First thing's first...

Technion enjoys over **300 DAYS OF SUNSHINE**

(and

74.3% of daylight hours in Haifa are sunny)

Connect to Technion
presidentsreport.technion.ac.il

Cover Illustration:
Natalie Waksman Shenker
No laboratory works alone, no scientist stands alone and no big idea is born alone. Connectivity is the channel for progress; expanding and enriching the future for us all.

Technion is all about Connectivity.

The Technion of Things is a Technion of interconnected points of light. From pure science through to application, through to global impact. Technion is a luminous cluster of connections, generating the ideas, knowledge and knowhow that make our world a better place.
CONNECT to TECHNION:

We offer you a website dedicated to this report - complete with interviews, videos, hyperlinks and all the other great stuff the net has to offer...

presidentsreport.technion.ac.il
Welcome to the 2017 President’s Report which is offered under the theme: Technion of Things.

Many of you will have heard of the Internet of Things (IoT): it’s the term used to refer to systems of interconnected computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Today’s rule for future technology is that anything that can be connected, will be connected. The analyst firm Gartner says that by 2020 there will be over 26 billion connected devices.

At Technion, the template for this evolution of technology is deeper than electronics. It’s about the nature of evolution, and the wisdom of connectivity behind all scientific and technological progress. It was Isaac Newton who enshrined this insight when he famously said: “If I have seen further it is by standing on the shoulders of giants.” Our position as a world-class center of education and innovation depends on the great scientists and visionaries that went before us; it depends on our colleagues and collaborations around the world; and it depends on the promise of tomorrow as embodied in each unique Technion student.

Connectivity is the prerequisite of progress. No scientist is an island. No researcher will progress far without drawing on the vast, connected wellsprings of knowledge, concurrent research and connected disciplines. Every mind needs to open to the known and the unknown in order for genius to flow. This openness means that we can both send and receive data, without compromising the treasure of individual perspective. It’s what makes Technion part of the global whole. Whether through our global partnerships from New York to China, through to a myriad of academic institutions across the world, through our outreach programs, through the ability to unite under the torch of progress, Technion is evolving rapidly with multidisciplinary structures that support the connectivity needed to co-create our future.

In 2016, Technion became the only Israeli representative in the Nature Index of Rising Stars. This prestigious ranking affirmed a 40 percent increase in Technion publications in leading scientific journals. Putting Technion in 26th place worldwide, the list includes 100 institutions – virtually all of them universities – around the world. The index is further evidence of Technion’s academic excellence, the incessant improvement in the achievements of its researchers and our constant progress in realizing Technion’s vision: to be one of the world’s ten leading science and technology research universities.

To this end, we are working on recruiting dozens of outstanding new faculty members every year and expanding our academic and international research activities. A recent example is the launch of a groundbreaking partnership between Technion and the New York Genome Center. Through this structure we will intensify medical research, advance genomics and accelerate clinical application. It is through powerful global alliances such as these that global impact flows, and the Technion of Things - the global network of connected expertise and resources is expanding rapidly for the benefit of the whole.

In this report we will open some windows into the tremendously exciting ‘things’ which are happening at Technion. These are snapshots into the world of tomorrow, into the Technion daily endeavor, and above all into the connectedness that is empowering all progress. Within this unfolding, connected map, our readers, friends, colleagues and supporters are an indispensable part of the whole, and as such, let’s take some time together to celebrate and enjoy today’s Technion of Things.
Summer 2016 and Technion City opened its eyes to the stars, hosting the International Space University (ISU), the first ever in the Middle East.

“Today, I consider myself a global spokesman for space.”
- Dr Buzz Aldrin, at Technion SSP

Over 100 participants from 24 countries paraded their national flags, many wearing national costumes to initiate an academic festival of lectures, distinguished guests and space innovation.

Technion hosted the 29th annual Space Studies Program (SSP16) for an intense nine-week graduate level program which offers the participants a unique and comprehensive professional development experience covering all aspects of space programs and enterprises.

Guests included US astronauts Buzz Aldrin (second man on the moon), Jeff Hoffman, and Jessica Meir; Rona Ramon, (widow of Israeli astronaut Ilan Ramon); Canadian astronomer David Levy, who discovered Comet Shoemaker-Levy 9; and aerospace engineer and science-fiction writer Eric Choi.

Events included a robotics competition, a rocket launch at Kibbutz Gal’ed, and the first SpaceUp Unconference in the Middle East. The energy charged summer even included a ‘Selfie’ of SSP participants at the heart of Technion campus, taken by satellite.
Earthlings formed the letters ISU on the great lawn at the heart of the campus for a selfie from space!
In effect, we demonstrated how to develop a device that "shoots" entangled photonic pairs on demand. Hailed as a breakthrough in quantum computing, a knitting machine to supply entangled photons on demand has been introduced by researchers at the Faculty of Physics.
The tremendous power of quantum computing can only be unlocked through knowhow within the field of quantum entanglement. Called by Einstein ‘Spooky action at a distance’, entanglement is the means through which physical entities relate to each other irrespective of the distance between them. Entangled entities cannot be defined separately. For example, two particles can be arranged in an entangled state such that if particle A spins one way, particle B (even if it is vastly separated in time and space) will spin the other way.

The global challenge has been how to make entanglement work to our advantage in the revolutionary field of quantum computing. Now, Prof. David Gershoni and doctoral students Ido Schwartz, Dan Cogan, and Prof. Netanel Lindner, have developed and demonstrated a novel way to generate clusters of entangled photons on demand. Their results were published in *Science*.

“In effect, we demonstrated how to develop a device that “shoots” entangled photons on demand,” explains Prof. Gershoni. “This discovery is an important milestone bridging current classical technology and future quantum technologies.” The conceptual idea of a quantum knitting machine, or a quantum “machine gun” to ensure supply-on-demand of entangled photons was first suggested by Lindner (originally a student of Prof. Asher Peres) and Prof. Terry Rudolf of Imperial College London in 2009.

“Our demonstration presents a breakthrough in quantum technology... it may have revolutionary prospects for technological applications as well as to our fundamental understanding of quantum systems,” announces the paper’s abstract. The device at the core of their experiment is a “quantum dot”, several tens of nanometers in size, and comprised of a semiconductor embedded in another type of semiconductor.

For some, Quantum Computing could still seem the stuff of science fiction, but Prof. Gershoni takes the fiction out of science. “I believe that our discovery will advance the field of quantum information processing,” he says, “and that in the near future we will be able to see genuine applications of quantum technologies in broad use.”

Quantum computers could quickly calculate way beyond the limits of today’s fastest supercomputers. Billions of dollars are being invested globally in the field of quantum information by corporations such as IBM, Apple, Google, NSA and various other government agencies.

Prof. David Gershoni holds the Joseph and Bessie Feinberg Academic Chair.
An analogous sonic black hole confirms Hawking radiation

This entanglement verifies an important element in the discussion of the information paradox as well as the firewall controversy."

---

Image: NASA/JPL-Caltech
Black holes are massive collections of mass – with gravity so strong that nothing can escape, not even light. Stellar-mass black holes appear when massive stars explode. Supermassive black holes exist in the hearts of galaxies and usually contain the mass equivalent of millions of suns. Is a black hole the birth of a universe or the end of it? What happens when matter disappears at the event horizon? What is gravity? What is Hawking radiation? What is gravity? What is Hawking radiation? What can black holes tell us about the nature of quantum entanglement?

In 1974, the Cambridge physicist Stephen Hawking theorized that black holes should create and emit sub-atomic particles, known today as Hawking radiation. Observation of this proposed phenomenon remained a “holy grail” for the fields of atomic physics, nonlinear optics, solid state physics, condensed matter superfluids, astrophysics, cosmology, and particle physics. Until last year, it remained just theoretical. But publishing in *Nature Physics*, Prof. Jeff Steinhauer presented first proofs that such radiation could exist.

In his lab at the Faculty of Physics, Steinhauer has constructed a sonic black hole - an analogue of the real thing. “We observe a thermal distribution of Hawking radiation, stimulated by quantum vacuum fluctuations, emanating from an analogue black hole,” says Steinhauer. “This confirms Hawking’s prediction regarding black hole thermodynamics.” Pairs of entangled phonons (particles of sound) appear spontaneously in the void at the event horizon of the analogue black hole. One of the phonons travels away from the black hole as Hawking radiation, and the other partner phonon falls into the black hole. The pairs have a broad spectrum of energies. It is the correlation between these pairs which allowed Steinhauer to detect the Hawking radiation.

“We saw that such high energy pairs were entangled, while the low energy pairs were not. This entanglement verifies an important element in the discussion of the information paradox as well as the firewall controversy,” explains Steinhauer.

This observation of Hawking radiation, performed in a Bose-Einstein condensate, verifies Hawking’s semi-classical calculation, which is viewed as a milestone in the quest for the graviton - a fundamental particle of matter which should exist, but which hasn’t yet been found.

Steinhauer has been working exclusively on the proof since 2009 in his hand-assembled lab at Technion, replete with lasers and dozens of mirrors, lenses, and magnetic coils to simulate a black hole. Motivated by an overriding curiosity regarding the laws of physics since he was a child, he says that evidence for the existence of quantum Hawking radiation brings us one step closer to uncovering the laws of our universe.

"Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty."

- Albert Einstein
Founder of the first Technion Society in 1923, Albert Einstein would remain an active Technion supporter throughout his life. Scientifically, Einstein’s Technion legacy continues until today.

The 1946 publication in the Technion yearbook exemplifies his dedication to making sure the theory of relativity would be accessible to every student. “It is interesting to note that forty years after Einstein developed his theory and after his theory was universally recognized in the scientific community, he still thought it important to make it accessible to the educated intelligentsia,” comments Prof. Joseph Avron of the Technion Faculty of Physics.

Founded in 1952, the Technion Department of Physics was led by Prof. Nathan Rosen, Einstein’s colleague. Rosen was one of the authors of the famous Einstein-Podolsky-Rosen (EPR) paper, questioning the very basics of Quantum Theory. Rosen was given a free hand in the recruitment of faculty members and among others, brought in another Einstein colleague, the world-renowned physicist Prof. David Bohm. A student of Rosen, Asher Peres, would become the beacon bearer of the Einstein legacy at Technion. Distinguished Prof. Peres is acclaimed for his work connecting quantum mechanics and information theory. Under his mentorship, generations of Technion physicists have emerged.
Combining light waves, sound waves and water waves, Technion researchers have opened the field for tiny sensors that could bring a critical refinement to current lab-on-a-chip devices.

Water-wave Laser

With a device smaller than the width of a human hair, researchers will get greater insight into microscopic cells in order to understand and test different drug therapies. The water-wave laser is the brainchild of Prof. Tal Carmon, who is head of the Optomechanics Center at the Faculty of Mechanical Engineering.
The innovation came when Prof. Carmon connected two areas of research that had been previously considered unrelated: nonlinear optics and water waves. The possibility of creating a laser through the interaction of light with water waves had not been previously examined due to the huge difference in frequency between waves of water and waves of light.

A typical laser can be created by electron oscillations in atoms, causing them to emit radiation in the form of laser light. Prof. Carmon and team have now shown that water-wave oscillations within a liquid device can also generate laser radiation.

An optical fiber delivers light into a tiny droplet of oil submerged in water. Light waves and water waves pass through each other, inside this droplet, approximately one million times, generating the energy that leaves the droplet as the emission of a water-wave laser.

The interaction between fiber optic light and the miniscule vibrations on the surface of the droplet are like an echo, where the interaction of sound waves and the surface they pass through can make a single scream audible several times. In order to increase this echo effect in their device, the researchers used highly transparent, runny liquids, to encourage light and droplet interactions.

Published in *Nature Photonics*, the research opens new horizons for scientists studying the interaction of light and liquid-phase matter at a scale smaller than the width of a human hair.

The team included students Shmuel Kaminski, Leopoldo Martin, and Shai Maayani.

Carmon did his postdoctoral research at CalTech, and recently returned to his alma mater the Technion from the University of Michigan, Ann Arbor where he served as a tenured professor.

Prof. Tal Carmon holds the Leona Chanin Career Development Chair.
The Receptive Mind

Deceptive Mind

things like NEURONS
Only synergy between the various biological, computational and engineering disciplines will lead to significant progress in our understanding of the brain and its functions.

In recent decades, the field of brain research has become diverse and multidisciplinary,” explains Prof. Jackie Schiller of the Rappaport Faculty of Medicine. “Engineering tools are an integral part of the development of brain research and the application of brain devices as a solution for motor and cognitive impairments. Artificial systems that mimic the human brain have tremendous potential. Today, it is clear to us that only synergy between the various biological, computational and engineering disciplines will lead to significant progress in our understanding of the brain and its functions. What we need here is extensive and multidisciplinary research activity based on coherent in-depth theoretical work and on preclinical and clinical studies.”

Schiller’s research, published in the prestigious journal *Neuron*, examines brain plasticity mechanisms related to anticipation, feedback, learning and memory, specifically in relation to the receptive aspect of the neuron - the dendrite.

Neurons are composed of several organelles: the cell body and nucleus; the axon, a branched offshoot that extends from the cell body and transmits information; dendrites, the main input sites of the neuron; and the synapses, the point of connection between the axon of one cell and the dendrite of another. These channels of communication – axons, dendrites and synapses – are essential for brain function, and are the sites of various devastating brain diseases.

Dendrites comprise most of the grey matter and occupy most of the volume of the cerebral cortex. They are tree-like branches, a few millimeters in length, which enable the cell to receive and process information from other neurons. In previous articles, Prof. Schiller demonstrated that dendrites are not simple structures but complex nonlinear processing machines, and now she has unveiled the mechanism behind their unique flexibility. “During the learning process, this mechanism changes the dendrite and synapse,” explains Schiller, “If we understand the precise nature of this mechanism we may be able to improve processes such as memory formation and potentially develop a novel class of treatment for neurodevelopmental and neurodegenerative diseases.”
The hydra, from the jellyfish family, is less than half an inch long. Yet it has long intrigued scientists with its ability to regrow itself completely from decimated parts. Now, Prof. Kinneret Keren from the Faculty of Physics with colleague Prof. Erez Braun and students Anton Livshits, Lital Shani-Zerbib, and Yonit Maroudas-Sacks, have revealed the role of the cytoskeleton in this process. Publishing in *Cell Reports*, the research team described how hydras have a structural memory that helps shape their new body plan according to a pattern inherited by the animal's skeleton. Until now, it was believed that only chemical signals informed the hydra's reformation.

