dependent on a globalised supply chain under US and European control, made it impossible for an isolated nation to replicate them before 2035. This narrative was reinforced by multiple rounds of sanctions and export controls, such as the CHIPS and Science Act and the trilateral agreement between the United States, Japan and the Netherlands[2] . It was mistakenly assumed that cutting-edge technological innovation was inseparable from liberal political systems and open international cooperation.

However, the announcement from the Shenzhen laboratories, under the technical direction of Lin Nan, a former scientist at ASML itself, has dismantled this presumption of invulnerability. The presentation of a functional prototype based on steady-state micro-

[1] Taleb, N. N., Taleb, N. N. (2007). The Black Swan: The Impact of the Highly Improbable. United States: Random House Publishing Group. ISBN: 9781588365835, 1588365832. Retrieved from (Google Books): https://www.google.es/books/edition/The_Black_Swan/gWW4SkJjM08C?hl=en

[2] Allen, G. C. (2023). *Choking off China's Access to the Future of AI*. CSIS (Centre for Strategic and International Studies). Washington D.C. Retrieved from: https://www.csis.org/analysis/choking-chinas-access-future-ai

array light sources (SSMB) poses an existential challenge to ASML's monopoly. This Dutch company, considered the technological "crown jewel" of Europe, has until now held a global monopoly on the manufacture of extreme ultraviolet lithography machines, the only devices capable of printing the most advanced circuits that bring modern artificial intelligence to life.

China's success not only demonstrates Beijing's technical capabilities, but also reveals a profound "strategic cognitive blindness" on the part of the West. By obsessively focusing on blocking China's access to ASML's supply chain, we neglected the possibility that our adversary could circumvent these restrictions through a physical paradigm shift. In other words, the sanctions were designed to prevent China from replicating the Western technique of firing lasers at tin droplets to generate light; however, Beijing has opted for a completely different physical route, using particle accelerator principles to generate that same radiation. This move, which invalidates the effectiveness of trade blockades by changing the rules of applied physics, is a textbook example of the innovation phenomenon known as *leapfrogging*, where the lagging competitor does not follow in the footsteps of the leader, but instead takes an unexplored path to overtake them.

This event strictly complies with the characteristics of the Black Swan described by Taleb. It was considered unlikely by NATO and Pentagon planners, who were confident that the trade restrictions of 2023 and 2024 would stifle Chinese progress. Its impact is extreme, as it effectively invalidates the effectiveness of current and future sanctions, as suggested by the White House's hasty reaction in announcing new punitive tariffs just five days after the discovery[3] . Finally, voices have begun to emerge that rationalise the event after the fact, arguing that massive Chinese state investment made this outcome inevitable, ignoring the fact that just a month ago those same analysts were calling China's efforts "inefficient spending".

The breaking of the monopoly on advanced lithography is not simply an industrial milestone. It represents the end of the illusion of unilateral control over critical technologies. Europe, and by extension Spain, now face a scenario where technological dependence is no longer one-way. The materialisation of this Black Swan forces us to rethink the concepts of strategic autonomy and economic security from scratch, as the

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[3] Reuters. (23 December 2025). *US to impose new tariffs on Chinese legacy chips following Shenzhen breakthrough*. Retrieved from: https://www.reuters.com/world/china/us-impose-tariffs-chips-china-2025-12-23/

adversary has not only crossed the technological Rubicon, but has also burned the ships of Western dependence on the shore.

The “Manhattan Project” of chips

The strategic surprise of 2025 cannot be explained solely by the accumulation of capital or political will. It requires understanding the confluence of two factors that the West systematically underestimated: the return of elite talent trained in the Western ecosystem itself and the commitment to a physical architecture radically different from the industry standard.

