Institute for Science and International Security

Research Memo

Significance of the Targeted Nuclear Scientists in the 12-Day War

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The June 2025 war between Israel and Iran, called the 12-Day War, saw the death of many Iranian nuclear scientists who participated in or are linked to Iran's nuclear weapons program. The Israel Defense Forces (IDF) has listed the names of eleven nuclear scientists that were eliminated during a series of attacks on the opening night of the war and afterwards. Media reporting has identified several other scientists who died during the war, bringing the total to almost 20 scientists. In addition, many family members were killed in the attacks.

Overall, the elimination of these nuclear scientists deprived Iran's nuclear weapons program of its most capable and experienced personnel. This act weakened Iran's base for building nuclear weapons, eliminating needed expertise and hard-to-get management experience.

Iranian officials were quick to respond to the killings of the scientists, one proclaiming, "Hundreds of nuclear scientists can replace those who were martyred," according to Tasnim News Agency (affiliated to the IRGC). Following the assassination of five nuclear scientists from Shahid Beheshti University (SBU), according to Tasnim News Agency, its President stated that "We have lost scientists, and this loss created a gap, and restoring it will take time. They were key players who are gone from us today, but it doesn't mean we cannot fill their places."

This is not the first time Israel has targeted scientists associated with Iran's nuclear weapons program. In total, six were killed prior to the 12-Day War, mostly in the period 2010-2012 and in 2020. These were relatively isolated attacks, disruptive in the short term, but losses were manageable in the long term for Iran, in the way the President of the University of Beheshti alludes to.

However, this time the Israeli effort is different and recovering may be far more difficult and take far longer. Not only were killings in the 12-Day War on a much larger scale, they were also part of a broader Israeli program. In an apparent effort to pre-empt recovery and recruitments, Israel threatened a far larger group of scientists during the war via social media, an effort that may continue, warning them explicitly that death awaits them if they work on nuclear weapons. They reached out throughout Iran offering rewards and safety to informants who provide information about secret nuclear activities. The desired message is clear: Any Iranian scientist or engineer who decides to work on nuclear weapons or on secret gas centrifuge programs will know that his or her life, and potentially their family's lives, are at risk and that a colleague nearby could become an informant, exposing the entire secret effort, with potentially devastating consequences.

In addition, Israel also targeted the detailed nuclear weapons information, designs, and data needed to develop and build nuclear weapons. It destroyed a copy of the Nuclear Archive located in the basement of the project's headquarters in Tehran, apparently in the Organization of Defensive Innovation and Research (SPND) headquarters. It also destroyed or severely damaged a range of nuclear weaponization development and production facilities, likely laden with sensitive equipment and data.

When discussing the attack of the Iranian nuclear program, many cite the phrase "knowledge cannot be destroyed." But it is well known through history that it can be forgotten, lost, or suppressed. In a highly secretive program such as Iran's nuclear weapons program, highly cognizant of the risk of leaks, it is likely that full knowledge of the most sensitive, most current developments of the program and how individual parts were intended to work together existed only in the heads of a few. Those Iranians who choose to work on producing nuclear weapons in the future will possess less information and expertise, while facing increased personal risks, resulting in an overall notably greater challenge in building the weapon itself.

Scientists' Expertise

This study identified a total of 19 persons, eleven on the IDF list and another eight listed in Iranian media. Considerable information exists about the eleven on the IDF list but very little is available about the eight other individuals.[1]

Of the eleven on the IDF list, nine could be identified as ex-Amad scientists or engineers. All eleven were affiliated with or had worked at SPND; six could be identified as senior managers there. Many were also top academics overseeing important programs at universities. Their average age was 60 years old.

They possessed a variety of nuclear weapons expertise:

- Six of the eleven scientists had expertise in explosives or multipoint initiation of explosives.
- At least three were experts in nuclear coding or simulation relevant to nuclear weapons development.
- Four were experts in neutron initiators.
- Four had expertise in the diagnostics associated with testing components of nuclear weapons.
- Two could be linked to foreign procurements for SPND or Iran's nuclear weapons program.
- Three had experience working on ballistic missiles.

[1] This report relies on a multitude of sources, first on information in the Institute's archive, supplemented by years of work by its personnel and consultants to understand the research of the key Iranian scientific personnel active in fields relevant to nuclear weapons development. The Iran Nuclear Archive was also critical to this study, summarized in Institute reports found on our website and in the book *Iran's Perilous Pursuit of Nuclear Weapons.* During and after the 12 Day War, Iranian media was extensively searched and translated, providing valuable insights into the lives of the killed scientists. These Iranian media sources are quoted by name but not cited beyond their name, reflecting the on-going nature of this research report.

- Two had done theoretical work on gas centrifuges.
- Two had worked on nuclear propulsion for submarines.

Ten of the eleven had known university positions, a few at multiple universities.

- Five were professors at the University of Beheshti.
- Two were at Malek Ashtar University.
- Two were at Imam Hussein University.
- Two were at Islamic Azad University.
- One each were at Amirkabir University and Tarbiat Modares University.

At least three of the eleven received their PhDs in Russia. Most of the others received PhDs in Iran.

Of the eight other scientists, no evidence of a link to SPND or Amad could be determined from the paucity of publicly available information about their careers or expertise. Nonetheless, one was an antenna specialist affiliated with Iran University of Science and Technology and Malek Ashtar University. His work had many sophisticated military applications. Another was a nuclear scientist with some work in fields relevant to gas centrifuge plants and other work relevant to nuclear weapons code development. The media reported another as part of the nuclear technology front, stating he preferred to remain in the shadows on joint projects of "industrial universities and defense-scientific institutions." There was a prominent AI expert, who may not have been targeted but killed due to an explosion in a neighboring building. Another was the wife of a scientist in the list of 11 distributed by the IDF.