Regenerating hydras use a network of tough, stringy protein fibers, called the cytoskeleton, to align their cells. When pieces are cut...
or torn from hydras, the cytoskeletal pattern survives and becomes part of the new animal. The pattern generates a small but potent amount of mechanical force that shows cells where to line up. This mechanical force can serve as a form of “memory” that stores information about the layout of animal bodies. “You have to think of it as part of the process of defining the pattern and not just an outcome”, says Keren.

When pieces of hydra begin the regeneration process, the scraps of hydra fold into little balls, and the cytoskeleton has to find a balance between maintaining the old shape and adapting to new conditions. “If you take a strip or a square fragment and turn it into a sphere, the fibers have to change or stretch a lot to do that,” explains Keren. However, some portions retain their pattern. As the little hydra tissue ball stretches into a tube and grows a tentacle-ringed mouth, the new body parts follow the template set by the cytoskeleton in fragments from the original hydra.

The cytoskeleton is like a system of taut wires that helps the hydra keep its shape and function. The main cytoskeletal structure in adult hydra is an array of aligned fibers that span the entire organism. Damage to this cytoskeleton will disrupt the formation of new hydras, the researchers found. In one experiment, the researchers cut the original hydra into rings which folded into balls that contained multiple domains of aligned fibers. Those ring-shaped pieces grew into two-headed hydras. However, anchoring the hydra rings to stiff wires resulted in healthy one-headed hydras, suggesting that mechanical feedbacks promote order in the developing animal.

Hydras are much simpler than most of their cousins in the animal kingdom, but the basic pattern of aligned cytoskeletal fibers is common in many organs, including human muscles, heart, and guts, says Keren. Studying hydra regeneration may lead to a better understanding of how mechanics integrate with biochemical signals to shape tissues and organs in other species. “The actomyosin cytoskeleton is the main force generator across the animal kingdom,” says Keren. “This is universal.”
Biological pacemakers derived from stem cells could be the cardiac revolution that makes electronic devices surgically inserted into the body a thing of the past.
When the heart needs support keeping rhythm, the life-saving solution today is the surgical implantation of an electrical pacemaker. While conventional pacemakers have saved many lives, they have always carried surgical risks and come with no hormonal sensitivity and a predetermined battery life. With children’s hearts that are still growing, the pacemaker implant becomes still more limited in its ability to support, as the heart rapidly outgrows it. What could be more natural than to turn to the wisdom of the body itself, and its own biological mechanism for maintaining the heart rhythm?

At Technion, Prof. Lior Gepstein of the Rappaport Faculty of Medicine and director of the Cardiology department at the Rambam Health Care Campus has long been in pursuit of the future biological pacemaker. The recent breakthrough published in the prestigious journal *Nature Biotechnology* involves the cultivation and use of sinotrial (SA) node pacemaker cells. The sinotrial (SA) node is the natural pacemaker of the heart, and is comprised of a group of dedicated heart cells – SA node pacemaker cells – responsible for initiation of the electrical signal leading to the heart’s rhythmic contraction.

The team from the Technion, Rambam Health Care Campus, and the University Health Network’s McEwen Centre for Regenerative Medicine in Toronto, employed developmental biology to develop a differentiation protocol for the creation of pacemaker cells from human embryonic stem cells.

“The pacemaker generated from embryonic stem cells exhibits the molecular, electrical and functional properties characteristic of human pacemaker cells and is able to pace the heart in animal models of abnormally slow heart rate,” said Prof. Gepstein. “It is an effective and promising alternative to natural pacemaker cells in the event of their dysfunction. This development is significant both in terms of research – because it will enable scientists to study the heart in new ways, and in practical terms – since we are presenting an ‘assembly line’ here for an unlimited reservoir of pacemaker cells to treat patients with heart rhythm problems. Together with our Canadian partners, we present a method for producing a population of pure pacemaker cells, and provide proof that they work well as a substitute for natural pacemaker cells that have been damaged.”

Prof. Lior Gepstein holds the Sohns Chair in Tissue Engineering and Regenerative Medicine.
Using synthetic DNA sequences as the tiniest of barcodes, Technion researchers have developed a new diagnostic technology for determining the suitability of specific anticancer drugs to a specific patient – before treatment even begins.

Publishing in *Nature Communications*, the research team led by Prof. Avi Schroeder of the Wolfson Faculty of Chemical Engineering has created what could be described as a safe, miniature lab inside the patient’s body, which examines the effectiveness of any drug on that individual patient.

“The medical world is now moving towards personalized medicine, combining our barcoding technology with genetic screening ensures more accurately tailored cancer treatments that will determine which medicine is best for each patient,” explains Prof. Schroeder.

Together with doctoral student Zvi Yaari, Schroeder packed miniscule quantities of anticancer drugs inside dedicated nanoparticles they developed. The unique design of the drug-loaded, nanoscale packages allows them to flow in the bloodstream to the tumor, where they are swallowed by the cancer cells. Synthetic DNA sequences attached to the anticancer drugs in advance serve as barcode readers of each drug’s activity in the cancer cells.

After 48 hours, a biopsy is taken from the tumor, and the barcode analysis provides accurate information about cells destroyed by each drug. Together with the Technion Integrated Cancer Center, the researchers are currently working with drugs registered as anticancer drugs, but in principle, they can test a battery of drugs for each patient and find out which is the most effective to treat his or her disease.

“It’s a bit like testing for allergies, where simple tests provide us with a specific person’s allergy profile. We developed a simple test that provides us with a profile of the cancer patient’s response to the designated anti-cancer drug. This method makes it possible to test the effectiveness of several medications concurrently inside the patient’s tumor. The minute doses are not felt by the patient, and do not pose any danger. Based on the test results, the most effective drug for the specific patient is selected.”

The study is being funded by a prestigious Horizon 2020-ERC grant from the European Union and by the Israel Science Foundation and the Israel Cancer Association. The new technology was patented and discussions are underway for commercialization.
Unravelling the mysteries behind the **Placebo Effect**, researchers at the Rappaport Faculty of Medicine have shown how the brain's "reward system" transmits messages via the sympathetic nervous system that affect the efficiency of the immune system.

Publishing in the journal *Nature Medicine*, Profs. Asya Rolls and Shai Shen-Orr and doctoral student Tamar Ben-Shaanan, used new methods to show that triggering the reward system in the brain stimulates the immune system, causing it to operate more effectively and eliminate bacteria faster. In addition, the immune system memory was shown to become more robust against bacteria, with advance warning the next time.

"Placebo is a complex phenomenon in which the patient’s expectation of recovery affects his state of health," explains Rolls. "Expectation of improvement and arousal of positive emotions are reflected in the activity of neurons in the brain. We decided to understand, at the molecular level, how areas of the brain associated with positive feelings affect the functioning of the immune system, which is basically the body’s main defense system. We have no doubt that this could lead to significant medical applications based on the findings."

Positive expectations can vastly enhance our body's immune system, but why? And how can this placebo effect be leveraged to optimize healing?
How mental states shape physical health is more than the philosophical mind-body question. It’s a fundamental aspect of physiology that we must understand in order to push medicine forward.

- Prof. Asya Rolls

Our breakthrough was made possible thanks to two new technologies,” explains Prof. Shen-Orr. “One is DREADD technology, which enables precise activation of specific neurons, and the second is CyTOF technology, which enables high resolution characterization of hundreds of thousands of cells in the immune system. By coupling these two technologies, we were able to demonstrate a causal connection between the activation of specific neural circuits in the brain and the increased activity of cell populations in the immune system.

In the brain context, the researchers focused on the ventral tegmental area (VTA), a key component in the dopamine reward system. “This is the area of expectation for reward,” explains Rolls, “and it’s stimulated, for example, when someone offers us a bar of chocolate. We found that stimulation of this area activates the immune system’s anti-bacterial response, especially if it occurs before exposure to bacterial infection.

The researchers also mapped the sympathetic nervous system, the route through which messages pass from the brain to the immune system. This is responsible for immediate reaction in emergency situations and stress.
Spiral of hope

The cinematic MEGA Plate that revealed the speed of bacterial resistance to antibiotics to global audiences is just part of an ongoing endeavor between Technion and Harvard Medical School to counter the emergence of the superbug.
Superdrugs for Superbugs

Does evolution depend on competition or collaboration? The discovery of antibiotics saved millions of lives, yet presently world health is in a vicious spiral in which bacteria rapidly evolve to defeat available classes of antibiotics. Recruiting resources and knowhow from across the globe, Prof. Roy Kishony and colleagues are returning to the genius of nature to create superdrugs for superbugs.

In a creative stroke inspired by the digital billboard for the Hollywood movie, Contagion, Kishony and his team at Technion and Harvard Medical School opened a global window to observe how bacteria evolve as they become impervious to drugs. Described in the September issue of Science, the large-scale experimental tool offered a first glimpse at bacteria adapting to increasingly higher doses of antibiotics, visible to the naked eye.

A two-by-four foot petri dish was filled with 14 liters of agar, a seaweed-derived jelly-like substance commonly used in labs to nourish organisms as they grow. The dish was divided into sections saturated with incremental doses of antibiotics. Over the course of two weeks, a camera mounted on the ceiling above the dish took periodic snapshots. The result was a direct and detailed observation of bacterial movement, death and survival: evolution at work. The headline-grabbing Microbial Evolution and Growth Arena, was called the MEGA Plate for short. The video produced by the Kishony lab was viewed over 24 million times, likely making it the most viewed scientific experiment video of all times.

According to Kishony, “Seeing bacteria spread for the first time was a thrill. Our MEGA-plate takes complex and often obscure concepts in evolution, such as mutations-selection, lineages, parallel evolution and clonal interference, and provides a visual seeing-is-believing demonstration. It is also a powerful illustration of how easy it is for bacteria to become resistant to antibiotics.” Co-investigators Michael Baym and Tami Lieberman said the images spark the curiosity of lay and professional viewers alike.

Ultimately, in a dramatic demonstration of evolved drug resistance, bacteria spread to the highest drug concentration. In the span of 10 days, bacteria produced mutant strains capable of surviving a dose of the antibiotic trimethoprim 1,000 times higher than the one that killed their progenitors. When researchers used another antibiotic (ciprofloxacin) bacteria developed 100,000-fold resistance to the initial dose.

Kishony’s lab is collaborating with Israel’s health services and with the Faculty of Computer Science to collate big data in order to develop “predictive genome-based” diagnostics capable of foreseeing bacterial evolution and provide the best treatment at the individual patient level.

- Roy Kishony is the Marilyn and Henry Taub Professor of Life Sciences and Head of the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering.
"If we reduce the pressure on the bacterium and don't kill it but rather prevent its pathogenic aspects, the resistance may not rush to develop."

(l - r) Prof. Meytal Landau, Einav Tayeb-Fligelman, Dr. Orly Tabachnikov
The highly pathogenic Staphylococcus aureus bacteria is one of the top five causes of hospital-acquired infections. From 1999 through 2005 in the US alone the estimated number of S. aureus related hospitalizations increased 62%, from 294,570 to 477,927.

Publishing in Science, Prof. Meytal Landau of the Faculty of Biology has unveiled a radical insight into how the bacteria works within the body. The revelation is found in unique amyloid fibrils, through which the pathogenic Staphylococcus aureus bacterium attacks the human cells and immune system. The research could advance the discovery of antibiotics with new strategies to disable key bacterial toxins.

Amyloids are proteins in cells that are known in association with neuro-degenerative diseases such as Alzheimer’s and Parkinson’s. The amyloids form a web of protein fibrils characterized by an orderly and extremely stable structure. This stability enables them to withstand extreme conditions in which ordinary proteins die.

One of the best-known examples of this is the 1986 “Mad Cow” disease outbreak in England. According to Prof. Landau, “This disease surprised the scientific community because its cause was not a virus, nor a bacterium, but a protein called Prion, possessing an amyloid-like structure. It then became clear that a protein can be transmissible, and due to its stability, it infected human beings who consumed the contaminated beef – meaning, the protein did not break down in the stages of meat processing, cooking and digestion.”

Landau estimates that the discovery will lead to the development of antibiotics with a new action mechanism. “From the very first moment, it was clear to us that what we had was a paradigm shift,” says Landau. Such drugs will inhibit the amyloid formation but not kill the bacteria, thus reducing the risk of bacterial resistance. “Resistance to antibiotics develops in bacteria due to evolutionary pressure. If we reduce the pressure on the bacterium and don’t kill it but rather prevent its pathogenic aspects, the resistance may not rush to develop.”

The research was conducted by members of the Landau lab, including Einav Tayeb-Fligelman, Orly Tabachnikov, Asher Moshe and Orit Goldshmidt-Tran, with the assistance of Michael Sawaya from the University of California Los Angeles (UCLA), and of Nicolas Coquelle and Jacques-Philippe Colletier from Université Grenoble, France.
Sunlight offers an infinite source of renewable energy. If we add the amount of solar energy that is absorbed by the Earth's atmosphere, land and oceans every year, we end up with approximately 3,850,000 EJ (exajoules or 10^18 joules). This is equivalent to: 2.7 million earthquakes of the same size as the Tohoku earthquake in Japan (2011); 40,000 times the total energy consumption in the United States; and 8,000 times the total consumption in the whole world. The energy resource of the sun is awesome, and as fossil fuels decline in supply and global warming increases, the heat is on to find new means to generate power to supply a rapidly expanding global population.

The leading technology today is the photovoltaic cell. Currently, photovoltaic cells use a narrow range of the solar spectrum; radiation outside the range is wasted. This energy loss limits the maximum efficiency of current solar cells to around 30 percent.

At the laboratory of Prof. Carmel Rotschild in the Faculty of Mechanical Engineering, a new strategy is underway to increase these low levels of efficiency. The team's method is based on an intermediate process that occurs between sunlight and the photovoltaic cell. The photoluminescence material they created absorbs the radiation from the sun, and converts the heat and light into an "ideal" radiation, which illuminates the photovoltaic cell, enabling higher conversion efficiency. As a result, the device's efficiency is increased from 30 percent (the conventional value for photovoltaic devices) to 50 percent.

The inspiration for the breakthrough comes from optical refrigeration, where the absorbed light is re-emitted at higher energy, thereby cooling the emitter. Similarly, but with sunlight, "Solar radiation, on its way to the photovoltaic cells, hits a dedicated material that we developed for this purpose, the material heats the unused part of the spectrum," says graduate student Assaf Manor, who led the study as part of his PhD work. The group aims to demonstrate a full operating device with record efficiency within five years' time. If they are successful, this could become a disruptive technology in solar energy.