From imitation to innovation

For years, the prevailing narrative in Washington and Brussels was that China could only advance through reverse engineering or industrial espionage. However, Shenzhen's progress is inextricably linked to the figure of Lin Nan, a profile that embodies the failure of Western talent retention policy. A former senior scientist in ASML's light source metrology division and a disciple of Nobel Prize winner Anne L'Huillier[4] , Lin did not return to China in 2021 to copy existing machines, but to solve the fundamental problems that limited current technology.

His leadership at the helm of the joint team from Tsinghua University and the Shanghai Institute of Optics and Fine Mechanics (SIOM) has been instrumental. Unlike previous efforts by Chinese company SMEE (Shanghai Micro Electronics Equipment), which attempted to replicate ASML's lenses and mirrors with mediocre results, Lin Nan's team was given a mandate similar to that of the original Manhattan Project: to ignore immediate commercial viability and focus on the physical feasibility of a new light source. This approach allowed China to leapfrog two decades of incremental development that tied Western companies to their own legacy patents.

[4] South China Morning Post. (29 April 2025). Former ASML head scientist Lin Nan drives China's latest EUV breakthrough. Retrieved from: https://www.scmp.com/news/china/science/article/3308204/former-asml-head-scientist-lin-nan-drives-chinas-latest-euv-breakthrough

This breakthrough is not an isolated case, but the spearhead of a demographic strategy that the West ignored: the systematic repatriation of the scientific elite.

Lin Nan is not an anomaly; he is the archetype of a trend that has accelerated since 2022. Although the famous "Thousand Talents Plan" was officially dismantled under FBI scrutiny, Beijing quietly replaced it with the "Qiming" (Enlightenment) programme. This scheme, operated under strict secrecy by the Ministry of Industry and Information Technology, offers housing subsidies and signing bonuses of up to 5 million yuan (approx. £500,000) to attract experts in semiconductors and other subjects of interest trained at MIT, Stanford or Delft[5] .

The paradox is that this reverse brain drain was largely catalysed by Western paranoia itself. Initiatives such as the US Department of Justice's China Initiative, designed to purge Chinese influence in academia, created a 'chilling effect' that prompted thousands of scientists of Chinese origin — many of them US citizens — to return to China, where they were guaranteed legal immunity and unlimited budgets[6] .

Why did Western predictions fail?

To understand why the component blockade failed, it is necessary to briefly delve into the physics of the problem. Western technology, monopolised by ASML, uses a method known as LPP (Laser Produced Plasma). Simply put, it involves firing a high-powered carbon dioxide laser at microscopic droplets of molten tin falling at high speed; as it vaporises, the tin emits extreme ultraviolet (EUV) light. It is a process of astonishing mechanical complexity, dirty (it generates waste) and extremely difficult to scale in power[7] . Western sanctions were effective here in blocking China's access to CO2 lasers from the German company Trumpf and Zeiss optics necessary for this specific method.

[5] Reuters. (24 August 2023). China quietly recruits overseas chip talent as US tightens curbs. Retrieved from: https://www.reuters.com/technology/china-quietly-recruits-overseas-chip-talent-us-tightens-curbs-2023-08-24

[6] Y. Xie, X. Lin, J. Li, Q. He, & J. Huang, Caught in the crossfire: Fears of Chinese–American scientists, Proc. Natl. Acad. Sci. U.S.A. 120 (27) e2216248120, https://doi.org/10.1073/pnas.2216248120 (2023).

[7] Deng, X., Chao, A., Feikes, J. et al. Experimental demonstration of the mechanism of steady-state microbunching. Nature 590, 576–579 (2021). https://doi.org/10.1038/s41586-021-03203-0

The miscalculation was to assume that this was the only way to generate EUV light. The Chinese prototype, based on steady-state microbunching (SSMB) theory, radically changes the premise. Instead of firing at metal droplets, it uses a particle accelerator (an electron storage ring about 150 metres in circumference) to force electrons to bunch together in precise patterns. As they spin inside the ring, these "packets" of electrons emit continuous, pure, high-power EUV light[8] .