Senior Scientists Identified by the IDF

The IDF has published a list of eleven nuclear scientists killed during the 12-Day War, identified as "senior scientists in the Iranian regime's nuclear project."

1. Fereydoun Abbasi-Davani
2. Mohammad Mahdi Tehranchi
3. Ali Bakouei Ketrimi
4. Abdolhamid Minouchehr
5. Ahmadreza Zolfaghari
6. Seyed Amir Hossein Feghhi
7. Mansour Asgari
8. Akbar Mottalibizadeh
9. Saeed Borji Kazeruni
10. Mohammadreza Seddighi Saber
11. Seyed Asghar Hashemitabr

Fereydoun Abbasi-Davani

Abbasi-Davani, born in 1958, joined the Islamic Revolutionary Guard Corps (IRGC) following the 1979 Islamic Revolution and participated in several operations during the Iran-Iraq War in the 1980s. In 1984, he graduated in nuclear physics from Shiraz University and earned a doctorate in 1987 from Ferdowsi University of Mashhad.

During and after the war, Abbasi-Davani led a unit at the Ministry of Revolutionary Guard Corps tasked with importing new sciences and technologies, including nuclear-related technologies, which were absent from Iran. Individuals from the unit became key members of the Islamic Republic's first generation of nuclear scientists, starting from scratch and undoubtedly devoted to building both military and civilian nuclear programs. *Jame Jam Online*, a state-owned and state-controlled broadcaster in Iran, said Abbasi-Davani was "one of the silent architects of the Islamic Republic's nuclear advances; someone whose name is behind many of the advances in this field. "

According to Press TV, "In 1993, he joined the faculty of the Physics Department at Imam Hussein University—affiliated with the IRGC, the Ministry of Science, and the Ministry of Defense—and later became head of the department. He went on to earn additional doctorates: one in nuclear engineering from Amirkabir University of Technology in 2003, and another in nuclear physics from Shahid Beheshti University."

In the 1990s, he participated in a government-sponsored effort to develop a comprehensive nuclear roadmap involving over 200 experts from the Ministry of Defense, the Atomic Energy Organization of Iran (AEOI), energy and oil ministries, universities, and private industry. This roadmap laid the foundation for Iran's indigenous nuclear industry, both military and civilian. He was joined in this effort by Mohsen Fakhrizadeh, the future leader of Iran's nuclear weapons program, Masoud Alimohammadi, and Majid Shahriari. All four became key leaders in the Amad Plan of the early 2000s and post-Amad organizations. Alimohammadi and Shahriari were killed in 2010. Abbasi-Davani narrowly survived an assassination attempt. Fakhrizadeh was killed in 2020.

Abbasi-Davani had many roles in the Amad Plan, which officially ended in 2003/2004. Some are documented in the Iran Nuclear Archive, which Israel purloined in Tehran in 2018.[2]

In the late 1990s or early 2000s, he led an effort along with Shahriari to investigate transient phenomena in nuclear reactor accidents, a practice employed by other countries in developing nuclear weapons. Understanding and modifying these readily available reactor codes allows a nuclear weapons program to study the brief period of time when a reactor core undergoes a rapid rise in power and then disassembles, or the reactor "runs away", another way of providing an unclassified starting point for studying the dynamic simulation of a nuclear explosion. In the proposal, Abbasi-Davani notes the project's importance: "Since this information will play a key role in the operational stage of the *operating system*,

[2] See for example, David Albright with Sarah Burkhard and the Good ISIS Team, *Iran's Perilous Pursuit of Nuclear Weapons* (Washington, DC: Institute for Science and International Security Press, 2021)

the importance of this project is clear" (emphasis added). "Operating system" was the codename for the nuclear weapon at that time.

In 2000, he was part of the top technical committee overseeing the nuclear weapons effort led by Fakhrizadeh. A memo of a committee meeting discussed a proposal Abbasi-Davani had submitted on selecting an underground test site for a nuclear explosive in the Iranian desert. The memorandum of the meeting suggests that the nuclear weapons effort had grown, and Abbasi-Davani needed to delegate some of his responsibilities to a project manager, one able to oversee all aspects of selecting and building an underground nuclear test site. Besides showing that Abbasi-Davani was overcommitted, according to his colleagues on the committee, the memorandum shows his important role in the nuclear weapons program.

One of his key tasks in the Amad program was to design, develop, and test the neutron initiator, made of uranium deuteride, producing neutrons through deuterium-deuterium fusion. This device is placed at the center of the weapon-grade uranium core of Iran's nuclear weapon to introduce a spurt of neutrons at the right time to start the chain reaction.

Abbasi-Davani also played a critical role in the closure of the Amad Plan in 2003/2004, its downsizing, and re-orientation into overt and better camouflaged covert programs (see section below on Amad closure and reorientation).

By 2003, he was listed as affiliated with the IAP (Institute of Applied Physics), which is recognized by the International Atomic Energy Agency and governmental information as a cover for the nuclear weapons effort during Amad and afterwards, serving as a bridge between the nuclear weapons effort and universities.

In 2011, Abbasi-Davani was appointed as head of the AEOI. He served in that position until 2013. In his post-AEOI career, Abbasi-Davani served in the Majlis, Iran's parliament, and ran for president.

Abbasi-Davani was placed on the United Nations sanctions list in 2007 under Security Council Resolution 1747 as a "senior scientist at the Ministry of Defense and associated with the Institute of Applied Physics of Iran" for his involvement in "nuclear or ballistic missile activities." The United States also sanctioned him in 2012 for his role in the AEOI. The Treasury Department specifically noted his contribution to the development of Iran's uranium enrichment processes and expertise in nuclear isotope separation. He remained on the U.S. and Western sanctions lists until his death.