The study was conducted with the assistance of the Grand Technion Energy Program (GTEP) and the Russell Berrie Nanotechnology Institute (RBNI) at Technion.
“Solar radiation is absorbed and re-emitted at a blue-shifted spectrum. This radiation is then harvested by the solar cell.”
Technion researchers have invented a new method that separates hydrogen production from oxygen production in the water splitting process using solar energy. This innovation will facilitate the centralized, safe and efficient production of hydrogen on tap.

Publishing in *Nature Materials*, the researchers envision hydrogen production at the point of sale (for example, at a gas station for electric cars fueled by hydrogen) located far from the solar farm. The technology is forecast to significantly reduce the cost of producing the hydrogen and shipping it to the customer.

Hydrogen is considered one of the most promising fuel alternatives because it can be produced from water, and therefore production does not depend on access to non-renewable natural resources. Most hydrogen is currently produced from natural gas in a process that emits carbon dioxide into the atmosphere, but it is also possible to produce hydrogen from water by splitting the water molecules into hydrogen and oxygen in a process called electrolysis. However, since electricity production itself is an expensive and polluting process, global research is exploring a photoelectrochemical (PEC) cell that uses solar energy to split water into hydrogen and oxygen directly, without the need for external power source.

The main challenges in the development of PEC solar farms for the production of hydrogen are keeping the hydrogen and the oxygen separate; collecting the hydrogen from millions of PEC cells; and transporting the hydrogen to the point of sale. The Technion team solved these challenges by developing a new method for PEC water splitting. With this method, the hydrogen and oxygen are formed in two separate cells – one that produces hydrogen, and another that produces oxygen, avoiding the risk of a flammable and explosive mixture.

The study was led by Avigail Landman, a doctoral student in the Nancy and Stephen Grand Technion Energy Program (GTEP). Landman is working on her doctorate under the guidance of Prof. Avner Rothschild from the Faculty of Materials Science and Engineering, and Prof. Gideon Grader, Dean of the Wolfson Faculty of Chemical Engineering.

“According to our cost estimate, our method could successfully compete with existing water splitting methods and serve as a cheap and safe platform for the production of hydrogen,” says Landman.

Prof. Gideon Grader holds the Arturo Gruenebaum Chair in Materials Engineering.
Our method could successfully compete with existing water splitting methods and serve as a cheap and safe platform for the production of hydrogen.

- Avigail Landman
Among the new faculty members welcomed at Technion this year is Prof. Alex Bronstein of the Faculty of Computer Science. Bronstein is an alumnus of the Technion Excellence Program.

Long-term Technion friends will remember Alex and his brother Michael as the identical twins who presented a 3D face recognition research project in the aftermath of 9/11, which was so precise that it could differentiate between them. Under the mentorship of Prof. Ron Kimmel, Bronstein was co-inventor of a 3D sensing technology that was acquired by Intel Corporation in 2012 and distributed under the RealSense™ brand.

Admission at Technion is based on a single criterion: excellence. "
- Prof. Peretz Lavie
"The walls between disciplines, faculties, and fields of research are collapsing. Future achievements in science and engineering will require cooperation between laboratories and researchers from different fields. In order to achieve significant scientific and engineering breakthroughs, enormous knowledge is now required – knowledge that an individual scientist does not possess."
Technion President Prof. Peretz Lavie has been elected to a third term by a large majority. The only other Technion president in history to have served a third term was Amos Horev, making this an exceptional affirmation of the ongoing paradigm shift of multidisciplinary progress and globalization that has occurred under Lavie’s leadership throughout the previous eight years. The decision awaits ratification by the 2017 Technion Board of Governors.

“I see the position of Technion President as the most important mission in my academic life,” said Prof. Lavie. “I will continue to work with all my might so that the glorious institution we are all so proud of will develop and thrive.”

During Prof. Lavie’s current term in office (2009-2017), Technion recorded impressive achievements led by the recruitment of more than 200 new faculty members. “Outstanding faculty members are the most important asset of any university,” said Prof. Lavie. “The quality of Technion and its future status will be determined first and foremost by the quality of its faculty members.”

The increase in the number of faculty members was accompanied by a significant increase in the number of publications in the world’s leading scientific journals. In 2016, Technion was ranked 26th in the world in the list of Rising Stars, published by the leading scientific journal *Nature*, following a 40 percent increase in Technion’s publications in leading scientific journals. In the Shanghai ranking, the world’s leading index of academic institutions, Technion has been consistently rising and leads Israel’s elite educational institutions. These rankings, along with a significant increase in competitive research grants, are testimony to Technion’s academic excellence and the research achievements of its faculty members.

An impressive achievement during Prof. Lavie’s term in office was the strengthening of its global standing. This is embodied in the establishment of Technion branches in New York and China and in strategic partnerships with leading universities around the world. In September 2017, the permanent campus of the Jacobs Technion-Cornell Institute for applied engineering-scientific research will be inaugurated in the heart of Manhattan. The Institute was established after Cornell University and Technion jointly won the City of New York’s international competition, in which more than 50 leading universities from the US and around the world participated. Technion is the first non-American university in the world to award its own academic degree on American soil.

Construction of the Guangdong Technion campus, which will be inaugurated in China in December 2017, is nearing completion. The Institute, located near the Shantou University campus in the province of Guangdong in southeastern China, will be a research university. Teaching and research programs in its initial years will focus on environmental protection.

Technion is also strengthening its international reputation through cooperation with leading universities around the world. Technion International accepts students from around the world, and has significantly expanded its activities; the number of students has increased from 39 in 2009 to 700 in 2016.

These international projects place Technion at the forefront of global research and constitute an important milestone in its progress toward achieving the Technion vision: becoming one of the world’s ten leading scientific-technological research universities in the development of human capital, leadership, and knowledge creation, to advance the State of Israel and humanity.
CONDUCTING THE FUTURE
Phanthropist Mortimer Zuckerman has launched the Zuckerman STEM Leadership Program, a transformative initiative designed to support future generations of leaders in science, technology, engineering and math in the United States and Israel.

In January, 2017 Mortimer B. Zuckerman was honored at the official residence of the President of Israel Reuven Rivlin for his STEM initiative.

JAPAN@TECHNION
An Israeli-Japanese conference on regenerative medicine and stem cells was held at the Rappaport Faculty of Medicine in March. This was followed in May by a visit of Japan's Minister of Science, Technology and Space, Yosuke Tsuruho. “Israel and Japan share a common vision of developing advanced technology for the benefit of humanity,” said the Minister.

TECHNION LAUDS LAUDER!
Many more Technion students - the fuel of Israel’s future - will be at home with the latest amenities at the new Undergraduate Student Village. The prime campus location features four nine-story buildings with 16 apartments and 488 beds.

The new student village construction was spearheaded by a gift from Ronald S. and Jo Carole Lauder.

“The significance of these dormitories reaches far beyond the materials with which they are being constructed,” said Ronald S. Lauder. “These dorms will help the Technion recruit and retain the very best students, who are the lifeblood of the university. They are an investment in the future that will reinforce the university’s role as the place for future innovators whose work will benefit us all.”
Technion and Cornell University honored the 2017 graduates of the Joan & Irwin Jacobs Technion-Cornell Institute at Cornell Tech - including the first-ever graduating class of Health Tech students and the second graduating class of Connective Media students. This will be the last class graduating from Cornell Tech’s temporary home in the Google building in Chelsea as the new Cornell Tech campus (home of the Jacobs Technion-Cornell Institute) opens on Roosevelt Island in September.

CHINA, ISRAEL & GTIIT

A year after the cornerstone ceremony of the Guangdong Technion Israel Institute of Technology, the fledgling multinational institute in China received official approval from the Chinese Ministry of Education. Cooperation with Technion is consistent with the goal of the Chinese Government to establish world-class research universities and to promote innovation-based development, confirmed the ministry. The new campus opens in the coming academic year.

JACOBS TECHNION-CORNELL

Technion President Peretz Lavie joined ABNY’s “Future of Higher Education in NYC” panel in January, alongside leaders from Columbia University, New York University, Cornell Tech, and the City University of New York. “The Jacobs Institute and Cornell Tech have attracted fantastic faculty members and absolutely great students. I feel this is one of the greatest experiments in academic education in modern times,” said Prof. Lavie.
MICROBOT RINGS THE BELL
The latest Technion generated company to ring the Nasdaq closing bell is Microbot Medical. The brainchild of Prof. Moshe Shoham, Microbot Medical is a leading medical device company focused on research, design, development and commercialization of technological platforms for microrobotic-assisted medical devices. The company rang the Nasdaq Bell on February 23, 2017.

THINGS LIKE NOBEL PRIZES
Times Higher Education analysis reveals the institutions with the most affiliated Nobel prizewinners this century. Technion is the only university outside the US to make the top 10.

In 2004, Technion became home to Israel’s first Nobel Prizes in science. Since then the Technion Nobel legacy has continued, with the 2011 and 2013 Nobel Prizes in Chemistry.

The Nobel Laureates Square was inaugurated on April 2, 2017 in the Ramat Almogi neighborhood of Haifa in honor of Technion’s laureates, Distinguished Profs. Avram Hershko, Aaron Ciechanover, and Dan Shechtman.

MEDICAL CANNABIS
A Technion MOOC (Massive Open Online Course) targets health professionals, caregivers, and patients with knowledge and clarity on the subject of medical marijuana for pain control.

World pain expert Prof. Elon Eisenberg, of the Rappaport Faculty of Medicine, is pioneering the course. “The course provides coherent information for healthcare providers - as well as for a broad audience,” explains project manager Ronit Lis-Hacohen.
AEROSPACE 1ST
The Center for World University Rankings, initiated in Saudi Arabia and headquartered in the United Arab Emirates, ranked Technion first in the world in aerospace engineering in 2017. The inaugural subject rankings feature the top global universities in 227 subjects covering all academic disciplines in the sciences and social sciences.

WINDS OF TIME AND SPACE
New insights into the winds around black holes are brought to us by Technion Prof. Ehud Behar and Prof. Keigo Fukumura of James Madison University. The scientists observed that the magnetic field created around a black hole plays a major role in the creation of the accretion disk and the winds it diffuses.

PRESIDENTIAL PIZZA
Held at the initiative of the student union, Technion students tasted the full endorsement of Italian cuisine direct from their President. According to the student union, the pizza party was a welcome break from a period of intense studies, charging the dietary batteries for the next wave of concentrated excellence.

BRAIN THRESHOLD
Technion Prof. Simone Engelender and Harvard Medical School Prof. Ole Isacson say the toxic protein behind Parkinson's disease may not spread like an infection from nerve cell to nerve but rather that the protein, called alpha-synuclein, may simultaneously affect all parts of the nervous system inside and outside of the brain. They describe this game-changing insight as “threshold theory” of Parkinson's for the first time in a report recently published in Trends in Neuroscience.
Technion Guardians have made the highest level of commitment to the Institute.
**GIFTS**

- **Applebaum** Foundation Research Fund for the Study of Contributing Factors to Acute Myeloid Leukemia Repopulation Following Conventional Cytotoxic Therapy
- **Applebaum** Foundation Research Fund for the Identification of Driver Proteins for Accelerating Immune System Recovery
- Rosalyn **August** Girls Empowerment Initiative at the Technion
- **Azrieli** Foundation Faculty Fellowships
- Stanley **Batkin** Alternative Energy Research Fund in the Grand Technion Energy Program
- Jim **Blum** 2-Bedroom Handicapped Accessible Apartment in the Undergraduate Student Village
- **Blum** Family Foundation Apartment in the Undergraduate Student Village
- **Cooperman** Family Fund for the Outdoor Patio of the Technion Student Counseling Center
- **FIRST** USA gift to Support **FIRST** Israel
- **Gemunder** Fund for Security Research Equipment Fund in Memory of Raymonde and Roland **Getreide** in the Prince Center for Neurodegenerative Disorders of the Brain
- Sam and Joan **Ginsburg** Fund to Study Novel Pathophysiological Mechanism Underlying Loss of KAT6A Function
- Dr Andrew and Aviva **Goldenberg** Architecture Student Pavilion
- **Hanisee** Fund for the Bee Robot Project
- Sandy **Hittman** Fund for the Undergraduate Student Village Apartment in Memory of Daniel and Joyce **Karp** in the Morton and Beverley Rechler Family Foundation Dormitory
- **Kaufman** Fund Gift to Support Scientific Research at the Technion
- **Keefeld** Estate Fund
- **Klaman** Family Foundation Fund to Support the Undergraduate Student Village
- Michael F. **Klein** Architectural Studio Complex
- Noemi **Landau** Fund for the Undergraduate Student Village
- Harry and Sadie **Lasky** Foundation Apartment in the Stanley Shalom Zielony Graduate Student Village
- Ronald S. and Jo Carole **Lauder** Student Dormitory
- **Levinson** Family Recruitment Fund
- **Louis** Family Laboratory for Targeted Drug Delivery and Personalized Medicine Technologies
- Robert and Ruth **Magid** Electron Beam Quantum Dynamics Lab
- **Magid** Family Fund for Applied Research with Commercial Potential
- **Mehoudar** Innovation Center at the Technion
- **Netivei Israel** Gift to Support the Tzoarei Tahbura Program in the Faculty of Civil and Environmental Engineering
- Curt N. and Eleanor **Parker** Apartment Unit in the Stanley Shalom Zielony Graduate Student Village
- **Phoenix Chapter** Project for Prof. Yehuda Assaraf’s Research
- Victoria and Robert **Polak** Fund for Applied Research with Commercial Potential
- Allen and Jewel **Prince** Fund for the Undergraduate Student Village
- **PTC Inc.** Fund to Support the Center for Robotics and Digital Technology Education
- **Ravitz** Foundation Gift to Support Technion Leaders of the Future
- **Marvin Reinstein** Fellowships in Physics
- **Rothschild** Scholars Program
- **Rubinger** Family Visiting Lectureship in the Technion Computer Engineering Center
- **UConn – Technion Energy Collaboration Initiative donated by Ed Satell**
- **Seed the Dream Foundation** to Support the Ofakim LeHigh-Tech Program
- **Sherman** Ethiopian Advancement Program
- **Sherman-Saifer** Career Advancement Chair for Women Irving and Branna **Sisenwein** Fund for Vision Research and Treatment
- Terry and Anita **Steen** L’Dor V’Dor Fund within the Prince Center for Neurodegenerative Disorders of the Brain
- Multipurpose Learning Complex in the Henry and Marilyn **Taub** and Family Science and Technology Center
- Rooftop Terrace in the Henry and Marilyn **Taub** and Family Science and Technology Center
- **Technion Canada** Gift to Support International Space University Program 2016
- **Tikvah Fund** Gift to Support the Jewish Studies Cluster in the Department of Humanities and Arts
- Andrew H. and Ann R. **Tisch** Professorship at JTCI
- Jane **Weitzman** Undesignated Fund for JTCI
- **Yad Hanadiv** Foundation Gift to Support the Equal Opportunities Project for Arab Students at the Technion
- **Zuckerman** STEM Leadership Program