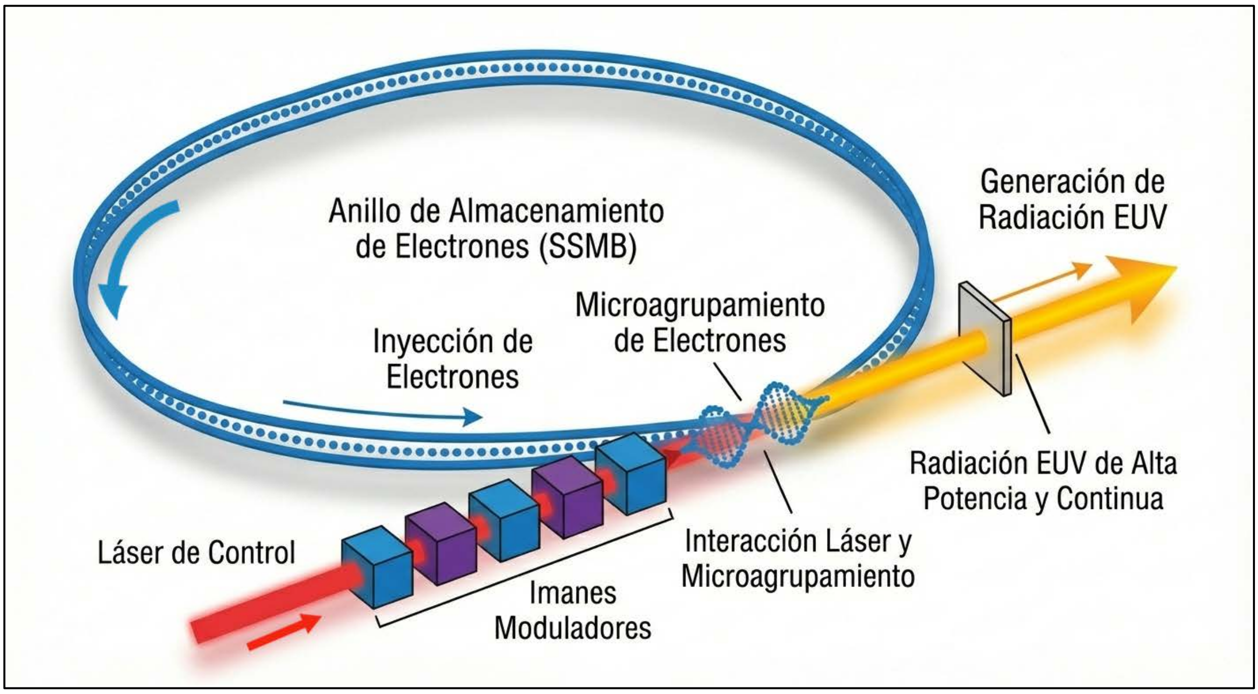

Figure 1. Conceptual diagram of the SSMB (Steady-State Microbunching) light source. Unlike traditional lithography, this system uses an electron storage ring to generate high-power, continuous EUV radiation. Source: own elaboration.

The strategic irony lies in the fact that the components used to build a particle accelerator (magnets, vacuum tubes, radio frequency systems) are commonly used in high-energy physics and were not subject to the same level of strict control as lithography components. China was able to acquire or manufacture the infrastructure for its "light factory" domestically while Western intelligence kept a close eye on the import of industrial lasers.

[8] Bauerle Danzman, S. & Gilli, A. (2023). China's Progress in Semiconductor Manufacturing Equipment. Centre for Security and Emerging Technology (CSET). Georgetown University. Retrieved from: https://cset.georgetown.edu/publication/chinas-progress-in-semiconductor-manufacturing-equipment/

The photon factory

The third aspect of this disruption is the change in industrial model. While ASML sells individual machines (the size of a bus) that are installed inside a factory, Lin Nan's Chinese proposal turns the factory itself into the machine.