According to Press TV:

> "His scientific expertise encompassed sensitive and strategic fields, including nuclear physics, isotope separation, radiation dosimetry, particle accelerators, and plasma focus systems. As one of the founders of the Iranian Nuclear Society, Dr. Abbasi [-Davani] held several leadership roles, such as former head of the Physics Faculty at

> Imam Hossein University and head of the Laser Research Center at Malek Ashtar Industrial University. He supervised numerous MSc and PhD theses and authored over 40 scientific articles in reputable journals. In recognition of his contributions, he received the National Exemplary Professor Award in 2007."

Abbasi-Davani wrote or co-wrote with colleagues at a variety of Iranian universities many academic articles related to neutron production via deuterium-deuterium and deuterium-tritium reactions, the detection of the neutrons emitted by these small-scale thermonuclear reactions, reactions of deuterons on the beryllium nuclei, and the embedding of deuterium and tritium into substrate materials. This research was related to his Amad and post-Amad work on a uranium deuteride neutron initiator and the creation of a post-Amad overt program based in universities and institutes that could indirectly assist, or provide recruits for, the highly secretive program developing and ultimately producing the uranium deuteride neutron initiator for the nuclear weapons program.

More broadly, he was committed to IRGC-related universities teaching the expertise needed to staff industries and programs at the heart of a nuclear weapons program. While the work related to nuclear weapons was highly covert, the expertise he and his former Amad colleagues would create in the universities would be a pool to recruit people into the secret programs when needed.

Abbasi-Davani recently claimed on Iranian television that Iran could make nuclear weapons, and he would work on them if asked. He added that Iran did not need a missile or a plane to deliver a nuclear weapon to the inside of the countries of Iran's enemies, namely the United States and Israel.

He was targeted and killed in the same building where Mohammad Mahdi Tehranchi lived.

Mohammad Mahdi Tehranchi

Tehranchi, born in Tehran in 1965, received his bachelor's and master's degrees from Iran's Shahid Beheshti University. He completed his PhD in theoretical physics at the Moscow Institute of Physics and Technology in 1997. One of his first positions was as the Deputy Executive and Planning Faculty at Shahid Beheshti University from 1998-1999.

Tehranchi was a leading figure in the Amad Plan. An image from the Nuclear Archive shows him present at a test of a flash x- ray in Taleghan 2 at Parchin in the early 2000s. This flash x-ray was used to film rapidly occurring implosion system tests inside the high explosive chamber in Taleghan 2. At the time, he oversaw Project 3.30, in charge of diagnostics. The U.S. government confirmed that Tehranchi was also an Amad program supervisor and in charge of Project 3.30.

He participated in meetings of the committee overseeing the Amad Plan as well as closing and reorienting it after 2003 (see below).

From 2003 to 2004, he served as Research Director of the Laser Institute at Shahid Beheshti University. He also implemented a major photonics project at the Research Institute for Defense Industries, which is believed to refer to the flash x-ray program.

According to Press TV, Tehranchi's field of activity was condensed matter physics, quantum computing, and nanophysics. He published over 98 articles in domestic and international scientific journals, delivered over 130 conference presentations, supervised dozens of MSc and PhD theses, and led 17 large-scale national scientific and technological projects.

A review of his publications on researchgate.com reveals 23 pages of published journal articles. Many of these journal articles are in areas indirectly related to laser isotope separation physics.

In 2019, he was placed on the sanctions list by the U.S. Treasury Department for his activities in the Amad nuclear project. The Commerce Department added him to the Entity List as part of its March 2020 sanctions against Iranian nuclear scientists.

Tehranchi served as president of Shahid Beheshti University from 2012 to 2016 before becoming president of the Islamic Azad University's Tehran branch. Since 2018, he has held the position of President of the entire Islamic Azad University system.

As President of Islamic Azad University, he appears to have facilitated collaboration with SPND and its overseas illicit procurements, a role he had played earlier. The collaborative relationship with a university allowed SPND personnel to conduct open research useful to its covert aims, procure equipment, and recruit personnel. Iran *Redline* obtained and published a memorandum of cooperation between an Institute of Applied Physics (IAP) and the Islamic University Central Tehran Branch in 2016 to equip advanced radiation laboratories, establish and conduct collaborative research, and facilitate the recruitment of post-graduate students for the IAP. *Redline* detected several links between SPND and IAP, indicating IAP as a front for SPND. The first is IAP's address on the memorandum, on Mojdeh Street, the same as SPND's. Their phone numbers match as well. The second link is the person who signed for IAP, its head, Ruha Ghaderi. Ruhollah Ghaderi Barmi was identified by the U.S. Treasury as head of SPND's Shahid Fakhar Moghaddam Group, involved in attempts to procure X- ray equipment from foreign suppliers. The third link is the coincidence that Tehranchi was appointed to be president of the Islamic University Central Tehran Branch soon after this memorandum was signed. Overall, the IAP appeared to be fronting for the SPND on a major collaborative effort with an important Iranian university. This approach is reminiscent of the Institute of Physics that was recruited or established in the mid-2000s at Shahid Beheshti University as part of overt work related to the neutron initiator when Mohammad Mahdi Tehranchi was a senior official at that university.

According to Press TV, "In 2018, Tehranchi delivered a key scientific policy speech to the Leader of the Islamic Revolution, Ayatollah Sayyed Ali Khamenei, laying out a vision of science in service of Iran's sovereignty and resistance against the Western imperialist powers."

