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About the Weizmann Institute of Science

The Weizmann Institute of Science is one of the world's leading multidisciplinary basic research institutions in the natural and exact sciences. The Institute's five faculties Biology, Biochemistry, Chemistry, Physics, Mathematics and Computer Science are home to scientists and students who embark daily on fascinating journeys into the unknown, seeking to improve our understanding of nature and our place within it. The Institute has been the venue of pioneering research in neuroscience, nanotechnology and alternative energy, the search for new ways of fighting disease and hunger and creating novel materials and developing new strategies for protecting the environment. Mathematicians and computer scientists working together with biologists are uncovering unseen patterns in everything from our DNA to the ways our cells age to personal nutrition. From participating in the discovery of the Higgs boson at CERN to joining in scientific missions to the planets in our solar system, Weizmann Institute researchers are helping lead international science. The campus comprises of 1.1sq km (280 acres) and includes over 240 buildings, research facilities, administration and housing; 2,500 faculty and staff; 1,400 students and postdocs Research volume annually is of more than $100m total worth of grants for Weizmann Institute research projects.

Faculty of Biology

Department of Neurobiology

Department Head: Prof. Elad Schneidman

Research in Neuroscience in the Department of Neurobiology encompasses a wide variety of subjects, in areas including cellular and molecular biology, neuroanatomy, functional magnetic resonance imaging (fMRI), physiology, pharmacology, psychophysics, and computational sciences.

Basically, the research of the various groups of the Department covers, among others, the following topics: Analysis of the molecular and cellular basis of neuronal and synaptic function. Imaging of neuronal activity underlying higher brain functions. Tracing and characterization of neuronal communication profiles. Characterization of the CNS response to trauma and lesion; developing molecular and cellular therapeutic agents. Determination of the underlying processes and mechanisms of vision, perception, learning, and memory in behaving rodents and primates. Computer modeling of brain function. At the Neurobiology Department, the structure, function, development, and plasticity of the nervous system are studied at various levels of analysis, using different types of cell and experimental animal models. The groups studying neuronal function at the molecular and cellular levels use *in vitro* systems ranging from non-neuronal and neuronal cell lines to primary neuronal and glial cells of cerebellar, hippocampal and cortical origin. In many cases, the cells studied are transfected with genes of interest. These cell systems allow the study of the roles of various components of the nervous system, including cell surface membrane components, specific enzymes, neurotransmitters, neuromodulators, growth factors, neuroreceptors, lipid components, ionic channels and cytoskeletal constituents. Algorithms for the synaptic plasticity between neurons, and the role of dendritic ion channels in synaptic input and information processing, are also being studied. Injury models of nerve lesion and oxidative stress paradigms are applied to examine the principles of CNS regeneration, rescue from ischemia and stroke, and apoptotic cell death and senescence.

The groups studying the CNS at the system level are striving to understand the complex neuronal mechanisms underlying learning, memory, and sensory processing (vision, taste, smell), and to determine the relationship between brain and mind. Using track tracing methods, the rules governing the interconnections in the visual cortex are being unraveled. Behavioral studies focus on principles of learning and consolidation, cortical information processing, learning disabilities, and addiction. Functional brain imaging of the human visual cortex is being studied by various techniques, including fMRI. Psychophysical approaches are being used to define processes involved in image segmentation, learning and memory skill acquisition, motor control, and language. Nearly 20 groups of researchers carry out both independent studies and collaborative research with colleagues from within the Department and outside it.

Research activities

Prof. Ehud Ahissar

Prof. Yadin Dudai

Prof. Tali Kimchi

Prof. Yitzhak Koch

Prof. Ilan Lampl

Collaboration with: Heinz Beck, Bonn Alex Binshtok, Hebrew University Nicholas Priebe, Austin

Prof. Rony Paz

Dr. Michal Ramot

Dr. Michal Rivlin

Prof. Dov Sagi

Dr. Rita Schmidt

Prof. Elad Schneidman

Prof. Michal Schwartz

Collaboration with: Prof. Ido Amit

Collaboration with: Prof. Eran Elinav

Collaboration with: Prof. Naomi Habib, Hebrew University; Prof. Anna Greka, Broad Institute, Boston, USA.