The SSMB design unveiled in Shenzhen is not a device that can be put in a container; it is a massive infrastructure where a central accelerator ring generates light and distributes it via beams to multiple peripheral lithography stations. This offers an advantage that the West cannot replicate in the short term: scalability. While TSMC and Intel struggle to purchase ASML machines at £300 million apiece, China is building "photon power stations" capable of feeding dozens of production lines simultaneously.

Although the most sceptical analysts correctly point out that China still faces challenges in photoresists (light-sensitive chemicals) and in the yield rate of the chips produced, the physical milestone has already been crossed. The "wall" of physics that was believed to be insurmountable for a sanctioned nation has, in fact, been circumnavigated.

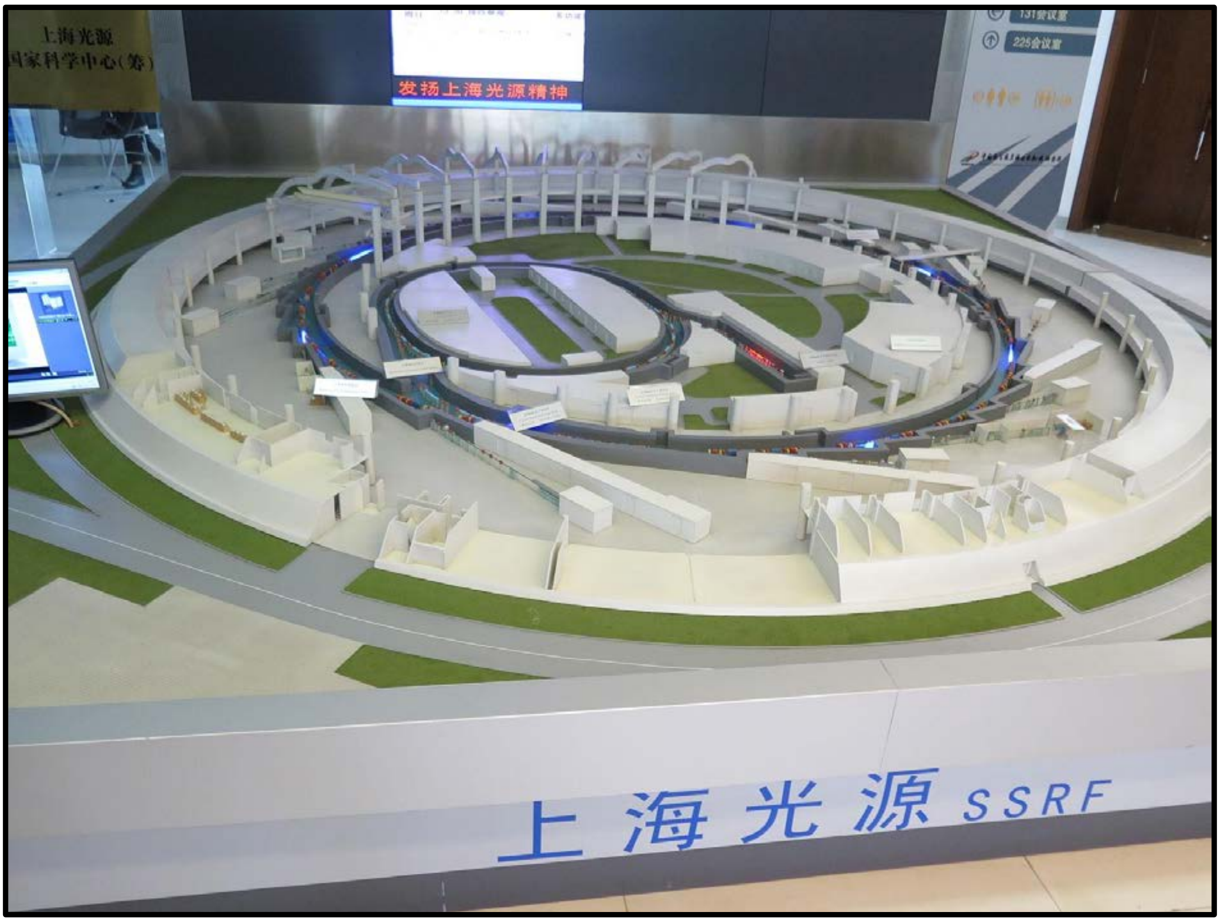

Figure 2. Shanghai Synchrotron Radiation Facility (SSRF). SSMB technology requires infrastructure of this magnitude, transforming the concept of lithography from a machine installed in a factory to a factory that is, in itself, the machine. Source: Galaxyharrylion via Wikimedia Commons, under CC BY-SA 3.0 license.

The failure of economic deterrence and export controls

China's technological advance represents the empirical refutation of the theory of 'militarisation of interdependence' that has guided transatlantic foreign policy since 2019. The premise was seductive in its simplicity: given that semiconductor value chains were hyper-centralised and passed through bottlenecks controlled by the United States and its allies (design in California, lithography in the Netherlands, optics in Germany), it would suffice to close these points of passage to strangle China's technological rise. However, time has shown that the sanctions acted not as a retaining wall, but as a powerful incentive for accelerated self-sufficiency.

Review of the 2019-2024 sanctions

The export control strategy, which began with the inclusion of Huawei on the Entity List and culminated in the radical controls of 7 October 2022 and the trilateral agreement of 2023, was based on a static view of the market. It was assumed that China would accept a position of perpetual technological subordination in order to maintain access to global markets. This miscalculation ignored the resource mobilisation capacity of a party-state when it perceives an existential threat.