In addition, according to Press TV, Tehranchi served as a scientific advisor to the Expediency Discernment Council, which is a high-level political body that resolves disputes between the Parliament (Majlis) and the Guardian Council and advises the Supreme Leader. He also headed projects at Iran's Defense Industries Training and Research Institute.

According to Press TV, "He played a key role in challenging Western dominance through scientific knowledge and innovation and was widely admired for his scholarly integrity and institutional leadership in academic circles throughout the country. His work embodied the Islamic Republic's defiance of Western hegemony and Zionist aggression."

Abbasi-Davani's and Tehranchi's Role in Reorienting the Amad Plan

Both Abbasi-Davani and Tehranchi played senior roles in sculpting and carrying out Iran's post-Amad nuclear weapons efforts. Both subsequently remained affiliated with SPND.

Their leadership role is captured in a series of memoranda in the Iran Nuclear Archive. By late summer 2003, the Amad Plan had entered a period when senior leaders had to make decisions about reducing the scale of the program and better concealing it, while still making progress on building nuclear weapons, in case a decision were made to resume building nuclear weapons. The beginning of this shift is captured in a series of memoranda by the Amad Plan Technical Committee, which held a series of "intensive meetings" over eight days in August and September 2003.

The meetings, attended by both scientists, were dominated by conducting official orders to downsize but preserve the assets and activities of the Amad Plan. Discussions were multi-faceted, encompassing goals of better camouflaging remaining activities of Project 110 (the part of Amad responsible for building the nuclear weapon), preserving the number of project personnel, and maintaining a capability to build nuclear weapons. Overall, the discussions laid out an explicit plan of how to transform the Amad Plan and carry the redesigned project into the future. In these plans, every major component in the nuclear weapon was analyzed and discussed in the context of its place in the future effort.

A memorandum on the new instructions about Amad also contained details about the split of the nuclear weapons program into overt and covert parts, namely, "In the new approach, work is divided into two general parts: covert (secret structure and goals) and overt (normal structure)." The covert work was further distinguished between "contaminating" and "non-contaminating" work. According to this document, "In the contaminated part, which is intended to be done after the non- contaminated work, the team's efforts focus on portability to be safe from espionage activities and to avoid detectable contamination."

The following are quotes made during the meetings from key leaders of the Amad Plan, including Abbasi-Davani and Tehranchi:

- Abbasi-Davani urged, "We should make a distinction between 'overt' and 'covert' activities."

- Majid [Majid Shariari] stated, “Overt activities are those that could be explained as part of something else, and not as part of the project, so that we would have an excuse for them.”
- Masoud [Masoud Alimohammadi] stated, “‘Neutrons’ research could not be considered ‘overt’ and needs to be concealed. We cannot excuse such activities as defensive. Neutron activities are sensitive, and we have no explanation for them.” (Here, defensive refers to preparations for the Nuclear Defense Project under the Amad Plan that evidently also continued after 2003 and served as another cover story for nuclear-weapons-related work.)
- Masoud also stated, “Development of methods and facilities could be considered overt – all other explorations should be covert.”
- Dr. Mohammed Mahdi [Tehranchi] noted, “Let there be no mistake, the amount of personnel in the overt and covert parts will not decrease. The structure will not become smaller, and every sub-project will supervise both its overt and covert parts.”

Creating and preserving documentation was emphasized by Tehranchi and Alimohammadi:

- Tehranchi: “It is necessary that we conduct our future short-term activities, with the policy of documenting all of the (past) performed operations.”
- Alimohammadi: “We (must) gather and document all the records of scientific activities so that these activities are not unfinished. We should not lose quality staff and should preserve them in scientific developments with a fully defined framework.”

Ali Bakui Katrimi (Bakouei)

Bakouei, born in 1966, earned his PhD from Moscow State University in 2004 in nuclear physics and elementary particles. He reportedly worked on condensed matter physics, materials science, and supercapacitor development. He was an Assistant Professor at Tarbiat Modares University in the Faculty of Basic Sciences, Department of Atomic Molecular Physics, from 2004 to his death.

Bakouei is associated with the Young Researchers and Elite Club, Central Tehran Branch at the Islamic Azad University. The best and brightest young Iranians students are associated with this organization.

FDD reports,[3] based on unnamed governmental sources, that Bakouei “was in the Amad Plan, where he specialized in the development of multipoint initiation systems (MPI), nuclear weapons design, and explosives technologies. He was one of only a few knowledgeable scientists in this field during the Amad Plan. Following the Amad Plan, he held various roles in the nuclear program and was a senior figure involved in ballistic missile systems. Until recently, he was head of an SPND explosives group involved in the design of nuclear weapons.”

[3] Bridget Toomey and Andrea Stricker “The 9 Iranian Nuclear Scientists Israel Has Eliminated,” Foundation for Defense of Democracies (FDD), June 14, 2025, https://www.fdd.org/analysis/2025/06/14/the-9-iranian-nuclear-scientists-israel-has-eliminated/.

Based on his open academic publications, his specialties included the preparation of lithium niobate crystals for use in laser waveguides and the development of advanced electrode materials for asymmetric supercapacitors.

He was active in Russia, Belarus, and Ukraine. He co-authored several scientific articles with Russian and Belarusian scientists. From 2007 to 2010, he served as Iran's scientific representative and head of Iranian students in Russia, Belarus, and Central Asia. From 2010-2013 he served as the Scientific of the Islamic Republic of Iran and head of Iranian students in Belarus and Ukraine. He also served as Chairman of the First International Conference on Modern Applications of Nanotechnology held in 2012 in Minsk, Belarus. In 2015 he served as the Chairman of the 2nd International Conference on Modern Applications of Nanotechnology, held in Minsk, Belarus.