---

**FELLOWSHIPS**

- William and Barbara **Dahl** Master’s Fellowship Fund
- Carol B. **Epstein** Fellowship at JTCI
- Ariane **De Rothschild** Program for Female Doctoral Students
- H. Zvi **Griliches** Memorial Fellowship Fund
- Dalia and Eli **Hurwitz** Foundation Doctoral Fellowship Fund
- Jack J. **Kadish** Fellowship Fund
- Raymond **Shwake** Master’s Fellowship Fund
- Goldie and Allan **Singer** Family Fellowship Fund

---

**SCHOLARSHIPS**

- Michael **Filerman** Scholarship Fund
- Sharyn **Recht** Scholarship Fund
- **Bar-Shalom** Family Scholarship Fund
- Ann and Sam **Salman** Memorial Scholarship Fund

---

A complete list of giving is available at presidentsreport.technion.ac.il
Technion Guardians have made the highest level of commitment to the Institute

Menachem and Carmela Abraham, MA, USA
Adelis Foundation, France
Catherine and Frederick R. Adler, NY & FL, USA
Alon Family Foundation, CA, USA
Paul and Sherry Altura, CA, USA
Maurice Amado Foundation, CA, USA
Amdocs (Israel) Ltd.
Annenberg Foundation, PA, USA
Carl and Iris Barrel Apfel, FL, USA
Applied Materials Foundation, CA, USA
Eng. Paul S. Arieli (Goldschmidt) and Dr May Arieli, Israel
Arison Foundation, FL, USA / Tel Aviv, Israel
Lester Aronberg Foundation, IL, USA
Norman and Helen Asher, IL, USA
Victor and Efthichia Asser, Athens, Greece
Automatic Data Processing, Inc., NJ, USA
Florette and Henri Avram, Paris, France
Itice Avram, Paris, France
David and Stephanie Azrieli, Montreal, Canada
Morton and Selma Bank, FL, USA
Bank Hapoalim, Israel
Ovadia Barazani’s Foundation, Haifa, Paris, London
Samuel Barlant Family, IL, USA
Daron and Ron Barnes Family, AZ, USA
Matilda and Gabriel Barnett, CA, USA
Dr Euval and Olga Barrekette, NY, USA
Syd Barrett, FL, USA
Claire S. Behar, CA, USA
Belloch Family - Florence and Jack, FL, USA; Madeleine Morrison and Chuck, CO, USA; Emily and Steven, MI, USA
Hilda and Manasheh Ben-Shlomo Foundation, Liechtenstein
Miriam B. and Louis J. Benjamín, FL, USA
Yoda Leon and Luna Benaziya, Lausanne, Switzerland
Dr Irving and Jeannette Benveniste, CA, USA
Beracha Foundation, Jerusalem, Israel
Evelyn Berger, PA, USA
Ilene and Steve Berger, PA, USA
Bar-Nir Bergreen Family, PA, USA
Ruth Berkowitz, Switzerland
Randy L. and Melvin R. Berlin Family, IL, USA
Russell Berrie Foundation, NJ, USA
Jerry and Evelyn Bishop, NY, USA
Scott M. Black, MA, USA
Dahila and Ilan Blech, CA, USA
Neri and Bernard Bloomfield, Montreal, Canada
Harold and Penny B. Blumenstein, MI, USA
Richard C. and Carol Blumenstein, MI, USA
Simon and Tekla Bond, NY, USA
Octav Botnar, Switzerland
Samuel and Millicent Broadwin, FL, USA
Ruth S. Carne, FL, USA
Caster Family, PA, USA
Yoram and Zahava Cedar and their Trustees, CA, USA
Stanley and Pamela Chais, CA, USA
Leona and Marcy Chanin, NY, USA
Paul and Carol Chanin, FL, USA
Dr Lillian Chutick, NY, USA
Dr Rebecca Chutick, NY, USA
Said Cohen Foundation, CA, USA
Jerome J. Cole, IL, USA
Joan and Reginald Coleman Cohen, Brighton, England
Alex and Tina Coler, CA, USA
Sydney and Florence Cooper, Toronto, Canada
Elizabeth and Sidney Corab, London, England
Jeffrey Cosiol, NJ, USA & Costa Rica
Crown Family, IL, USA
Dr Gilbert and Betsie Cullen, MD, USA
Haron Dahan Foundation, MD, USA
Ruth and Gerard Daniel, FL, USA
Davidow Charitable Fund, CA, USA
William Davidson, MI, USA
Rebecca and Oscar Davis, NY, USA
Simon and Annie Davis Foundation, NY, USA
André Deloro, Monaco
Frances and Ralph Delur, NY, USA
Relly and Brent Dibner, MA, USA
Dibner Fund, a Family Foundation, CT, USA
Digital Equipment Corp., MA, USA
Jay “Yechiel” and Nilly Dor, FL, USA and Tel Aviv, Israel
Max and Lottie Drescher, IL, USA
Jerome and Sylvia Drexler, CA, USA
Eleanor and Mel Dubin, NY, USA
Louis Edelstein Family, NI, USA
Alvin and Helene Ecolff Charitable Foundation, IL, USA
Eldee Foundation, Montreal, Canada
Elron Electronic Industries Ltd., Haifa, Israel
Carla and Dr Hugo Elsbach-Hertzdahl Estate, Israel
Col. J.R. and Anna Tulin Elyachar, NY, USA
The Emerson Family, CA, USA
Dr Joseph N. and Beatrice B. Epel, MI, USA
Carol B. Epstein, MD, USA
E. Ike Eshaghian Foundation, NY, USA
Alex J. and Toby Etkin, MI, USA
Hortense and Lawrence Fairberg, CT, USA
Israel and Elizabeth F. Feldman, MD, USA
Ben and Fanny Fieldman, CA, USA
Lotte Fields, NY, USA
Sylvia and David I.A. Fine, CA, USA
Minnie and Ruben Finkelstein, CA, USA
Joseph and Edith Fischer, CA, USA
Jess and Mildred Fisher Family, Washington, DC, USA
Dr Regina Flesch, PA, USA
Ruth Elaine and Stan Flinkman, CA, USA
David and Paula Flitner, WY, USA
Benjamin and Lena Fohrman, CA, USA
Fohs and Sohn Families, OR, USA
Hilda and Rudolph Forchheimer, NY, USA
Alan and Tatyana Forman, NY, USA
Reinhard Frank, MA, USA
Ben and Florence Free, FL, USA
Joseph and Sharon Freed, MI, USA
Aron and Ruth Frenkiel and Family FL & NY, USA
Hilda Friedland, FL, USA
David and Paula Flitner, WY, USA
Elisha M. Friedman, NY, USA
Dr Orrie and Laurel Friedman, MA, USA
Leonard Friedman, CA, USA
Linda and Michael Frieze, MA, USA
Estate of Eugenie Froemer, NY, USA
Boruch and Olga Frusztajer, MA, USA
Rosalind Fuerst, NY, USA

G
Uzia and Ella Galil, Israel
Maurice G. and Hynda Gamze, IL, USA
Paul and Marilyn Geleris, CA, USA
Mark I. Gelfand, MA, USA
Gemunder Family Foundation
Joel F. Gemunder, FL, USA
German-Israeli Foundation for Science and Development, Jerusalem, Israel
München, Germany
Sir Arthur and Lady Gilbert, CA, USA
Estate of Gilbert W. Glass, NY, USA
Meyer Gold, NY, USA
Goldberg Guild Family, FL, USA
Linda and Gary Goldberg, Toronto, Canada
Irving P. Golden, FL, USA
Murray Goldenstein, NY, USA
Mimi Goldfinger, NY, USA
Bess and Paul Goldings, NY, USA
Richard N. Goldman, CA, USA
Horace W. Goldsmith Foundation, NY, USA
Arlene and Arnold Goldstein, NY, USA
Dr Elisehva Axelrad Goldstein, NY, USA
Morris E. Goldstein, FL, USA
Leslie and Susan Gonda (Goldschmied) Foundation, CA, USA
Lee and Albert Goodstein, NY, USA
Solvin and Wendy Gordon, MD, USA
Sophia and Bernard M. Gordon, MA, USA
Estate of Esther and Maynee Gospe, CA, USA
Howard and Anne Gottlieb, IL, USA
Salman, Evelyn, Stephen and Nancy Grand, MI, USA
Emanuel Green, FL, USA
Henry D. Greenspahn, IL, USA
Herman and Gertrude Gross, NY, USA
Irwin and Linda Gross, PA, USA
Jeanne and Bela Grunberger, France
Joseph S. and Caroline Gruss, NY, USA
Rosalind and Joseph Gurwin, NY, USA
Monroe Guttmann Foundation, PA, USA
Miriam and Aaron Gutwirth Fund, Tel Aviv, Israel
Nahum Guzik, CA, USA

H
Willard and Lilian Hackerman, MD, USA
Uzi and Michal Haley, TX, USA
Dr Harry and Tamara Handelsman, MD, USA
Dr Harold L. and Margaret Harris, IL, USA
Homer and Gloria Harvey, CA, USA
Morven and Michael Heller, London, England
Leona M. and Harry B. Helmsley Charitable Trust, NY, USA
Paula Herschberg, NY, USA
Hewlett-Packard, CA, USA
Beverly And Charles Hirsch, IL and FL, USA
Jon and Melissa Hirsch, MA, USA
Fred and Sandra Hittman, MD, USA
Louis and Marjorie Stoll Holtz, FL, USA
Eddie and Sala Hudes, CA, USA

I
William Ingram, CA, USA
Intel (Israel) Ltd.

J
Joseph and Edythe Jackier, MI, USA
Lawrence and Eleanor Jackier, MI, USA
Dr Irwin M. and Joan Jacobs, CA, USA
Shirlee Jacobs, FL, USA
Jarmyce Foundation