Far from paralysing Chinese industry, the Western blockade eliminated foreign competition from the Chinese domestic market, effectively handing a captive customer base to local companies such as SMIC (Semiconductor Manufacturing International Corporation) and Huawei. By cutting off access to Nvidia chips or ASML machines, the West forced Chinese technology companies, which previously preferred to buy proven foreign solutions, to invest in and refine nascent domestic solutions. What were inferior products in 2020 have become mature standards in 2025 thanks to massive capital injections and forced iteration resulting from isolation.

The recent reaction of the US administration, hastily announcing new punitive tariffs on legacy chips just days after Lin Nan's breakthrough, is symptomatic of this strategic impotence. As reported by international agencies, Washington is now seeking to tax technology that China already dominates, a measure that comes too late and barely conceals the collapse of the technology denial strategy.

The resilience of the Chinese supply chain and the European dilemma

While the United States opted for direct confrontation, Europe has been dragged into a trade war for which it was unprepared, exposing the seams of its own lack of autonomy. The Chinese supply chain has demonstrated an opaque but effective resilience, articulated through a network of "front" companies and state investment funds that financed the development of the SSMB far from the scrutiny of Western regulators.

For the European Union, the current scenario is the worst of all possible worlds. By blindly aligning themselves with US export controls, key European companies lost market share in their largest market, China, without managing to slow down Beijing's technological advance. This alignment has left Europe in a position of diplomatic and commercial vulnerability, highlighting the old continent's difficulty in defining its own position that balances security and economic prosperity. Geopolitical intelligence analysts had already warned that the paradigm of EU-China relations was fracturing under the pressure of a poorly calibrated systemic rivalry, with Europe bearing the economic costs of a containment strategy that has ultimately proved ineffective[9] .

Impact on Western markets

The most immediate consequence of the SSMB's progress is the loss of value of the "nuclear button" of sanctions. Until yesterday, the threat of cutting off the supply of spare parts for DUV or EUV machines was the strongest card in the deck of Western diplomacy. Today, with the existence of an alternative and sovereign technological route in China, that card has lost its value.