Abdolhamid Minouchehr

Minouchehr, born in 1962, was Head of Nuclear Engineering, Shahid Beheshti University and Former Dean of the Faculty of Nuclear Engineering. He received his PhD in Engineering from Moscow Engineering Physics Institute (MEPhl) in Moscow in 1998. His thesis was devoted to the penetration of neutrons into various zones of thermonuclear reactors. He received several scientific honors. He was old enough to have participated in many aspects of Iran's nuclear program, both civilian and military aspects.

According to Press TV, after graduation from MEPhI, he joined the faculty of Shahid Beheshti University, specializing in reactor physics, nuclear simulation, and advanced nuclear fuels. As Dean of the Faculty of Nuclear Engineering, he was instrumental in creating a strong foundation for educating new generations of specialists in Iran's nuclear industry.

Both Minouchehr and Ahmadreza Zolfaghari (see below) were associated with Majid Shahriari, all three being co-authors of two publications on neutron transport.

According to FDD, based on governmental sources, he had rare expertise in nuclear weapon yield calculations. The authors added, "As a member of Iran's armed forces and an official at the Ministry of Defense, according to Western government sources who spoke with FDD, Manouchehr participated in discussions regarding the development of nuclear weapons." According to FDD, "he also consulted with SPND on the design and development of nuclear weapons as well as nuclear submarine propulsion."

According to the Anadolu News Agency (ANA), Minouchehr was an "expert in the field of nuclear engineering who was interested in numerical and computational methods, simulation of physical and mechanical phenomena, reactor safety, investigation of material properties at the micro and nano scale, non-destructive testing methods, and environmental applications."

A survey of his academic publications reveals investigations into the primary radiation damage of silicon, robust PID control of power in lead fast cooled reactors, and xenon oscillations in VVER reactors. He has also researched the mechanical properties of 3D silicon

carbide which can be used in radiation hardened microelectronics. In 2011, he co-authored research on gas centrifuge separation factors with Zolfaghani, who is discussed below.

Minouchehr's academic publications reveal an expertise in calculations that can be used to model impact studies in the design of nuclear weapon components, such as simulating the collision of the various layers of a nuclear implosion weapon. This is drawn from the study: "PA/GF2 Composite Press Energy Recruitment Investigated by Gram Press Method Under the Testing Low Speed."[4]

His academic publications also indicate an expertise in computer modeling related to the calculation of the criticality of different fissile materials under different parameters by determining the alpha eigenvalue coefficient. This expertise was drawn from an academic study he co-authored with Zolfaghari (see his entry below), "An improved convergence rate for the prompt α eigenvalue calculation in α-k iteration methods."[5]

According to Press TV, Minoucher actively participated with Zolfaghari "in national strategic projects, playing vital roles in advancing Iran's scientific and technical self-sufficiency and the indigenization of technical knowledge."

Ahmadreza Zolfaghari Daryani

Zolfaghari was born on December 23, 1955, and received his doctorate in nuclear engineering from either Sharif University of Technology or Shahid Beheshti University. He was in the Faculty of Nuclear Engineering, Shahid Beheshti University. Earlier in 2025, Mohammad Mahdi Tehranchi, President of Shahid Beheshti University (see his listing

[4] "Thermoplastic composite sheets have increasingly attracted attention in various industries due to their high strength-to-weight ratio and energy absorption capacity. In the present study, the behavior of a composite sheet made of polyamide 6 thermoplastic matrix and continuous glass fibers (PA6/GF) is investigated under quasi-static penetration and drop-weight impact tests. Since the polyamide matrix exhibits significant sensitivity to strain rate effects, the necessary mechanical properties at different strain rates were obtained using Hopkinson bar testing. Based on these tests, the strength of the studied composite under a strain rate similar to that of the drop-weight test was 47% higher than that under quasi-static penetration. Upon projectile impact, the observed failure modes included fiber fracture, fiber–matrix debonding, and both vertical and horizontal cracking relative to the fiber orientation. Additionally, numerical simulation was carried out using LS-DYNA software, incorporating the strain rate effects derived from the Hopkinson tests, which improved the simulation accuracy for peak force prediction to within 9.6%. According to the numerical results, for thicknesses less than 2.5 mm, the energy absorption per unit weight of the composite sheet remained constant. Furthermore, the maximum energy absorption was observed in a 4-layer composite with the layup configuration [0°/90°/90°/0°], absorbing 18 joules of energy."

[5] "The α-k iteration method is a common approach for calculating the fundamental α- or time-eigenvalue. The bottleneck of the method lies in how to estimate or adjust the amount of α value in each iteration. Prolonged convergence as well as the need for a proper initial guess for the α-eigenvalue are two main deficiencies of commonly employed α adjusting techniques. This article proposes a direct physical relation to adjust the α-eigenvalue in the Monte Carlo (MC) α-k iteration method, lifting the need for an initial guess along with an improved convergence rate. To do that, a link is established between the actual physical parameters of the system and the α-eigenvalue in each iteration. Also, it is shown that the combination of currently used methods and our proposed algorithm would end to a reduced variance in the final result. The MC3 Monte Carlo code is empowered via several modules enabling us to perform a comparative analysis on the performance of α adjusting techniques. Several test cases are examined for the assessment of suggested scheme proving efficiency and robustness of the approach."

above), appointed Zolfaghari as the new Dean of the Faculty of Nuclear Engineering at the university.

According to FDD, Zolfaghari was one of the "few Iranian experts in nuclear bomb yield calculations. He also consulted for SPND while leading a military project to develop nuclear-powered submarines."