K
Kadoorie Charitable Foundations, Hong Kong
D. Dan and Betty Kahn, MI, USA
Judith and Maggie Kaplan, CA, USA
Mickey and Alice Kaplan, CA, USA
Sanford Kaplan Family, CA, USA
Gerhard and Gertrude Karplus, NY, USA
Fay and Max Katz, CT, USA
Harvey and Mireille Katz, TX, USA
Dr Albert Kaufman, CA, USA
Barbara and Jack Kay, MD/FL, USA
Dorothy and Martin Kellner, CA, USA
Harriet J. and Philip E. Klein, MD, USA
Jack And Candee Klein, CA, USA
Michael F. Klein, MD, USA
Stephen B. Klein, PA, USA
Dr Isaac and Judy Kliger, MA, USA
Amb. Philip M. and Ethel Klutznick, IL, USA
Dorothy Kobritz and Anthony Rios, FL, USA
Frances and Leo Kogan, CA, USA
Jay M. Kogan Foundation, MI, USA
Melville J. Koliner, CA, USA
Sidney and Vivian Konigsberg, CA, USA
Anna and Alexander Konoff, NY, USA
Jon-David Koppel, FL, USA
Koret Foundation, CA, USA
Jacob L. Kram, NJ, USA
Margaret Strauss Kramer, FL, USA
Theodore H. and Joan Krenchel, IL, USA
<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Name</th>
<th>Location</th>
<th>Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helen G. Kruger, FL, USA</td>
<td>George and Hannah Krumholz, FL, USA</td>
<td>Sybil and Reuben Kunin, Toronto, Canada</td>
<td>Saul and Gitta Kurlat, MA, USA</td>
<td>The Kurzbauer Family, DC, USA and Amsterdam, Netherlands</td>
<td>Kyocera Corporation, Kyoto, Japan</td>
</tr>
<tr>
<td>Land Niedersachsen, Ministerium für Wissenschaft und Kultur, Hannover, Germany</td>
<td>Benny and Patrisia Landa, Israel</td>
<td>Noemi and Jacques Landau, NY, USA</td>
<td>Stephen A. Laser, IL, USA</td>
<td>Lois and Leonard Laser, IL, USA</td>
<td>Scott J. and Susan S. Leemaster, MI, USA</td>
</tr>
<tr>
<td>Rose Lefkowitz, Toronto, Canada</td>
<td>Legacy Heritage Fund Limited, NY, USA</td>
<td>Corina Legrain, Barcelone, Spain</td>
<td>Henry J. Leir, CT, USA</td>
<td>William M. and Gloria Lester, FL, USA</td>
<td>Leumi, Israel</td>
</tr>
<tr>
<td>Dr Seymour Levine, NJ, USA</td>
<td>Leumi, Israel</td>
<td>Dr Seymour Levine, NJ, USA</td>
<td>Velva G. and H. Fred Levine, TX, USA</td>
<td>Harry H. and Gene G. Lewin, CA, USA</td>
<td>Meyer (Max) Lewin Estate, WV, USA</td>
</tr>
<tr>
<td>Yale S. Lewine and Ella Miller Lewine, CA, USA</td>
<td>Prof. Jacques and Dr Colette Lewiner, Paris, France</td>
<td>Eric and Leza Lidow, CA, USA</td>
<td>Mark and Claire Boonov Litchman, WA, USA</td>
<td>Larry I. Lokey, CA, USA</td>
<td>Norman and Trudy Louis, CA, USA</td>
</tr>
<tr>
<td>Samuel and Claire Luffman, FL, USA</td>
<td>Herbert and Marianna Luxenburg, OH, USA</td>
<td>Estate of David Lyman, HI, USA</td>
<td>Natalie B. and Arthur J. Lyons, FL, USA</td>
<td>Dr Hyman and Myrna Mitchner, CA, USA</td>
<td>Selma T. Mitran, PA, USA</td>
</tr>
<tr>
<td>Dr Saul Mackoff, IL, USA</td>
<td>Ruth Mahler, FL, USA</td>
<td>Alexandrine Mallat, Paris, France</td>
<td>Claude and Alfred E. Mann, CA, USA</td>
<td>Hal and Inge Marcus, WA, USA</td>
<td>William and Cynthia Marcus, MA, USA</td>
</tr>
<tr>
<td>Jennie and Dorothy Markowitz Trust, IL, USA</td>
<td>Sonia Marschak, IL, USA</td>
<td>Dalila and Dan Maydan, CA, USA</td>
<td>Medvedi, Shwartzman and Gensler Families, Israel</td>
<td>Marjorie Meltzer, IL, USA</td>
<td>Jeannette and Emery Pick, CA, USA</td>
</tr>
<tr>
<td>Hubert and Lisette Nassau, London, England</td>
<td>Bernice and Ruth Nathenson, IL, USA</td>
<td>Samuel Neaman, CA, USA</td>
<td>Abraham Nemes, Haifa, Israel</td>
<td>Albert and Jean Nerken, NY, USA</td>
<td>Neubauer Family Foundation, PA, USA</td>
</tr>
<tr>
<td>Dr Morton and Toby Mower, MD, USA</td>
<td>Peter Munk, Toronto, Canada</td>
<td>David and Inez Myers Foundation, OH, USA</td>
<td>Bela B. and Clara Nevai Charitable Foundation, FL, USA</td>
<td>Dr Hyman and Myrna Mitchner, CA, USA</td>
<td>Selma T. Mitran, PA, USA</td>
</tr>
</tbody>
</table>
|𝕖𝕟(14,53),(941,985)
Betty and Raymond Rosen, CA, USA
Michele and Maurice M. Rosen, PA, USA
Irving and Adele Rosenberg Foundation, Inc., NY, USA
Claire and Emanuel G. Rosenblatt, FL, USA
Ben and Esther Rosenbloom Foundation, MD, USA
Grace and Martin Rosman, MD, USA
Eric and Lore Ross, NJ, USA
Sheldon R. Roth Family, AZ, USA
Henry M. and Lillian R. Rothberg and Family, FL, USA
Steven and Beverly Rubenstein Charitable Foundation, NJ, USA
Allan Rubin, FL, USA
Arthur Rubloff, IL, USA
Julia and Joshua Ruch, NY, USA
Les and Eileen Seskin, FL and PA, USA
Prof. Rachel and Uriel Shalon, Haifa, Israel
William and Sophia Shamban, CA, USA
Andy and Kathy Shapiro, NJ, USA
Eugene and Marlene Shapiro, AZ, USA
Paul and Deane Shatz, Washington, D.C., USA
Shalom and Theda Shefferman, MD, USA
Max and Amparo Shein, Mexico City, Mexico
Irving and Sue Shepard, MS, USA
David Shepherd, London, England
Jane F. and D. Larry Sherman, MI, USA
Leonard and Diane Sherman, IL, USA
Honey and Barry Sherman, Toronto, Canada
Nate H. Sherman Foundation, IL, USA
Claire and Norton Sherman, MA, USA
Robert (“Dr. Bob”) and Mao Shillman, MA, USA
Sylvia and Stanley Shirvan, NJ, USA
Rannie and Gerald Silbert, NY, USA
Roslyn and Julius Silver, CT, USA
David and Edith Simchi-Levi, MA, USA
Irving and Branna Sisenwein, CA, USA
Bernard Sklar, AZ, USA
Jean and Jack Skadne, FL, USA
Scott Skadne, FL, USA
The Slater Family, MA and FL, USA
Michel and Esther Smidof, Geneva, Switzerland, FL, USA
Jerry B. Smoler Family, IL, USA
Sir Michael Sobell, Surrey, England
Edna and Jonathan Sohnis, NY, USA
Sheldon H. Solow Foundation, NY, USA
Samuel and Helene Soref Foundation, FL, USA
Ben and Shelley Sosewitz, IL, USA
Bernard Spira, CA, USA
Jacques H. Spreiregen, Monaco
Louis and Bessie Stein Family Foundation, PA, USA
Harry Stern Family Foundation, PA, USA
Harry J. and Lou Stern, NY, USA
Maria Steuerman, NY, USA
Karl Stoll, NY, USA
Stone Family, Canada / USA
Estate of Harry H. Stone, OH, USA
Janice and Stanley H. Sussman, IL, USA
Janey and Albert Sweet, CA, USA
Gerard Swape, CT, USA
Dr. S. Jerome and Judith D. Tamkin, CA, USA
Bernice and Joseph Tanenbaum, NY, USA
Jordan and Irene Tark, IL, USA
Henry and Marilyn Taub and Family, NJ, USA
Joseph and Arlene Taub, NJ, USA
Dr Sam B. and Eve Topf, FL, USA
Benjamin and Sarah Torchinsky, Canada / Cayman Islands
V Clément Vaturi, Paris, France
Andrew and Erna Finci Viterbi, CA, USA
Volkswagen-Stiftung, Hannover, Germany
W Wagner-Braunsberg Family Foundation, MD, USA
Louis Waldman, FL, USA
Famille Warszawski, France / Israel
Weill Family Foundation, NY, USA
Drs Mary and Arthur B. Wein, MD, USA
Charles and Juliette Weissmann, Zürich, Switzerland
Edna and K.B. Weissman, FL, USA
Robert and Carol Weissman, FL, USA
Harry and Mary Werksman, CA, USA
Lewis M. and Libby Weston, NY, USA
Shirley and Arthur Whizin and Shelley and Bruce Whizin, CA, USA
Susan and David Wilstein, CA, USA
Michael and Marilyn Winer, FL & MA, USA
Roma Broida Wilcoff, MS, USA
Joseph L. Wolf Foundation, MD, USA
Wolfson Foundation, London, England
Y Moshe Yanai, Kfar Yehezkel, Israel
Estate of Mildred Yellen, NY, USA
Z Kal and Joyce Zeff, CO, USA
Ruth and Allen Ziegler, CA, USA
Shalom Zieleny, NY, USA
Edith and Robert L. Zinn, TX, USA
Yehuda and Nava Zisapel, Israel
Zohar Zisapel, Israel
Isaiah and Harriet Zucker, NY, USA
HONORARY DEGREES & AWARDS

HONORARY DOCTORS*

A
Sir Patrick Abercrombie, 1953
Prof. Anatole de Abragam, 1986
Joseph Ackerman, 2009
Frederick R. Adler, 1998
Prof. Yakir Aharonov, 1992
Elie Alalouf, 2010
Yoram Alster, 2013
Walter H. Annenberg, 1991
Efraim R. Araz, 1985
MK Moshe Arens, 1986
Ing. Paul S. Arieli (Goldschmidt), 2003
Ted Arison, 1998
Prof. Alain Aspect, 2011
David J. Azrieli, 1985

B
Justice Aharon Barak, 1998
Alfred J. Bär, 2013
Zahava Bar-Nir, 2009
Prof. The Honourable Dame Marie Bashir AD CVO, 2016
Norman Belmonte, 2005
David Ben Gurion, 1962
Louis Benjamini, 1993
Miriam Benham, 1991
Gen. (Res.) Avihu Ben-Nun, 2006
Evelyn Berger, 2006
Prof. E. D. Bergman, 1955
Angelica Berrie, 2008
Prof. Sir Michael V. Berry, 2006
Dr A. Biram, 1965
Ilan Biran, 2013
Prof. Joan S. Lyttle Birman, 1995
Dr Joel Birnbaum, 1999
Prof. R. Byron Bird, 1993
Scott Black, 2007
Simha Blass, 1958
Arthur Blok, 1972
Melvin H. Bloom, 2013
Michael R. Bloomberg, 2016
Bernard M. Bloomfield, 1978
Neri J. Bloomfield, 1990
Erik Blumenfeld, 1992
Prof. David Bohm, 1992
Dr Niels Bohr, 1958
Dr Zeev Bonen, 2004
Dr Carl de Boor, 2002
Prof. Haim Brezis, 1998
Dr Andrei Zary Broder, 2014
Frances Brody, 2002
Lucien Bronicki, 2007
Yehudit Bronicki, 2007
Prof. Bernard Budiansky, 1995
Marshall Butler, 2001

C
Dr Santiago Calatrava, 2004
Prof. Alberto P. Calderon, 1989
Arie Carasso, 1988
Prof. Srulek Cederbaum, 2012
Prof. Malcolm Chaikin, 1991
Stanley Chais, 2008
Prof. Herman Chernoff, 1984
Prof. Alexandre Joel Chorin, 2003
Winston S. Churchill, 1997
Dr Lillian Chutick, 1979
Prof. Karl Taylor Compton, 1954
Sydney C. Cooper, 1992
Elizabeth Corob, 1993
Sidney Corob, 1986
Prof. Frank A. Cotton, 1983
Edith Cresson, 2011
Lester Crown, 1996

D
P. F. Danel, 1952
Dr George B. Dantzig, 1973
Robert A. Davidow, 2007
Dr Duncan Davies, 1982
Dr Igor Dawid, 2009
Prof. Arnold L. Demain, 2000
Prof. Alan M. Dershowitz, 2014
Bern Dibner, 1976
Prof. François Diederich, 2012
Gen. Yaakov Dori, 1967
Prof. Israel Dostrovsky, 1994
Max Dresher, 1991
Prof. Mildred S. Dresselhaus, 1994
Prof. Daniel Drucker, 1983
Prof. Jack D. Dunitz, 1990

E
Prof. Beno Eckmann, 1983
Dr Albert Einstein, 1953
Col. Jehiel R. Elyachar, 1979
J. Steven Emerson, 2013
Dr Joseph N. Epel, 1994
Dr Moshe Epstein, 2011
Prof. Paul Erdos, 1983

F
Yekutieli Federmann, 1989
Israel Feldman, 2003
Harry F. Fischbach, 1971
Edith Fischer, 2005
Max M. Fisher, 1991
Dr F. Julius Fohs, 1957
Dr William Fondiller, 1949
R. J. Forbes, 1953
Dr J. Franck, 1953
Dr H. Froman, 1995
Thomas L. Friedman, 2008
Dr William Friedmann, 1984
Prof. Gilbert F. Froment, 1984

G
Uzia Galil, 1977
Dr Jacob M. Geist, 1988
Prof. Boris Goldin, 2002
Emmanuel Gill, 1994
Raya Gensler, 2002
Prof. Mark Goodwin, 2006
Dr Bernard Gordon, 2005
Stephen Grand, 2010
Doreen Brown Green, 2014
Joseph Gruss, 1989
Joseph Gurwin, 2004

H
Prof. Peter Haasen, 1993
Homer Harvey, 1989
Dr George H. Heilmeier, 1997
Michael Heller, 2010
President Chaim Herzog, 1987
Sandy Hittman, 2015
Dr Christian Hodler, 1998
Dr Nicholas J. Hoff, 1980
Dr Alan Hoffman, 1986
Prof. Roald Hoffmann, 1996
Prof. Robert Hofstadter, 1985
Gen. (Res.) Amos Horev, 1984
Dr F. Houhouet-Biogny, 1962
Eli Hurwitz, 1990

I
Iisin Ivanier, 1981
Gen. (Res.) David Ivy, 1996

J
Lawrence S. Jackier, 2004
Prof. Joseph Jaffe, 1987
Mark Gefen, 2011
Raya Gensler, 2002
Emmanuel Gill, 1994
Arthur Gilbert, 1999
Benno Gitter, 1991
Prof. Israel Gohberg, 2008
Alexander Goldber, 1975
Edward R. Goldber, 1990
Dr Emanuel Goldberg, 1957
Gary Goldberg, 2012

K
D. Dan Kahn, 2011
Prof. Thomas Kailath, 2011
Dean Kamen, 2015
Sanford Kaplan, 1995
Dr Shlomo Kaplansky, 1950
Dani Karavan, 2009
Prof. Marcus Karel, 1991
Prof. Samuel Karlin, 1985
Prof. Theodore von Karman, 1951
Prof. Richard M. Karp, 1989
Prof. Alfred Kastler, 1983
Prof. Ephraim Katzir, 1983
Martin Kellner, 1985
Michael Kennedy Leigh, 1983
Moshe Keret, 2000
Dr Laurence R. Klein, 1982
Philip E. Klein, 2004
Prof. Leonard Kleinrock, 2010
Prof. Sir Aaron Klug, F.R.S., 1989
Teddy Kollek, 1994
Prof. Karl Ludwig Kompa, 1995
Sidney Konigsberg, 2002
Yaakov Kotlicki, 2011
Theodore H. Krengel, 2001

L
Frank R. Lautenberg, 1984
Benny Landa, 2004
Justice Moshe Landau, 1980
Prof. Rolf W. Landauer, 1991
Prof. Robert S. Langer, 1997
Dr Stephen A. Laser, 2009
David Laskov, 1975
Dov Lautman, 1995
Prof. Jean Marie Lehn, 2009
Francois Leotard, 1992
Daniel Libeskind, 2008

* Including Doctor of Architecture, Doctor of Science, Doctor of Science in Technology, Honorary Doctor, Honorary Doctor of Science
Lorry I. Lokey, 2007
Dr Walter C. Lowdermilk, 1952
Prof. Robert E. Lucas, Jr., 1996

M
Prof. Thomas L. Magnanti, 2007
Alexandre Mallat, 2002
Alfred E. Mann, 2005
Galia Maor, 2010
Harold Marcus, 2012
Prof. Rudolph A. Marcus, 1998
Dr Herman F. Mark, 1975
Prof. Krzysztof Matyjaszewski, 2015
Dr Dan Maydan, 2001
Raphael Mehoudar, 2014
Zubin Mehta, 2013
Etia Meilichson, 1997
Prof. Angelo Miele, 1992
Dr Hyman Mitchner, 2010
Gen (Res.) Amram Mitzna, 2010
Dr A. I. (Ed) Mlavsky, 1994
Dov Moran, 2016
Prof. Benno Müller-Hill, 2000
Peter Munk, 2001
Dr J. Fraser Mustard, 1995

N
Avinoam Naor
(Aharonovich), 2008
Ruth Leventhal
Nathanson, 2010
Samuel Neaman, 1982
Dr Yuval Ne’eman, 1966
Shlomo Nehama, 2006
Robert Neter, 1999
Dr Caroll V. Newsom, 1958
Itzhak Nissan, 2012
M. Novomeysky, 1957

O
Harry Oppenheimer, 1989
Dr Eli Oppen, 2012
Prof. Simon Ostrach, 1986

P
Prof. Amnon Pazy, 2006
Lois Peltz, 2006
Dr Arno A. Penzias, 1986
Shimon Peres MK, 1985
Prof. Lev Pitaevskii, 2010
David Polak, 2009
Israel Pollack, 1993
Rachel Pollak, 2005
Manes Pratt, 1968
Dan Propper, 1999