Collaboration with: Prof. Judit Aaron, Rambam hospital; Prof. Falik, Hagalil Hospital.

Collaboration with: Prof. Ido Amit

Collaboration with: Dr. Yifat Marbl

Prof. Menahem Segal

Collaboration with: Dr. Eduard Korkotian

Collaboration with: Prof. Dalit Ben Yosef (TAU)

Collaboration with: Professor Elisha Moses (Physics)

Prof. Michail Tsodyks

Collaboration with: H. Markram

Collaboration with: A. Grinvald, D. Sagi

Prof. Nachum Ulanovsky

Prof. Zvi Vogel

Collaboration with: Raphael Mechoulam

Prof. Ephraim Yavin

Prof. Ofer Yizhar

Collaboration with: Moran Shalev-Benami; Mudi Sheves

Collaboration with: Alon Chen

Department of Immunology and Regenerative Biology

Department Head:

The Department of Immunology and Regenerative Biology (IRB) currently comprises 17 research groups and a total of over 200 people. We are located on the Weizmann campus in the Candiotty, Britannia and Wolfson buildings. Research activities of the IRB Department span a broad spectrum of basic and clinically relevant questions. Topics range from fundamental aspects of cancer, hematopoiesis, cell differentiation, metabolism, inter-cellular communication, extracellular matrix remodeling and the genetic and epigenetic changes that contribute to these processes. With a unique focus on immune cell development and function, we study a wide range of physiological and pathophysiological settings, including the host-pathogen interface, embryonic development, inflammation, tissue regeneration post infection and injury, and vascular and lymph angiogenesis. State-of-the-art approaches developed by our members include intra-vital and whole organ 3D imaging, multiplexed ex vivo staining, conditional gene manipulation in animal models, organoid research, advanced genomics and proteomics, and human-derived samples and their bioinformatic analysis at the single cell level. Combining pre-clinical mouse models and patient samples, we also develop novel therapeutic strategies for improved immunotherapies and vaccinations.   The main projects that are currently performed in the department are: Host-pathogen interactions - Dr. Roi Avraham

Gut tissue dynamics -Dr. Moshe Biton Studying Tissue Macrophage Function in Health and Disease - Prof. Steffen Jung Protein degradation by the ubiquitin/proteasome system - Prof. Ami Navon Vascularization during pregnancy and cancer development - Prof. Michal Neeman Leukocyte trafficking and differentiation in inflammation and cancer- Prof. Ronen Alon ECM remodeling: from biophysical principles to drug design - Prof. Irit Sagi Intracellular signaling cascades in health and disease - Prof. Rony Seger Epigenetics in stem cells and cancer: developing and applying single-molecule imaging technologies to study the epigenetic code - Dr. Efrat Shema Cellular functions of long noncoding RNAs - Dr. Igor Ulitsky The development of the vascular system - Dr. Karina Yaniv xxx -Prof. Tsvee Lapidot Growth factors and their receptors in cancer - Prof. Yossi Yarden Cellular structural biology of human amyloid proteins - Prof. Philipp Selenko xxx Prof. Benny Geiger Investigating functional, metabolic and architectural features of normal and malignant tissues with magnetic resonance techniques - Prof. Hadassa Degani The meiotic cell cycle, angiogenic events associated with follicle development and embryo plantation - Prof. Nava Dekel Investigating ovarian follicle physiology, regulation and demise in mammals with emphasis on the ovulatory response, including the control of oocyte maturation, transformation of the follicle into corpus luteum and culminating with the release of the fertilizable ovum - Prof. Alex Tsafriri Elucidation of the mechanisms by which a synthetic tolerogenic peptide ameliorates autoimmune disease manifestations in animal models and in patients with systemic lupus erythematosus (SLE) and Sjogren Syndrome - Prof. Edna Moses Recognition and Signaling by Immunoreceptors. Electron Transfer and Transport Mechanisms Through Protein Matrices - Prof. Israel Pecht