According to Press TV, "Throughout his career, he served in both academic and managerial roles, making significant contributions to education and research in nuclear sciences…His work was particularly impactful in strategic and vital areas crucial to the country's advancement in nuclear technology, reflecting his dedication to both scientific excellence and national progress."

Press TV linked Minoucher and Zolfaghari, stating they both "actively participated in national strategic projects, playing vital roles in advancing Iran's scientific and technical self-sufficiency and the indigenization of technical knowledge."

As mentioned earlier, Zolfaghari was involved with Abdolhamid Minouchehr in the study of gas centrifuge separation factors. He participated in many other fields in the nuclear engineering area including gamma ray protection factors, thermomechanical behavior of UO_2 fuel rods, and solving the neutron diffusion equation using the meshless method. In 2008 he published a journal article along with Majid Shahriari (killed in 2010) on the numerical solution of multi group-two dimensional-adjoint equation with finite element method.

Zolfaghari also had connections to a group of Italian scientists, who were involved in modeling the shockwave implosion of a fissile core. The SP3 modeling Zolfaghari performed in one article plays an important role in the Italian scientists' simulations.

Seyed Amir Hossein Feghhi

Feghhi, born in 1978, earned his PhD in 2008 from Amirkabir University of Technology in Nuclear Engineering. He was a Professor of the Faculty of Nuclear Engineering, Shahid Beheshti University and Deputy Head of the Atomic Energy Organization of Iran (AEOI) and former head of the Nuclear Science and Technology Research Institute.

According to FDD, "Feghhi was one of Iran's few senior experts in nuclear physics and nuclear bomb yields, subjects critical to developing a nuclear implosion mechanism. He participated in both the Amad Plan as part of a small group of computation experts and at SPND, where he held managerial positions and possessed deep organizational knowledge and connections. According to Western government sources who shared information with FDD, he also participated in discussions at the strategic level on regional power dynamics, specifically in developing Iranian capabilities to change this balance."

Feghhi studied gamma ray attenuation factors, radiation damage in MOS devices, published studies on isotope production, neutron radiography systems, and various accelerator projects such as the Iranian Light Source Facility. In 2007 he published a journal article with

Majid Shahriari entitled “Calculation of neutron importance function in fissionable assemblies using Monte Carlo method.” And in 2008 he published a journal article along with Majid Shariari entitled “Calculation of the importance-weighted neutron generation time using MCNIC method.”

He published a series of journal articles on gamma-ray attenuation and radiation effects on MOS devices, radiation damage in Fe and Ni, single event upset cross-section due to heavy ions, radiation damage in NiCr/NiFe. Other research has focused on thorium-based fuel matrixes, comparison of Th-U233 and Th-U235 fuel burnup and computational analysis of the neutronic effect of ThO_2 rods loaded in CANDU fuel assemblies.

He had expertise in computer modeling of nuclear reactor behavior such as the effective multiplication factor that can also contribute to the circumstance in which a nuclear warhead reached supercriticality.[6]

Mansour Asgari

Asgari was born in 1958. According to Tasnim, he was a veteran of the Iran/Iraq War.

After completing his PhD studies, he held a position at Sharif University. According to Tasnim, Asgari was one of the founders of Iran's nuclear industry and a close colleague of Mohsen Fakhrizadeh. According to *Jame Jam Online*, “he was active in applied projects with deep ties to the country's strategic areas.” He was an expert and specialist in the nuclear field and collaborator in the Ministry of Defense's research complex.

In the early 2000s, Asgari was part of the Amad Plan. Evidence of his senior level involvement is that his name appears as a participant in a meeting in 2000 of the Committee for Project 3, another codename for Amad’s Project 110. This committee, mentioned earlier, was the premier technical committee overseeing the nuclear weapons program, with those listed a who’s who of the leaders of the Amad program.

In March 2019, the U.S. government designated Mansur Asgari, stating Asgari “served as head of SPND’s Research and Technology Department. Mansur Asgari previously was a manager under the Amad Plan, overseeing projects focused on explosives and exploding bridge-wire (EBW) detonators.”

[6] “Calculation of neutronic and kinetic parameters of Isfahan Miniature Neutron Source Reactor using slope fit and perturbation methods.” From the paper: "Kinetic and neutronic parameters play an important role in analysis of reactors dynamic behavior. Some of these parameters include effective multiplication factor (keff), reactivity (ρ), neutron flux as well as power spatial distributions, effective delayed neutron fraction (βeff) and prompt neutron lifetime (lp). In this work, Monte Carlo modeling and analysis of Isfahan MNSR is performed for calculation of the kinetic and neutronic parameters of using MCNPX2.6 code, slope fit and perturbation methods. Relative differences between results of the MCNPX2.6 code in calculation of the ρ and βeff and the reference values are about 0.5% and 2.1%, respectively. The relative differences between the results of the slope fit and perturbation methods and MCNPX2.6 code in calculation of the parameter with the reference values are about 17.6%, 4.8% and 29.19%, respectively. Therefore, the results of these research show that the MCNPX2.6 code is suitable for calculation of the reactor kinetic parameters such as the βeff, while the perturbation method is a simple and convenient method for neutron transport.

As is typical for members of the nuclear weapons efforts, he also held university positions. According to Khabar Online News Agency, over his career, Asgari was a professor and faculty member of the Physics Department at Imam Hussein University and head of the University's Center for Philosophy of Natural Sciences. He also served as a Member of the Scientific Board at the Physics College. He was also in the Faculty of Energy and Engineering Physics, Amirkabir University. He also served as a member of the Scientific Board at the Physics College at Imam Hossein University.