R
Dr I. I. Rabi, 1963
Yitzhak Rabin MK, 1990
Prof. Seymour Rabinowitz, 1991
Bruce Rappaport, 1979
Ruth Rappaport, 2014
Dr Johannes Rau, 2000
Leon Y. Recanati, 1999
Arnold Recht, 1999
Prof. James R. Rice, 2005
Hershel Rich, 1998
Dr L. A. Richards, 1952
Louis B. Rogow, 1988
Barrie Rose, 2000
Daniel Rose, 2013
David Rose, 1961
Edward E. Rosen, 1966
Maurice M. Rosen, 1978
Prof. Azriel Rosenfeld, 2004
Prof. Alvin E. Roth, 2013
Joel S. Rothman, 2015
Sir Evelyn de Rothschild, 1982
Lord Rothschild, 1968

S
Dr Henry Samueli, 2005
George Sarton, 1953
Ed Satell, 2016
Prof. Harold A. Scheraga, 1993
Dr M. Schiffer, 1972
Maximilian Scholmiuk, 1989
Michael Schor, 1985
Seymour Schulich, 2007
Prof. Helmut Schwarz, 2000
Al Schwimmer, 1968
Joan Seidel, 2012
Norman Seiden, 1986
J. R. Sensibar, 1963
Dr Donna Shalala, 1994
Prof. Rachel Shalom, 1988
Prof. Ascher H. Shapira, 1985
Max Shein, 1993
Irving A. Shepard, 2001
Dr Bernard Sherman, 2004
Leonard H. Sherman, 1994
Stanley Shirvan, 2006
Avraham B. Shochat, 2002
George P. Shultz, 1992
Gil Shwed, 2004
Ramie Silbert, 1996
Julius Silver, 1971
Prof. Barry Simon, 1999
Dr David J. Skorton, 2016
Haim Slavin, 1958
Prof. Richard E. Smalley, 2004
Prof. Louis D. Smullin, 1986
Dr Solomon H. Snyder, 2002
Michael Sobol, 1980
Jonathan Sohnis, 2008
Ben Sosowitz, 1999
Prof. Jason L. Speyer, 2013
Dr Philip Sporn, 1960
Prof. Günter Spur, 2012
Prof. Peter J. Stang, 2014
Eugene Stearns, 1986
Harry J. Stern, 2000
Prof. Eli Sternberg, 1984
Ing. Isaac (Eddie) Streifler Shavit, 2003
Prof. Werner Stumm, 1989
Prof. Nam Pyo Suh, 2007
Dr Avraham Suhami, 1981
Albert Sweet, 2014
Gerard Swope, 1957
Joseph Szydlowski, 1984

T
Joseph Tanenbaum, 2007
Henry Taub, 1983
Marilyn Taub, 2014
PM Margaret Thatcher, 1989
Prof. Edwin L. Thomas, 2016
Dr Lester C. Thurow, 2001
Laurence A. Tisch, 1989
Gen. Dan Tolkowsky, 1982
Sam B. Topf, 1992
Prof. Barry M. Trost, 1997
Abraham Tulin, 1957

U
Jacob W. Ullmann, 1980
Dr Harold C. Urey, 1962
Prof. Heinrich Peter Klaus Ursprung, 1996

V
Dr Yossi Vardi, 2009
Dr Andrew J. Viterbi, 2000

W
Dr Selman A. Waksman, 1966
Eyal Waldman, 2016
Prof. Arieh Warshel, 2015
Sanford I. Weill, 2015
Prof. Felix J. Weinberg, 1990
Aharon Weiner, 1971
Prof. Victor F. Weisskopf, 1989
Prof. Charles Weissmann, 2015
Dr Chaim Weizmann, 1952
Eitan Wertheimer, 2011
Stef Wertheimer, 1992
Lewis Weston, 1996
Prof. Elie Wiesel, 2005
Dr Eugene Paul Wigner, 1971
Dr Shmuel Winograd, 1992
Ben Winters, 1993
Dr J. Wolfowitz, 1972
Lord Leonard Wolfson, 1995
Prof. Chi-Huey Wong, 2007
Dr Robert B. Woodward, 1966
J. W. Wunsch, 1955

Y
Prof. Rosalyn Sussman Yalow, 1989
Moshe Yanai, 2012
Elisha Yanay, 2013

Z
Dr Felix Zandman, 1997
Prof. Bruno Zevi, 1990
Stanley Zilberstein, 1989
Zvi Zikler, 2000
Yehuda Zisapel, 2001
Zohar Zisapel, 2001

** Including Honorary Engineers
HONORARY DEGREES & AWARDS

B
Arthur Blok, 1954
Melvyn H. Bloom, 1993
Harry J. F. Bloomfield, Q.C., 2015
Ilse Blumenfeld, 2009
Milford Bohm, 1999
Rebecca Boukhris, 2015
David Brecher, 2004
Frances Brody, 1992
Gen. (Res.) Shlomo Burstein-Inbar, 2008
Marshall Butler, 1994

C
Joan Callner Miller, 1984
Dr Coleman Caplovitz, 2007
Arie Carasso, 1976
Benjamin Carasso, 2004
Macabi Carasso, 2007
Yoel Carasso, 2007
Stanley Chais, 2002
Leona Chanin, 2004
Paul Chanin, 1993
Jack Chisvin, 1983
Frances Cohen, 1984
Simcha Cohen-Stern, 1999
Hans Cohn, 2003
Reginald Coleman-Cohen, 1983
Alexander Coler, 1988
Maurice Commanday, 1986
Sydney Cooper, 1988
Eedis Cooperband, 1981
Jeffery Cosiol, 2012

D
Jeannette Dankner, 2005
Robert Davidow, 1997
Oscar Davis, 2011
Albert Deloro, 2014
André Deloro, 2009
Brent Dibner, 2013
David Dibner, 2001
Prof. Dr Ing. Ulrich Draugelates, 2002
Max Dresher, 1985
Jerome Drexler, 1999
Melvin Dubin, 1991

E
Melvin Dubin, 1991
Jerome Drexler, 1999
Max Dresher, 1985
Draugelates, 2002
Prof. Dr Ing. Ulrich David Dibner, 2001
Brent Dibner, 2013
Albert Deloro, 2014
Oscar Davis, 2011
Jeannette Dankner, 2005

F
Jeffery Cosiol, 2012

G
Mark Gelfand, 2008
Samuel Geltman, 1998
Raya Gensler, 1994
Moshe Bernard Gitter, 1979
Dr Amit Goffer, 2015
Aviva Goldberg, 2010
Gary Goldberg, 2005
Nathan Goldberg, 1977
Joan Goldberg Arbuse, 1982
Nathan Max Goldman, 1992
Horace W. Goldsmith, 1975
Ing. Aharon Goldstein, 1971
Salomon Gottesfeld, 1985
Ben-Ami Gov, 2010
Salman Grand, 1986
Doreen Green, 2000
Irving Greenberg, 1990
Marguerite Greenberg, 2000
Coleman Kenneth Greiding, 2006
Chaim M. Gringlas, 1989
Irwin L. Gross, 2007
Josef Gruevblat, 1979
Joseph Gurwin, 1996
Dipl. Ing. Helmut Gutmann, 1994
Aaron Gutwirth, 1978
Uzi Halevy, 2014
Dr Harry Handelsman, 2011
Tamar Handelsman, 1998
Robert Hanisee, 2016
Burt I. Harris, 1987
Louis Harris, 1988
Lawrence Harvey, 1977
Leo M. Harvey, 1972
Alexander Hassan, 1975
Benjamin Fohrman, 1991
Rudolph Forchheimer, 1997
Alan Forman, 2005
Reinhard Frank, 2004
Benjamin Free, 1991
Joseph Freed, 1998
David Friedman, 2001
Jerry Freedman, 1993
Michael Frieze, 2000
Michael Fuerst, 2010
Samuel Fryer, 1959

H
Yukietul Federmann, 1978
Israel Feldman, 1992
Rod Feldman, 2014
Elias Fife, 1955
Ruben Finkelstein, 1985
Fausta Finzi Carlí, 2011
Edith Fischer, 2001
Ruth Elaine Flinkman-Marandy, 2012
Benjamin Foehrman, 1991
Rudolph Forchheimer, 1997
Alan Forman, 2005
Reinhard Frank, 2004
Benjamin Free, 1991
Joseph Freed, 1998
David Friedman, 2001
Jerry Freedman, 1993
Michael Frieze, 2000
Michael Fuerst, 2010
Samuel Fryer, 1959

I
Isaac Dvoretzky, 2006
Zvi Dvoriesky, 1993
Dr Isaac Dvoretsky, 2006
Louis Edelstein, 1995
Dr George Elbaum, 2016
Anna Jehiel R. Elyachar, 1963
Rita Emerson, 2016
J. Steven Emerson, 2008
Dr Joseph N. Epel, 1987
Carol B. Epstein, 2009
Alex J. Etkin, 1995
Aaron Etra, 2004
Joseph K. Even, 1991

J
Yukietul Federmann, 1978
Israel Feldman, 1992
Rod Feldman, 2014
Elias Fife, 1955
Ruben Finkelstein, 1985
Fausta Finzi Carlí, 2011
Edith Fischer, 2001
Ruth Elaine Flinkman-Marandy, 2012
Benjamin Foehrman, 1991
Rudolph Forchheimer, 1997
Alan Forman, 2005
Reinhard Frank, 2004
Benjamin Free, 1991
Joseph Freed, 1998
David Friedman, 2001
Jerry Freedman, 1993
Michael Frieze, 2000
Michael Fuerst, 2010
Samuel Fryer, 1959

K
Martin Jelin, 1985
Ludwig Jesselson, 1973
Anatol Josepho, 1980
Prof. Eliahu I. Jury, 2001
D. Dan Kahn, 2006
Shmuel Kantor, 1989
Daniel Karp, 1994
Eyal Kaplan, 2016
Dr Albert A. Kaufman, 1991
Dorothy Kellner, 1999
Leon Kempler OAM, 2008
Adelaide Kennedy Leigh, 1991
Michael Kennedy Leigh, 1975
Avi Kerbs, 2015
Nathan Kirsch, 1984
Michael Klein, 2010
Philip E. Klein, 1998
Stephen B. Klein, 2016
Sidney Konigsberg, 1997
Alexander Konoff, 1949
Richard Aaron Koplow, 1992
Yaakov Kerner, 2005
Abba Kramer, 1988
Theodore Krengel, 1984
Reuben Kunin, 1991

L
Yesayahu Landau, 1992
Ing. Zvi Langer, 2000
Dr Joseph N. Epel, 1987
Carol B. Epstein, 2009
Alex J. Etkin, 1995
Elias Fife, 1955
Ruben Finkelstein, 1985
Fausta Finzi Carlí, 2011
Edith Fischer, 2001
Ruth Elaine Flinkman-Marandy, 2012
Benjamin Foehrman, 1991
Rudolph Forchheimer, 1997
Alan Forman, 2005
Reinhard Frank, 2004
Benjamin Free, 1991
Joseph Freed, 1998
David Friedman, 2001
Jerry Freedman, 1993
Michael Frieze, 2000
Michael Fuerst, 2010
Samuel Fryer, 1959

M
Louis Bernard Magil, 1983
Alexandre Mallat, 1997
Hal Marcus, 2006
William Marcus, 1996
Dr Shlomo Markel, 2016
Sonia Marshak, 2015
Justice Roy Matas, 1981
Frank G. Meyer, 2002
Pearl Milch, 1980
Raphael Mishan, 2012
Dr Hyman Mitchner, 2003
Leon Molleson, 1989
Monte Monaster, 1989
Mark Moshevicz, 1983
Prof. Burkhart Müller, 2001

N
Ernest Nathan, 1982
Albert Neren, 1992
Tzvi Neta, 2009
Albert Newman, 1989
Yehezkel Nussbaum, 1996

O
Seniel Ostrow, 1982

P
Daniel Peltz, 2014
Lois Peltz, 2000
David Polak, 2001
Herbert W. Pollack, 2004
Allen Prince, 2015
Miriam Pushkar, 2000

R
Judge Leonard Rabinowitz, 1984
Norbert M. Rand, 1997
Bennett Rechler, 2009
Hannah Rechler Rabinowitz, 2009
Arnold Recht, 1994
Hershel Rich, 1992
Eugene N. Riesman, 1986

S
Joan Goldberg Arbuse, 1982
Nathan Goldberg, 1977
Joan Goldberg Arbuse, 1982
Justice (Ret.) Tova Strassberg-Cohen, Israel
Ing. Isaac Eddie Streifler-Shavit, Israel
Stefan Sturesson, Sweden
Prof. Dr. Roderich Suessmuth, Germany
Ing. Sandor Szego, Brazil
Prof. Zehev Tadmor, Israel
Ira Taub, USA
Irwin Tauben, Canada
Gideon Tolkowsky, Israel
Itzhak Torgeman, Israel*
Oded Tyrah, Israel
Pim Van Den Dam, Netherlands
Dr Yossi Vardi, Israel
John Veronis, USA
Dan Vilenski, Israel
Dr Andrew Viterbi, USA
Dr Kobi Vortman, Israel
Naftali Weitman, Israel
Eyal Waldman, Israel
Prof. Dr Peter Weinberger, Austria
Naftali Weitman, Israel
Eitan Wertheimer, Israel
Avigdor Willenz, Israel
Andrea Wolfe, USA
Ben Wygodny, Canada
Danny Yamin, Israel
Maj. Gen. (Res.) Shlomo Yanai, Israel
Elisha Yanay, Israel
Chaim Yaron, Israel*
Dr Giora Yaron, Israel
Imad Younis, Israel*
Yehuda Zisapel, Israel
Zohar Zisapel, Israel
Miriam Ziv, Israel*
Dr Amir Ziv-Av, Israel