Markets have already begun to discount this new reality. The fall in the stock market valuation of semiconductor equipment giants reflects fears that China, freed from the need to import Western tools, will go from being the world's largest customer to becoming, by 2030, a global competitor flooding the market with high-end chips at subsidised prices. Economic deterrence has failed because it was based on the arrogance of believing that advanced physics was the exclusive preserve of liberal democracies.

Geopolitical and security implications

If the breakdown of the EUV lithography monopoly is an economic earthquake, its aftershocks in the realm of global security have the potential to trigger a geopolitical tsunami. The security strategy in the Indo-Pacific over the last decade has rested on an unspoken but fundamental premise: technological interdependence acted as a deterrent to war. This balance, colloquially known as the "Silicon Shield," is now in danger of dissolving.

[9] Lisa News. (14 November 2024). The paradigm of EU-China relations as a reflection of European difficulties. Retrieved from: https://www.lisanews.org/internacional/el-paradigma-de-la-relacion-ue-china-como-reflejo-de-la-dificultad-europea/

The end of economic "Mutually Assured Destruction" in Taiwan

The Silicon Shield theory posited that a Chinese invasion of Taiwan was unlikely because it would destroy the TSMC (Taiwan Semiconductor Manufacturing Company) foundries, on which the Chinese economy itself depended to function. Taiwan was not just an island; it was the critical node in Beijing's digital value chain.

Advances in technology and the validation of SSMB dramatically alter this strategic calculation. If China succeeds in scaling this technology to mass production by 2028-2030, as new projections suggest, Beijing's dependence on Taiwanese chips will cease to be existential and become merely convenient. In terms of deterrence theory, the "opportunity cost" of military action is reduced.

Figure 3. Distribution of semiconductor foundries in Taiwan, near the west coast in potential locations for a hypothetical Chinese landing. The extreme geographical concentration of global manufacturing capacity constitutes the so-called "Silicon Shield," whose deterrence is weakened by China's new technological autonomy. Source: created by the author based on the NordNordWest map (Wikimedia Commons), under CC BY-SA 3.0 license, using public location data from TSMC.

For People's Liberation Army (PLA) planners, autonomy in EUV lithography eliminates the greatest fear of a blockade or invasion scenario with a total cut-off of advanced chip supplies from the West. If China has its own "photon factory" on the mainland, immune to Western missiles and sanctions, the destruction or capture of TSMC is no longer a prerequisite for its economic survival and becomes a purely geopolitical objective. This paradoxically increases the likelihood of conflict, as Beijing could calculate that it can survive a forced post-conflict decoupling, a resilience it did not possess in 2024[10] [11] .

Dual-use applications

Beyond Taiwan, sovereignty in 5nm, 3nm and lower node chips has direct implications for the global military balance. Until now, sanctions sought to degrade China's ability to train large Artificial Intelligence (AI) models and develop autonomous weapons systems. The logic was simple: without cutting-edge chips (such as Nvidia's H100), there can be no first-class military AI.

SSMB technology breaks this bottleneck. It allows China to manufacture AI-dedicated processors with extreme densities without asking Washington for permission. SSMB technology breaks this bottleneck. It allows China to manufacture AI-dedicated processors with extreme densities without asking Washington for permission. This has a direct translation on the battlefield that spans three critical dimensions. In the realm of cognitive warfare and cybersecurity, it grants unlimited capacity to train language models and decryption algorithms that require massive computing power. Simultaneously, it drives the development of unmanned systems, facilitating the deployment of swarms of autonomous drones with edge computing, capable of operating in denied electronic warfare environments without relying on constant data links. Finally, it represents a substantial improvement in hypersonic weapons, perfecting the guidance and

[10] Institute for Security and Development Policy (ISDP). (2025). The Silicon Shield Erosion: Fortifying Taiwan Against Geopolitical Shocks. Retrieved from: https://www.isdp.eu/the-silicon-shield-erosion-fortifying-taiwan-against-geopolitical-shocks/

[11] European Guanxi. (2024). Taiwan's Silicon Shield: The Role of Semiconductors in Cross-Strait Relations. Retrieved from: https://www.europeanguanxi.com/post/taiwan-s-silicon-shield-the-role-of-semiconductors-in-cross-strait-relations

manoeuvring systems of ballistic missiles and the DF-ZF series, whose avionics require extremely high-performance and heat-resistant chips[12] .