Research activities

Dr. Avraham Roi

Dr. Moshe Biton

Collaboration with: Prof. Omer Yilmaz, Prof. Eduardo Villablanca, Prof. Yinon Ben-Neriah, Prof. Steffen Yung

Prof. Hadassa Degani

Collaboration with: Dr. Talia Golan and her team, Sheba Medical Center

Collaboration with: Dr. Edna Haran,

Prof. Nava Dekel

Prof. Erez Ayelet

Collaboration with: Eytan Ruppin Uri Tabori Angel Progador

Prof. Atan Gross

Prof. Michal Neeman

Collaboration with: Prof Nava Dekel, Weizmann Prof Lucio Frydman, Weizmann Prof Joel Garbow, Washington Univ. St Louis Prof Silvio Aime, Univ Torino Prof Simcha Yagel and Dr Ofer Behavior, Hadassah Medical Center Prof Michal Kovo, Meir Medical Center Prof Tal Raz, HUJ

Prof. Irit Sagi

Prof. Rony Seger

Prof. Philipp Selenko

Collaboration with: Daniella Goldfarb, Hagen Hofmann, Ori Avinoam, Atan Gross, Ami Navon

Collaboration with: Daniella Goldfarb, Hagen Hofmann, Koby Levi

Dr. Efrat Shema

Prof. Alex Tsafriri

Collaboration with: Helena Ashkenazi, Shmulik Motola, Xiumei Cao, Malka Popliker, Seymour Pomerantz, Marco Conti, Stanford

Collaboration with: Atan Gross, KerenYacobi

Prof. Igor Ulitsky

Prof. Yosef Yarden

Collaboration with: Julian Downward Nadege Gaborit Belinda Sanchez Raya Eilam Eli Pikarsky Luis Paz-Ares

Department of Molecular Cell Biology

Department Head: Prof. Eli Keshet

The molecular mechanisms underlying cell structure, dynamics and fate, and their involvement in embryonic development and cancer are among the primary topics of interest of the Department. These include studies on the mode of action of growth factors and the nature of signals triggered by them in target cells following binding to specific surface receptors. Growth regulation is also approached through the study of suppressor genes encoding such proteins as p53, which inhibit proliferation and drive cells towards differentiation or apoptosis. These studies, focusing on the mechanisms stimulate cell proliferation, differentiation, or death, can elucidate the basis for cancerous transformation in a large variety of systems. Overproduction or hyperactivation of growth-promoting systems was shown to have an oncogenic (cancer-causing) effect, and a similar process may be induced when growth-suppressor or apoptosis-inducing genes

fail to function. The levels at which cell structure, activity and fate are studied in this department and the focus of these studies are many and diverse, including the characterization of soluble growth factors and their receptors, the nature of complex signal transduction pathways, the action of specific regulators of cytokine action, rearrangement of genes associated with oncogenic processes, and the properties of tumor suppressor and apoptosis promoting genes. Since such processes involve networks of interacting factors, we are also interested in mathematical modeling and computerized analysis of biological gene circuits.

In addition, there is broad interest in the molecular mechanisms of cell adhesion and their involvement in the regulation of cell fate. These studies include characterization of the basic rules underlying adhesive interactions, the binding of surface-associated adhesion molecules with the cytoskeleton, and the nature of growth- and differentiation-promoting signals triggered by adhesive interactions. Of special interest are proteins such as ÃŽÂ²-catenin, which play a crucial role in reinforcing cell-cell adhesions as well as triggering gene expression.

Research activities

Prof. Uri Alon

Collaboration with: Nir Friedman

Prof. Avri Ben-Ze'ev

Prof. Alexander D. Bershadsky

Prof. Eli Canaani

Prof. Benjamin Geiger

Dr. Shalev Itzkovitz

Professor Emeritus Zvi Kam

Collaboration with: Benjamin Geiger, John Sedat, David Agard (UCSF)

Prof. Valery Krizhanovsky

Collaboration with: Uri Alon

Collaboration with: Ittai Ben-Porath, Hebrew University

Collaboration with: Dr. Tal Biron-Shental, Meir Hospital

Prof. Sima Lev

Collaboration with: Thomas Karn, Eytan Ruppin, Gordon Mills, Flavio Maina, Frank Westermann, Yosef Yarden