ALTERNATE MEMBERS

Jacques Benkoski, USA
Jack Bensimon, Canada
Serge Bitboul, France
James Blum, USA
Steve Bramson, Canada
Julian Brass, Canada
Marilyn Caplovitz, USA
Neil Closer, Canada
Steve Ekstein, Canada
George Elbaum, USA
Rita Emerson, USA
Rod Feldman, USA
Gill Fishman, USA
Laura Flug, USA
Joseph Freed, USA
David Friedman, USA
Harold Garfinkel, Canada
Dr Harry Handelsman, USA
Tamara Handelsman, USA
Jon Hirschlick, USA
Evert Jonsson, Sweden
Tommy Klaztkow, Sweden
William Marcus, USA
Steve Merling, Canada
Ruth Owades, USA
Beth Periman, USA
Herbert Pollack, USA
Paul Raducanu, Canada
Bennett Rechler, USA
David Ronn, USA
Joshua Ruch, USA
Julia Ruch, USA
Andrea Rush, Canada
Les Seskin, USA
Eugene B. Shapiro, USA
Cindy Sipkin, USA
Lawrence Sipkin, USA
Jozef Stern, Sweden
Bruce Whizbin, USA
Roma Witcoff, USA
Dr Frank Witte, Germany

HONORARY LIFE MEMBERS

Moshe Arens, Israel
Evelyn Berger, USA
Paul Bernstein, USA
Dr Joel Birnbaum, USA
Dr ilan Blech, USA
Robert Brand, USA
Leona Chanin, USA
Jack Chisin, Canada
Frances Cohen, Canada
Sydney C. Cooper, Canada
Elizabeth Corob, UK
Jeanette Dankner, Israel
Richard Davison, USA
Michael Dresner, Israel
Prof. Jerome Drexler, USA
Prof. George Feher, USA
Israel Feldman, USA
Meyer Frank G., USA
Dr Avi Friedman, Canada
Michael Frieze, USA
Sofia L. de Grimberg, Argentina
Gary Gross, USA
Jack Hahn, Canada
Louis N. Harris, UK
Dr Michael Helper, Canada
Dr Christian Hodler, Germany
Charles Housen, USA
Ivonicy B. Ischpke, Brazil
Maggie Kaplan, USA
Barbara Kay, USA
Nathan Kirsh, South Africa
Stephen B. Klein, USA
Theodore H. Krengel, USA
Ing. Zvi Langer, Israel
Alexander Lidow, USA
Bernard Mars, USA
Louis Milgrom, USA
Jonathan Mitchell, USA
Dr Hyman Mitchner, USA
Bennett Nathanson, USA
Ruth Leventhal Nathanson, USA
Parviz Nazarian, USA
Justice Shoshana Netanyahu, Israel
Prof. Dr Ewald Nowotny, Austria
Samuel Pisar, France
Rachel Pollak, Israel
Eugene Riesman, Canada
Morris Rochlin, USA
Barrie Rose, Canada
Daniel Rose, USA
Elihu Rose, USA
Shmuel Rotem, Israel
Eric Samson, South Africa
Paul Shatz, USA
Sholom Shefferman, USA
Harry Sheres, Canada
Emanuel Shimon, Israel
Abe Simkin, Canada
Janey Sweet, USA
Bernice Tanenbaum, USA
Joseph Taub, USA
Gen. (Res.) Dan Tolkowsky, Israel
Lucy Ullmann, USA
Yona Uspiz, Israel
François Wasservogel, France
Mary Werksman, USA
Stef Wertheimer, Israel
deEstelle Yach, South Africa
Ruth Ziegler, USA
Robert Zinn, USA

REPRESENTATIVES OF GROUPS AND ORGANIZATIONS

JEWISH AGENCY
Alan Hoffman

ASSOCIATION OF ENGINEERS AND ARCHITECTS
Simcha Afek
Amnon Bartal
Emanuel Zvi Liban

ISRAEL ACADEMY OF SCIENCES AND HUMANITIES
Prof. Yaron Silberberg

ALUMNI ASSOCIATION
Eyal Kaplan*
Dr Ilana Maor
FAST FACTS 2017

FOUNDED: 1912
STUDENT POPULATION: 14,538
ACADEMIC DEPARTMENTS: 18
UNDERGRADUATE PROGRAMS: 50
GRADUATE PROGRAMS: 83
DEGREES AWARDED: 110,634
FACULTY: 556
TECHNICAL AND ADMINISTRATIVE STAFF: 1,083
RESEARCH CENTERS: 60
BUILDINGS ON CAMPUS: 95
BUILT-UP AREA: 490,719 m²
DORMITORY BEDS: 4,918

DEGREES AWARDED (GRADUATES)

<table>
<thead>
<tr>
<th>Program</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's</td>
<td>1,911</td>
<td>1,951</td>
</tr>
<tr>
<td>MD</td>
<td>134</td>
<td>146*</td>
</tr>
<tr>
<td>Master's</td>
<td>801</td>
<td>894</td>
</tr>
<tr>
<td>PhD</td>
<td>205</td>
<td>243</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,051</td>
<td>3,234</td>
</tr>
</tbody>
</table>

TOTAL DEGREES AWARDED (1924–2017)

<table>
<thead>
<tr>
<th>Program</th>
<th>1924–2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's</td>
<td>80,761</td>
</tr>
<tr>
<td>MD</td>
<td>2,713</td>
</tr>
<tr>
<td>Master's</td>
<td>21,785</td>
</tr>
<tr>
<td>PhD</td>
<td>5,375</td>
</tr>
<tr>
<td>TOTAL</td>
<td>110,634</td>
</tr>
</tbody>
</table>

* Including 29 on the Technion American Medical School Program

TOTAL STUDENT POPULATION

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>13,253</td>
</tr>
<tr>
<td>2014</td>
<td>13,731</td>
</tr>
<tr>
<td>2015</td>
<td>13,926</td>
</tr>
<tr>
<td>2016</td>
<td>14,286</td>
</tr>
<tr>
<td>2017</td>
<td>14,538</td>
</tr>
</tbody>
</table>

* Including 238 MBA students, 104 of whom are externally funded
** Including 501 MD 4th-6th year students, 135 of whom are on the Technion American Medical School Program
*** Applied Mathematics; Autonomous Systems & Robotics; Biotechnology; Design & Manufacturing Engineering; Energy; Polymer Engineering; Nanoscience & Nanotechnology; Real Estate Studies; Systems Engineering; Urban Engineering; and Vehicle Systems Engineering

All data correct to May 1st, 2017
FISCAL OVERVIEW

INCOME

Thousands of NIS  %
Government Allocation 1,007,235 69.2
Self Income 223,765 15.4
Tuition Fees 124,000 8.5
Technion Societies 69,500 4.8
Deficit 30,100 2.1
Total Income 1,454,600 100%

EXPENDITURE

Staff Emoluments 749,303 51.5
Pension Payments 275,916 19.0
Operating Expenses 197,615 13.6
Maintenance 120,494 8.3
Student Aid 111,272 7.6
Total Expenditures 1,454,600 100%

(*) The actuarial liability of the Technion as of September 30, 2016 was NIS 7.3 billion.
The consolidated liability (Technion and TRDF) is NIS 7.9 billion.

TOTAL INCOME FROM TECHNION SOCIETIES ($US M)

86.8 57.6 74.0 84.4 97.8 104.2 108.1

SPONSORED RESEARCH FROM EXTERNAL SOURCES ($US M)

86.9 83.8 86.3 83.3

TECHNION INVESTMENT

Millions of NIS  %
CPI Linked Investments 3,439 55
Stocks 1,667 27
Shekel Unlinked Investments 648 10
Foreign Currency Investments 509 8
Total 6,263 100%

DEVELOPMENT EXPENDITURE ($US M)

57.9 65.7 42.5 26.4 31.1 35.0 43.6

DEVELOPMENT EXPENDITURE 2015/2016

October 1, 2015 - September 30, 2016

Thousands of $US  %  Thousands of NIS*
Buildings, Renovations & Infrastructure 24,438 56.1 94,950
Multidisciplinary Research Centers 14,571 33.4 55,795
Laboratories & Equipment 4,585 10.5 17,793
Total 43,594 100% 168,538

* $US 1 = 3.758 NIS
LEADERSHIP

Lawrence Jackier
Chairman of the Board of Governors

Gideon Frank
Chairman of the Council

Prof. Peretz Lavie
President

Prof. Adam Shwartz
Senior Executive Vice President

Prof. Hagit Attiya
Executive Vice President for Academic Affairs

Prof. Wayne Kaplan
Executive Vice President for Research

Matanyahu Englman
Executive Vice President and Director General

Prof. Boaz Golany
Vice President for External Relations and Resource Development

DEANS

Dean of Undergraduate Studies
Prof. Orit Hazzan

Dean of the Jacobs Graduate School
Prof. Dan Givoli

Dean of the Azrieli Division of Continuing Education and External Studies
Prof. Zeev Gross

Dean of Students
Prof. Benveniste Natan

ACADEMIC HEADS

Faculty of Aerospace Engineering
Prof. Yaakov Cohen

Faculty of Architecture and Town Planning
Prof. Iris Aravot

Faculty of Biology
Prof. Yehuda Assaraf

Faculty of Biotechnology and Food Engineering
Prof. Marcelle Machluf

Wolfson Faculty of Chemical Engineering
Prof. Gideon Grader

Schulich Faculty of Chemistry
Prof. Noam Adir

Faculty of Civil and Environmental Engineering
Prof. Oded Rabinovitch

Faculty of Computer Science
Prof. Ira Yavneh

Faculty of Education in Science and Technology
Prof. Yehudit Judy Dori

Viterbi Faculty of Electrical Engineering
Prof. Ariel Orda

Department of Humanities and Arts
Prof. Efraim Lev

Davidson Faculty of Industrial Engineering and Management
Prof. Avishai Mandelbaum

Faculty of Materials Science and Engineering
Prof. Eugen Rabkin

Faculty of Mathematics
Prof. Eli Aljadeff

Faculty of Mechanical Engineering
Prof. Yoram Halevi

Rappaport Faculty of Medicine
Prof. Shimon Marom

Faculty of Physics
Prof. Assa Auerbach

Guangdong Technion-Israel Institute of Technology
Vice Chancellor, Distinguished
Prof. Aaron Ciechanover

Joan and Irwin Jacobs Technion-Cornell Institute
Prof. Ron Brachman

Assistant to the President for Strategic Projects and Technion International
Prof. Paul Feigin

Technion Program for Excellence
Prof. Michael Elad

Center for Pre-university Education
Prof. Dan Zilberstein

ADDITIONAL OFFICERS

Deputy Senior Vice President
Prof. Daniel Rittel

Deputy Vice President for Research
Prof. Anath Fischer

Deputy Vice President for Research for the Pre-Clinical Research Authority
Prof. Jackie Schiller

Deputy Vice President for Academic Affairs
Prof. Avi Ostfeld

Deputy Vice President for Computing and Information Systems
Prof. Reuven Cohen

Deputy Vice President for Safety Matters
Prof. Yaakov Mamane

Deputy Director General for Finance
Dganit Shindelman

Deputy Director General for Human Resources
Ariel Hazan

Deputy Director General of Operations
Zehava Laniado
### ACADEMIC FACULTY 2017

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Individuals</th>
<th>Full Time Equivalents (FTEs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Professor</td>
<td>228</td>
<td>228</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>148</td>
<td>147</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>159</td>
<td>157</td>
</tr>
<tr>
<td>Lecturer</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Others</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>556</td>
<td>552</td>
</tr>
<tr>
<td>Clinical Track Appointments</td>
<td>310</td>
<td>121</td>
</tr>
<tr>
<td>External Adjuncts</td>
<td>904</td>
<td>277</td>
</tr>
</tbody>
</table>

### NEW FACULTY APPOINTMENTS

#### AEROSPACE ENGINEERING
- Dan Michaels
  - Lecturer

#### ARCHITECTURE AND TOWN PLANNING
- Danny Broitman
  - Assistant Professor
- Ruth Liberty-Shalev
  - Assistant Professor
- Aaron Sprecher
  - Associate Professor
- Ezri Tarazi
  - Professor

#### BIOMEDICAL ENGINEERING
- Yoav Shechtman
  - Assistant Professor

#### CIVIL AND ENVIRONMENTAL ENGINEERING
- Adi (Ish Am) Radian
  - Assistant Professor
- Semion Zhutovsky
  - Assistant Professor

#### CHEMICAL ENGINEERING
- Tamar Segal-Peretz
  - Assistant Professor

#### CHEMISTRY
- Nadav Amdursky
  - Assistant Professor
- David Eisenberg
  - Assistant Professor

#### ELECTRICAL ENGINEERING
- Ariel Epstein
  - Assistant Professor
- Omer Bobrowski
  - Assistant Professor
- Anat Levin
  - Associate Professor

#### INDUSTRIAL ENGINEERING AND MANAGEMENT
- Dan Garber
  - Assistant Professor

#### MEDICINE
- Gidon Berger
  - Clinical Lecturer
- Shai Berlin
  - Assistant Professor
- Ilan Bruchim
  - Assistant Professor
- Michal Cohen
  - Lecturer
- Eyal Gottlieb
  - Professor
- Noam Kaplan
  - Assistant Professor
- Dean Keren
  - Clinical Assistant Professor
- Irena Kessel
  - Clinical Lecturer
- Raz Palty
  - Assistant Professor
- Ruth Perets
  - Lecturer
- Ze’ev Ronai
  - Professor
- Tzofnat Weiner
  - Clinical Lecturer
- Hagai Wolfensohn
  - Assistant Professor

#### PHYSICS
- Itai Arad
  - Assistant Professor
- Guy Bonin
  - Assistant Professor
- Vincent Desjacques
  - Assistant Professor
- Ari Turner
  - Associate Professor
INTERNATIONAL AWARDS AND HONORS

ACM
Edsger W. Dijkstra Prize in Distributed Computing
Prof. Alon Itai
Faculty of Computer Science
“A Fast and Simple Randomized Parallel Algorithm for the Maximal Independent Set Problem”

AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS AND SCIENTISTS
International Honorary Member Award
Assoc. Prof. Eran Friedler
Faculty of Civil and Environmental Engineering

AMERICAN INSTITUTE OF ARCHITECTS LOS ANGELES CHAPTER
2016 AIALA Design Award
Assoc. Prof. Aharon Shprecher
Faculty of Architecture and Town Planning

AMERICAN SOCIETY OF CIVIL ENGINEERS
Environmental Water Resources Institute Service to the Profession Award
Prof. Avi Ostfeld
Faculty of Civil and Environmental Engineering

ASME
Mayo D. Hersey Award
Prof. Emeritus Izhak Etzion
Faculty of Mechanical Engineering
“in recognition of distinguished and continued contributions over a substantial period of time to the advancement of the science and engineering of tribology”

COLLOQUIUM ON STRUCTURAL INFORMATION AND COMMUNICATION COMPLEXITY
2017 SIROCCO Prize for Innovation in Distributed Computing
Prof. Shmuel Zaks
Faculty of Computer Science