China's "Military-Civil Fusion" strategy ensures that innovation born in Shenzhen's laboratories is immediately transferred to PLA programmes, closing the qualitative gap that the United States hoped to maintain at least until the 2040s.

The US reaction

Given the failure of economic containment (the Commerce Department's "weapon"), it is foreseeable that the United States will shift the weight of its strategy to the Department of Defence. If China's technological development cannot be slowed down, Washington's only option is to accelerate its own or prepare to mitigate its military effects.

This portends a dangerous transition. The rivalry will shift from export lists and tariffs to a classic arms race and a consolidation of military alliances (AUKUS, QUAD, NATO in the Pacific). The risk of this new scenario is that it eliminates the 'grey areas' of competition. When trade ceases to be the vehicle for bilateral relations, diplomatic channels atrophy and the probability of kinetic miscalculation increases exponentially.

The 'unipolar moment' of technology is over. The West must accept that it is facing a rival that no longer needs to steal blueprints to build the future, but has found its own physics to design it.

The impact on Europe and Spain

If the United States loses its absolute hegemony and China gains technological sovereignty, Europe risks becoming collateral damage in this tectonic realignment. The Black Swan of Shenzhen exposes the vulnerabilities of a European Union that has staked its geopolitical relevance on regulatory power (the "Brussels Effect") and niches of technological excellence that, as the case of ASML demonstrates, are no longer impregnable.

[12] Department of Defence. (2023). Military and Security Developments Involving the People's Republic of China: Annual Report to Congress. Office of the Secretary of Defence. Retrieved from: https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF

The vulnerability of the "Hidden Champion"

Over the last decade, the narrative of European digital sovereignty has been underpinned by the Dutch company ASML. The existence of a European monopoly on lithography machinery allowed Brussels to sit at the negotiating table with the superpowers. The emergence of Chinese SSMB technology does not mean that ASML is immediately obsolete, but it fatally erodes its long-term strategic value.

The risk for Europe is twofold. On the one hand, the loss of technological exclusivity reduces the EU's diplomatic leverage vis-à-vis China. On the other hand, the European semiconductor industry (STMicroelectronics, Infineon, NXP), which is heavily dependent on the Chinese market for its power and automotive chips, now faces a competitor that is moving towards total self-sufficiency. If China can manufacture its own advanced lithography machines, the next logical step is to replace imports in industrial sectors where European companies still lead. The policy of uncritical alignment with US sanctions has accelerated the creation of Chinese competitors who, financed by the state, will end up competing with European firms for global markets[13] .

The failure of technological containment is forcing the EU to engage in a profound doctrinal reflection. The strategy of 'de-risking' without 'decoupling' has proven insufficient. Europe has paid the economic price of trade restrictions without achieving the security objective of curbing Chinese military advancement.

In this new scenario for 2026, Europe must decide whether to continue to be the squire of a failed US strategy or to seek true 'Open Strategic Autonomy'. This means recognising that export controls are no longer a viable tool for halting Chinese development. The priority must shift from trying to trip up the fastest runner (China) to training harder so as not to fall behind. This requires shielding critical European assets and diversifying supply chains, assuming that Chinese dual-use technology will be present in the global market, whether we like it or not.

[13] European Union Chamber of Commerce in China. (2025). European Business in China Position Paper 2025/2026. Retrieved from: https://www.europeanchamber.com.cn/en/publications-archive/1373/European_Business_in_China_Position_Paper_2025_2026

Recommendations for Spain

For Spain, this paradigm shift comes at a critical moment in the implementation of its recovery funds and industrial strategy, meaning that the impact of China's progress must reorient national priorities along three fundamental axes.