Asgari's academic publications include a study on the gamma-neutron shielding for a nuclear-pumped laser, gamma-ray shielding properties of flexible composites, and an article in the *Journal of Military Medicine on Dosimetry Studies and Ionizing Radiation Shielding Design* in which his affiliation is listed as the Department of Physics, Imam Hossein University.

Akbar Motalebizadeh

Motalebizadeh was born in 1963 and received his PhD in applied chemistry. The Anadolu News Agency reported that he was a "faculty member of Shahid Beheshti University and a physics lecturer at Yazd Islamic Azad University." After teaching at Islamic Azad University's Yazd branch as an assistant professor in physics and chemistry, he became a faculty member at Shahid Beheshti University

Motalebizadeh was in the Amad Plan. For example, documents from the Nuclear Archive show he attended an important Amad meeting on August 30, 2003, in the offices of Project 110, the part of Amad charged with building the nuclear weapon itself.

He was a specialist in chemical engineering with experience in nuclear applications. Redline reports him to be a "high explosive senior expert" working in the Amad Plan.

Motalebizadeh worked with Saeed Borji (see below), and both had links to the high explosive work carried out in the Amad Taleghan high explosive chambers at Parchin. They also published work together on the production of nanodiamonds, a spinoff of the work done during Amad at Parchin with the aid of former Soviet nuclear weapons expert Vyacheslav Danilenko on key nuclear weapons components. (Danilenko lived in Iran from 1996 to 2002). See for example, Mohamad Amin, Ali Akbar Motallebizadeh, and Saeed Borji, "Influence of Cooling Medium on Detonation Synthesis of Ultradispersed Diamond," Diamond and Related Materials, 18 (4): 611–614, April 2009.

The U.S. government sanctioned Motalebizadeh in March 2019, stating, "Akbar Motalebizadeh previously was head of Shahid Karimi Group, where he supervised SPND projects. Akbar Motalebizadeh also has served as an advisor to Mohsen Fakhrizadeh, the head of SPND." Shahid Karimi Group is a SPND subordinate group that works on missile and explosives-related projects for SPND.

FDD states, "Motalebizadeh, an expert in chemistry and an SPND official, was important to the development of components for a nuclear explosive device."

Saeed Borji

Borji, born in 1958, had a PhD in mechanical engineering from Malek Ashtar University of Technology and later held a faculty position there. He was in the Amad Plan and later in SPND. According to Press TV, he had "previously collaborated with the renowned nuclear scientist Mohsen Fakhrizadeh." According to a Persian source (Fararu), some of their sources considered him responsible for the high explosive tests related to nuclear weapons development at the Parchin site.

Along with Motalebizadeh, Borji attended an important Amad meeting of senior Amad personnel involved in Project 110 on August 30, 2003. He and Motalebizadeh had links to the high explosive work conducted in the Taleghan high explosive chambers at Parchin. They also published work together on nanodiamond production in high explosive chambers (see above).

The two reportedly also published with other foreign collaborators involved in assisting the Amad Plan. Borji is known to have also been involved with and received training in the manufacture of detonators and research using explosive chambers from Danilenko around 2000.

Borji reportedly headed the Center for Explosion and Impact Technology Research, aka Center for R&D of Explosion and Shock or Metfaz (its Persian acronym), a subsidiary of post-Amad successor organizations, including SPND. In 2019, the U.S. Treasury Department sanctioned Borji, calling him an "explosives and metals expert for SPND's Shahid Karimi Group who has assisted SPND's efforts to procure equipment used for containing explosions."

His academic research also included the fabrication and properties of Tungsten/Copper (W/Cu) composites used in missile re-entry and motor components. In another study, the static firing of the bi-propellant engine has been employed to investigate the transpiration cooling phenomenon of W-Cu materials during ultra-high erosion against liquid alumina droplets.

Mohammad Reza Seddighi Saber

Seddighi Saber, born in 1974, was on the faculty of Malek Ashtar University of Technology. News17 reported that he was "also a senior officer with the Islamic Revolutionary Guard Corps (IRGC)."

Earlier, Seddighi was either part of the Amad Plan or a Defense Ministry scientist who aided this project directly. Later, he was a senior official heading SPND's Shahid Karimi Group. Seddighi was involved in a neutron initiator experiment at the Taleghan 1 high explosive chamber at Parchin during the Amad Plan. The head scientists were Majid Shariari and Fereydoun Abbasi-Davani who were responsible for deploying a specially developed neutron detector array outside of the Taleghan 1 chamber. This array would measure the neutron emission following the compression by high explosives of the neutron initiator at the center of the weapon-grade uranium core.

As reported on April 14, 2012, by Anton Krueger of the *Sueddeutsch Zeitung* concerning the neutron initiator test at Talegahn 1 (original in German):

> "According to intelligence-service information, the two scientists [Majid Shahriari and Fereydoun Abbasi-Davani] were at Parchin as project managers partly responsible for developing a special array of neutron detectors and installing it outside of the test chamber. It was used during an experiment to see whether the neutron initiator worked, releasing sufficient particles. In addition, a flash x-ray camera was installed that would capture the implosion of the test system in the metal cylinder at very high resolution. The data from both sources combined allow an assessment of whether the ignition mechanism for a nuclear warhead would work.
>
> According to intelligence sources, two other scientists whose identities are known to the IAEA assisted Shahriari and Abbassi-Davani. **Mohammed Reza Sedighi Saber,** allegedly an expert from the Ministry of Defense, was entrusted with the simulation and computer-assisted analysis of the experiment. According to this information, Ali-Reza Mola Heidar, an expert on instrumentation, contributed to the development of the flash x-ray system and the positioning of the neutron detectors." (emphasis added)

After Amad, while a PhD student in 2006, Seddighi published a study on explosions inside an explosive chamber under the auspices of the Defense Industries Education Research Institute, Metfaz (short for Center for R&D of Explosion and Shock). As mentioned above, Metfaz was part of the successor organization to Amad. It appears that Saddeghi was part of the post-Amad work on explosives at Sanjarian or in the Taleghan high explosive chambers, which remained operational for several years after Amad ended.