EUROPEAN SOCIETY FOR SIGNAL PROCESSING
EURASIP Fellow
Prof. Yonina Eldar
Viterbi Faculty of Electrical Engineering

IEEE
AI’S 10 to Watch
Asst. Prof. Reshef Meir
Davidson Faculty of Industrial Engineering and Management
Fellows
Prof. Dov Dori
Davidson Faculty of Industrial Engineering and Management
“for contributions to model-based systems engineering and document analysis recognition”
Prof. Israel Cidon
Viterbi Faculty of Electrical Engineering
“for contributions to high-speed packet network, network-on-chip and wide area files systems”
Richard W. Hamming Medal
Distinguished Prof. Shlomo Shamai
Viterbi Faculty of Electrical Engineering

INFORMATION AND COMMUNICATION COMPLEXITY

INSTITUTION OF CHEMICAL ENGINEERS
Dhirubhai Ambani Resource-Poor People Award
Prof. Hossam Haick
Wolfson Faculty of Chemical Engineering and Russell Berrie Nanotechnology Institute

MARINE BIOLOGICAL LABORATORY, WOODS HOLE
University of Chicago Distinguished Scientist
Distinguished Prof. Avram Hershko
Rappaport Faculty of Medicine
“for his studies at the Laboratory defining the role of ubiquitin-mediated protein degradation in the cell division cycle”

REPUBLIC OF FRANCE
Legion d’honneur
Distinguished Prof. Dan Shechtman
Faculty of Materials Science and Engineering

SIAM: SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS
Outstanding Paper Prize
Joseph (Seffi) Naor and Roy Schwartz
Faculty of Computer Science
“A Tight Linear Time (1/2)-Approximation for Unconstrained Submodular Maximization”

The SIAM Activity Group on Optimization (SIAG/OPT) Prize
Asst. Prof. Shoham Sabach
Davidson Faculty of Industrial Engineering and Management

SOCIETY OF AUTOMOTIVE ENGINEERS
Fellow
Dr Leonid Tartakovsky
Faculty of Mechanical Engineering

SOCIETY OF MELANOMA RESEARCH
Lifetime Achievement Award
Prof. Ze’ev Ronai
Rappaport Faculty of Medicine
“for his significant contributions to melanoma research that are advancing understanding of this deadly form of skin cancer and could lead to new treatments”

SPINOFF.COM
SPIN-OFF Award
Prof. Hossam Haick
Wolfson Faculty of Chemical Engineering and Russell Berrie Nanotechnology Institute
“for his tremendous contribution to the diagnosis of diseases through innovative markers that he discovered in his research at Technion”

THOMSON-REUTERS
Highly Cited Researcher 2016
Prof. Michael Elad
Faculty of Computer Science
Distinguished Prof. Shlomo Shamai
Viterbi Faculty of Electrical Engineering

INFORMS
Khachiyan Prize
Prof. Emeritus Aharon Ben-Tal
Davidson Faculty of Industrial Engineering and Management
HORIZON 2020: THE EU FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

ERG ADVANCED GRANTS

Prof. Yuval Ishai
Faculty of Computer Science

Prof. Moshe Tennenholtz
Davidson Faculty of Industrial Engineering and Management

ERG PROOF OF CONCEPT (POC) GRANTS

Prof. Yehuda Kalay
Faculty of Architecture and Town Planning

Assoc. Prof. Avner Rothschild
Faculty of Materials Science and Engineering

Assoc. Prof. Yuval Shaked
Rappaport Faculty of Medicine

Assoc. Prof. Eran Yahav
Faculty of Computer Science

Prof. Eli Ben Sasson
Faculty of Computer Science

ERG STARTING GRANTS

Asst. Prof. Mirela Ben-Chen
Faculty of Computer Science

Assoc. Prof. Tomer Shlomi
Faculty of Computer Science

ISRAELI AWARDS AND HONORS

AZRIELI FOUNDATION
Azrieli Fellows

Asst. Prof. Noam Kaplan
Rappaport Faculty of Medicine

Asst. Prof. Michael Khanevsky
Faculty of Mathematics

Asst. Prof. Tamar Segal-Peretz
Wolfson Faculty of Chemical Engineering

COUNCIL FOR HIGHER EDUCATION
Allon Fellows

Asst. Prof. Yuval Filmus
Faculty of Computer Science

Asst. Prof. Tzipi Horowitz-Kraus
Faculty of Education in Science and Technology

Asst. Prof. Reshef Meir
Davidson Faculty of Industrial Engineering and Management

Asst. Prof. Tomer Michaeli
Viterbi Faculty of Electrical Engineering

Asst. Prof. Yonatan Savir
Rappaport Faculty of Medicine

Shosh Berlinsky-Sheinfeld Excellence Award for Academic-Community Involvement

Prof. Rachel Kallus
Faculty of Architecture and Town Planning

ISRAEL CHEMICAL SOCIETY
Technological Innovation Award

Prof. Timor Baasov
Schulich Faculty of Chemistry

ISRAEL SOCIETY FOR NEUROSCIENCE
Sir Bernard Katz Award

Asst. Prof. Omri Barak
Rappaport Faculty of Medicine

ISRAEL VACUUM SOCIETY
IVS Excellence Award for Research

Prof. Efrat Lifshitz
Schulich Faculty of Chemistry

THE ISRAEL YOUNG ACADEMY OF SCIENCE
Elected Members

Assoc. Prof. Ayelet Baram-Tsabari
Faculty of Education in Science and Technology

Prof. Roy Kishony
Faculty of Biology

MINISTRY OF HEALTH
Lifetime Achievement Award

Prof. Eliezer Shalev
Rappaport Faculty of Medicine

MUNICIPALITY OF HAIFA
Citizen of Merit Award

Prof. Emeritus Moshe Eizenberg
Faculty of Materials Science and Engineering

NATIONAL UNION OF STUDENTS
Inspiring Lecturer Award

Dr. Muhammed Akashe
Faculty of Physics

Dr. Aviv Censor
Faculty of Mathematics
AWARDS & HONORS 2016/2017*

ISRAELI AWARDS AND HONORS

THE MARKER
40 Most Promising under 40 in Israel
Asst. Prof. Yonatan Savir
Rappaport Faculty of Medicine

WOLF FOUNDATION
2017 Krill Prize for Excellence in Scientific Research
Asst. Prof. Carmel Rotschild
Faculty of Mechanical Engineering
Asst. Prof. Asya Rolls
Rappaport Faculty of Medicine
Asst. Prof. Avi Schroeder
Wolfson Faculty of Chemical Engineering

YAD HANADIV (ROTHSCHILD FOUNDATION)
Michael Bruno Memorial Award

Prof. Roy Kishony
Faculty of Biology

TECHNION AWARDS AND CHAIRS

COOPER AWARDS FOR EXCELLENCE IN RESEARCH
Assoc. Prof. Amir YehudaYoff
Faculty of Mathematics
"for application of ideas from mathematics to study theoretical aspects of computation"

Assoc. Prof. Eran Yahav
Faculty of Computer Science
"for developing techniques that change the way software is constructed"

ALEXANDER GOLDBERG RESEARCH PRIZE
Asst. Prof. Guy Bartal
Viterbi Faculty of Electrical Engineering

HENRI GUTWIRTH FOUNDATION RESEARCH GRANTS
Asst. Prof. Yuval Cassuto
Viterbi Faculty of Electrical Engineering
"Re-Write Codes for Multi-Level Memories"

Asst. Prof. Oded Amir
Faculty of Civil and Environmental Engineering
"Computational approaches for optimal design of aviation structures fabricated by additive manufacturing in Titanium"

Dr Beni Cukurel
Faculty of Aerospace Engineering
"Acoustic Resonance Excited Heat Exchanger"

UZI AND MICHAL HALEVY INNOVATIVE APPLIED ENGINEERING AWARD AND RESEARCH GRANTS (2016)
Assoc. Prof. Ori Lahav
Faculty of Civil and Environmental Engineering

Asst. Prof. Matthew Suss
Faculty of Mechanical Engineering

Prof. Nir Tessler
Viterbi Faculty of Electrical Engineering

JULUDAN RESEARCH PRIZE (2016)
Assoc. Prof. Ayelet Fishman
Faculty of Biotechnology and Food Engineering

The Sanford Kaplan Prize for Creative Management in 21st Century High Technology
Assoc. Prof. Mark Gandelman, Alexander Artaryan, and Dr Gennady Nisnevich
Schulich Faculty of Chemistry
"Innovative Solutions in Bromination Processes"

RAYMOND AND MIRIAM KLEIN RESEARCH PRIZE
Assoc. Prof. Dan Tsafrir
Faculty of Computer Science
"for groundbreaking achievements in understanding the atomistic and microstructure of biogenic material"

NORMAN SEIDEN PRIZE FOR ACADEMIC EXCELLENCE
Assoc. Prof. Boaz Pokroy
Faculty of Materials Science and Engineering
"for work on specific stages of the gene expression system, for example, transcription and translation"

DIANE SHERMAN PRIZE FOR MEDICAL INNOVATIONS FOR A BETTER WORLD
Prof. Mordechai Choder
Rappaport Faculty of Medicine
"for investigating the endogenous pain inhibitory system"
DANIEL SHIRAN MEMORIAL PRIZE
Asst. Prof. Shelly Tzlil
Faculty of Mechanical Engineering

HENRY TAUB PRIZES FOR ACADEMIC EXCELLENCE (2016)
Prof. Idit Keidar
Viterbi Faculty of Electrical Engineering
Prof. Assaf Schuster
Faculty of Computer Science
Assoc. Prof. Doron Shilo
Faculty of Mechanical Engineering
Assoc. Prof. Eldad Yechiam
Davidson Faculty of Industrial Engineering and Management

MOSHE YANAI AWARDS FOR EXCELLENCE IN EDUCATION (2016)
Faculty Prize: Biotechnology and Food Engineering
Assoc. Prof. Oded Amir
Faculty of Civil and Environmental Engineering
Asst. Prof. Guy Bartal
Viterbi Faculty of Electrical Engineering
Prof. Eli Biham
Faculty of Computer Science
Dr Ari Gero
Faculty of Education in Science and Technology
Prof. Ron Holtzman
Faculty of Mathematics
Prof. Sima Yaron
Faculty of Biotechnology and Food Engineering

KURT MAHLER PRIZE FUND IN MATHEMATICS
Asst. Prof. Uri Shapira
Faculty of Mathematics
"Integer points on spheres and their orthogonal lattices"

LEADERS IN SCIENCE AND TECHNOLOGY AND CAREER ADVANCEMENT CHAIRS
Career Advancement Chair at the Technion
Asst. Prof. Yoav Schechtman
Faculty of Biomedical Engineering
Chaya Career Advancement Chair
Asst. Prof. Nadav Amdursky
Schulich Faculty of Chemistry
Deloro Career Advancement Chair
Asst. Prof. Adi (Ish Am) Radian
Faculty of Civil and Environmental Engineering
Horev Fellows
Asst. Prof. Michael Khanevsky
Faculty of Mathematics
Asst. Prof. Tamar Segal-Peretz
Wolfson Faculty of Chemical Engineering
Jack Klein Career Advancement Chair
Prof. Ze’ev Ronai
Rappaport Faculty of Medicine
Taub Fellows
Asst. Prof. Noam Kaplan
Rappaport Faculty of Medicine
Assoc. Prof. Anat Levin
Viterbi Faculty of Electrical Engineering
Women’s Division Career Advancement Chair
Asst. Prof. Raz Palty
Rappaport Faculty of Medicine

NEW CHAIR INCUMBENTS
American Technion Society
Academic Chair
Prof. Avi Ostfeld
Faculty of Civil and Environmental Engineering
Prof. Ayellet Tal
Viterbi Faculty of Electrical Engineering
Bernard Elkin Chair in Computer Sciences
Prof. Tuvi Etzion
Faculty of Computer Science
Feldman Family Chair in Computer Sciences
Prof. Dan Geiger
Faculty of Computer Science
Benno Gitter and Ilana Ben Ami Chair in Biotechnology
Prof. Marcelle Machluf
Faculty of Biotechnology and Food Engineering
David HaCohen and Hillel Dan Academic Chair
Prof. Aviad Shapira
Faculty of Civil and Environmental Engineering
Dr Joel Hamburger Chair in Clinical Thyroidology
Prof. Yedidia Bentur
Rappaport Faculty of Medicine
Albert and Anne Mansfield Chair in Water Science and Technology
Prof. Ori Lahav
Faculty of Civil and Environmental Engineering
Lily and Silvian Marcus Chair in Life Science
Prof. Jackie Schiller
Rappaport Faculty of Medicine

NEW CHAIR INCUMBENTS
Pearl S. Milch Chair in Biomedical Engineering Sciences
Prof. Noam Ziv
Rappaport Faculty of Medicine
Laura and Isaac Perlmutter Chair of Cancer
Prof. Eyal Gotlieb
Rappaport Faculty of Medicine
Ruben and Tallu Rosen Chair in Solid State Physics
Prof. Dan Ritter
Viterbi Faculty of Electrical Engineering
Pearl Seiden Chair in Sciences
Prof. Shimon Marom
Rappaport Faculty of Medicine
Beatrice Sensibar Chair in Environmental Engineering
Prof. Per-Olof Gutman
Faculty of Civil and Environmental Engineering
Stanley and Sylvia Shirvan Chair in Cancer and Life Sciences
Prof. Shulamit Levenberg
Faculty of Biomedical Engineering
Philip Tobias Chair in Material Sciences
Prof. Yair Ein-Eli
Faculty of Materials Science and Engineering
Chil and Berta Weissman Chair in Personalized Medicine
Prof. Ze’ev Ronai
Rappaport Faculty of Medicine
It all began in 2005. Technion students Eyal Cohen and Tomer Wassermann from the Mechanical Engineering faculty and Matan Orian and Dvir Dukhan of Industrial Engineering and Management took on the challenge to build a Rube Goldberg machine that lights the Chanukah menorah, as a Technion celebration of the festival of lights in Israel. This led to a Technion Rube Goldberg machine for Passover, which led to hundreds of Rube Goldberg imaginative creations from high-schools from around the world.

Earth Day, Independence Day, you name it, all have found creative expressions through the legendary domino outreach program expressed at Technion. Check the Technion YouTube channel to enjoy the rides through ingenuity, creativity and above all connectivity, as one thing, leads to another and imagination encircles the world.