Firstly, a review of the PERTE Chip programme and a firm commitment to photonics are necessary. Attempting to compete in the nanometre race for cutting-edge chip manufacturing is a losing battle for Spain in the face of massive subsidies from the United States and China. However, China's success with SSMB, based on light and optics, validates the importance of integrated photonics, a field in which Spain has world-class centres of excellence in Valencia, Vigo and Madrid. Spain's strategy should pivot towards the design of alternative architectures such as RISC-V and photonics, where sovereign intellectual property can still be generated, rather than obsessing over attracting mega-factories that may be late to market.

Secondly, the implementation of a National Microelectronics Security Scheme is required. Given the proliferation of high-performance chips of uncontrolled origin, the Ministry of Defence, under the technical direction of the National Cryptology Centre, must establish a Secure Origin Certification for critical components. This implies moving from a policy of trust in the supplier to a Zero Trust model for hardware. The creation of a silicon forensic analysis laboratory within the Defence Technology Campus is proposed, capable of auditing the absence of backdoors in chips purchased for weapons systems, regardless of whether the supplier is Asian or a European integrator that subcontracts manufacturing. The traceability of silicon must be raised to the same level of requirement as the classification of the information it processes[14] .

Finally, Spain must promote scientific diplomacy through the Barcelona Supercomputing Centre, a critical infrastructure in the European ecosystem. Faced with the breakdown of the computing monopoly, Spain must promote this asset as a neutral cooperation hub, attracting talent that may feel alienated by the polarisation between Washington and Beijing, and leading the development of European sovereignty in supercomputing that

[14] Arteaga, F. (2021). Technology and strategic autonomy in Spanish defence. Elcano Policy Paper. Elcano Royal Institute. Retrieved from: https://www.realinstitutoelcano.org/policy-paper/tecnologia-y-autonomia-estrategica-en-la-defensa-espanola/

does not depend on either American or Chinese hardware in the long term, in line with the European Processor Initiative.

In short, for Spain and Europe, the Chinese Black Swan is not a signal to build higher walls, but to run faster in areas where we still have a competitive advantage, before the new physics of Shenzhen renders them obsolete.

Conclusions

The history of military technology teaches us that monopolies are, by nature, ephemeral. However, the speed and manner in which China has broken the siege of extreme ultraviolet lithography in 2025 forces a painful but necessary review of our security schemes. Although we have categorised this event as a 'Black Swan' due to its traumatic impact and its break with linear projections, a dispassionate analysis suggests that it is more of a 'Grey Rhino', a highly probable threat, visible in academic papers and in the massive return of talent, which we chose to ignore under the false sense of technical superiority.

The fundamental lesson of this milestone is not engineering, but strategic. The policy of containment, based on the premise that the development of a superpower could be frozen by denying it access to specific tools, has failed. By closing ASML's door, the West did not stop China; it simply forced it to open a new and larger window through the physical paradigm shift of SSMB. The result is paradoxical: in seeking to preserve our advantage, we have accelerated the birth of a fully autonomous competitor, now immune to the leverage of sanctions and with potentially superior production capacity.

For the Euro-Atlantic environment, and specifically for Spain, the implications are severe. The "Silicon Shield" that protected the *status quo* in the Taiwan Strait has been fractured, raising the risk of a kinetic conflict for which economic deterrence no longer serves as a counterweight. We are entering a phase of real technological bipolarity, where national security can no longer rely on the hope that the adversary does not have the right chips. The adversary has them, understands them and will soon export them.

In short, the dawn of the era of Chinese sovereign lithography marks the end of the "unipolar moment" of digital technology. The West's response cannot be to build higher walls around a garden that is no longer exclusive, but to return to the roots of its own success: radical innovation, investment in basic science, and protection of its value chains, not through prohibitions, but through excellence. The time for denial is over; the time for extreme competition has begun.

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