The Amad leaders decided HMX and PETN [plastic explosives] projects should be operated by Malek-Ashtar University of Technology (MUT) or the Explosion Center (not defined). Seddighi's on-going work on explosives and their initiation was at Malek-Ashtar University.

Seddighi's academic papers show expertise in high explosives and their initiation.

In May 2025, the United States imposed sanctions on Seddighi stating that he was then the head of Iran's SPND's Shahid Karimi Group, a group that works on explosives-related projects.

Asghar Hashemi Tabar or Asghar Hashemitabar

Hashemitabar was born in 1974 and, according to the Mehr Agency, he had a PhD in Strategic Defense Sciences from the National Defense University. He reportedly conducted research focused on pulse power and had written a thesis on designing a digital controller for a surface-to-surface missile at Tarbiat Modares University in 1999.

According to a post on X by Ronen Solomon, @IntelliTimes, Hashemitabar participated in Iran's pre-2004 weapons program.

According to a December 19, 2011, Associated Press (AP) report, Iran identified to the IAEA Hashemitabar as working in the nuclear program, but he "will be off limits to any questioning from IAEA experts."[7] In this AP report, Tabar was described as the head of the detonation group in the Iranian defense ministry.

Hashemitabar was described as "an expert in measuring detonation phenomena" the next year by AP in an article on May 13, 2012. *Redline* labelled him as an "expert in explosive materials and explosive tests."

Hashemitabar was sanctioned by the United States in March 2019, where the sanctions listing stated that he "has served as a managing expert at Shahid Chamran Group, where he has focused on pulse power research." Shahid Chamran has conducted research for SPND related to electromagnetics, pulse power, and wave generation.

Other Scientists Reportedly Killed

The media has reported several more deaths of scientists. There is much less information available on these scientists, and sometimes the information is conflicting.

Sayed Isar Tabatabai Ghomsheh

Iranian media identified Ghomsheh as a nuclear scientist. The source of the information that he was killed in the attacks is reportedly Sharif newspaper, which may be published by Sharif University. In any case, the report states that he received his master's degree in mechanical engineering in 2004 and his doctorate in the same field in 2007, majoring in nuclear engineering. He then worked for many years in Iran's nuclear industry.

Ghomsheh is a coauthor of several English language academic publications that identify him as a nuclear scientist at Sharif University. He published articles evaluating static batch sublimation, which the authors stated was relevant to heating uranium hexafluoride in the process of feeding it into gas centrifuge cascades, and developing codes pertinent to design, accident analysis, and safety of high temperature reactors.

No information about his links to SPND is publicly available.

Seyed Hossein Mohseni Armaki

Mohseni was a widely published antenna specialist. His academic publications list him on the faculty of Iran University of Science and Technology and in the Department of Electrical and Computer Engineering, Malek Ashtar University of Technology.

[7] George Jahn, "APNewsBreak: Diplomats say Iran invites nuke aides," Associated Press, December 19, 2011.

His publications include areas with a wide variety of military purposes, including high precision, covert, and operational applications and ways to improve the performance, security, and adaptability of military radar, communication, and electronic warfare systems, among others.

Majid Tajan Jari

Tajan Jari was a young, prominent Iranian AI pioneer. According to the ANA, he was considered part of Iran's scientific elite. He was a university professor and active researcher in the field of new technologies and intelligent systems, although the exact name of the university has not yet been officially announced. He was actively involved in many national technology projects related to information technology, expert systems, and innovation in the industry.

Any role in SPND or the nuclear weapons program is unknown, as is whether he was specifically targeted. In fact, ANA Journal reported he "suffered serious injuries on Friday when a building across from his home in Tehran's Marzdaran neighborhood exploded, and he died in the hospital."

Soleiman Soleimani

Soleiman Soleimani was a chemical engineer who reportedly graduated from the Chemical Engineering Department of the Iran University of Science and Technology.

Intelli Times reported that he was an "expert in material design for a company under sanctions. His latest field of work involved turbine blades used in gas, nuclear, and aviation engines." This description may imply an expertise in cruise missile engines.

Mahdi Zakerian Amiri

Zakerian has been identified in the media as a scientist killed during the 12-Day War. Our search does not reveal this but instead identifies Zakerian as a specialist in international relations at the Faculty of Law, Theology and Political Science, Islamic Azad University, Science and Research Tehran Branch.

An Iranian government letter protesting the deaths of scientists lists an engineer Mohammadreza Zakarian Amiri as having been killed, at 33 years old, and as a "leading AI specialist and technology researcher."

The conflicting information cannot be resolved thus far.

Mostafa Sadati Armaki

According to Pars News, Sadatu Aranaki was a nuclear scientist, holding a PhD in nuclear physics. He was also a Shahid Beheshti University Professor.

Tahereh Taheri

Taheri is listed in the media as born on September 20, 1978, and as holding a PhD in Chemical Engineering. Tasmin News reported she held a PhD in Strategic Military Science. Other media sources state that while she pursued her undergraduate and master's degrees, she conducted nuclear physics research in France and the United Kingdom. She was the wife of Asgar Hashemi Tabar, who apparently was the target of the attack.

Ali Bekai Karimi

Jame Jam Online identifies Karimi as "among the unknown but effective figures of the Iranian nuclear technology front," adding he "preferred to remain in the shadows." But "he played a vital role in joint projects with industrial universities and defense-scientific institutions."