Prof. Gil Levkowitz

Prof. Moshe Oren

Collaboration with: Prof. Michal Lotem, Hadassah Medical Center Prof. Yinon Ben-Neriah, Hebrew University Medical School

Collaboration with: Prof. Varda Rotter, Weizmann Institute; Prof. Vassilis Gorgoulis, Athens University Medical School

Prof. Varda Rotter

Prof. Yardena Samuels

Prof. Oren Schuldiner

Dr. Yonatan Stelzer

Dr. Ravid Straussman

Dr. Itay Tirosh

Collaboration with: Mario Suva, Massachusetts General Hospital. Sid Puram, Washington University.

Prof. Eldad Tzahor

Dr. Leeat Yankielowicz-Keren

Collaboration with: Prof. Michal Lotem Prof. Eli Pikarsky Dr. Jonathan Cohen Prof. Yardena Samuels Prof. Steve Hodis Prof. Scott Rodig

Collaboration with: Prof. Gerard Socie

Collaboration with: Dr. David van Valen

Prof. Yehiel Zick

Department of Immunology

Department Head: Prof. Benjamin Geiger

The immune system was originally recognized for its role in defense of the organism against pathogens, including bacteria and viruses. However, we have come to realize that the system not only reacts to exogenous pathogen attacks, but also to internal challenges posed by tissue remodeling, aging, metabolic unbalance and cancer. Moreover, immune cells are also critically involved in normal developmental processes and the maintenance of adult homeostasis in light of innocuous and beneficial environmental challenges such as the microbiome.   Research in the Department of Immunology addresses the challenge to understand contributions of immune cells to physiology and pathophysiology, with the aim to deepen our knowledge and develop new strategies for therapeutic intervention. Accordingly, our research spans a wide range from studying basic mechanisms of development, inter-cellular communication, cell trafficking and effector functions of immune cells to the definition of their specific roles in aging, autoimmune disorders, allergies and cancer.   Department members investigate cellular and molecular mechanisms underlying immune disorders, such as aging, immunodeficiencies, innate immunopathologies, autoimmunity, as well as infectious diseases. Using pre-clinical mouse models and patient samples, we develop novel therapeutic strategies including check-point blockade, immunotherapies and improved vaccination protocols. We develop and employ state-of-the-art approaches ranging from intra-vital imaging and conditional gene manipulation, to advanced bulk and single cell genomics and proteomics to uncover physiological and pathological roles of the immune system. For more details on our exciting research projects and specific groups in the Immunology Department, please see our web page https://www.weizmann.ac.il/immunology/

Research activities

Dr. Jakub Abramson

Prof. Ronen Alon

Collaboration with: Ziv Shulman (WIS) Steffen Jung (WIS)

Collaboration with: Natalio Garbi (Bonn)

Collaboration with: Moshe Biton (WIS)

Collaboration with: Steffen Jung

Collaboration with: Kristin Hogquist (U. of Minnesota, MN) Jakob Abramson (WIS)

Prof. Ido Amit

Prof. Ruth Arnon

Collaboration with: R. Aharoni

Collaboration with: R. Aharoni; M. Sela

Collaboration with: M. Sela; R. Aharoni

Collaboration with: R. Maron

Prof. Gideon Berke

Collaboration with: Hassin D. and Sevilya Z.; Assuta Ashdod Medical Center.

Prof. Irun R. Cohen

Dr. Rony Dahan

Prof. Lea Eisenbach

Collaboration with: yardena samuels, david bassan, adam solomon, esther tzehoval

Collaboration with: David Bassan

Collaboration with: Dr Gideon Gross

Prof. Eran Elinav

Prof. Steffen Jung

Collaboration with: Marco Prinz, University of Freiburg, Germany Pablo Blinder, TAU, Israel Reuven Stein, TAU, Israel Susanne Wolf, MDC, Berlin Soyon Hong, UCL, London, UK Kia Movahedi, VIB, Brussels, Belgium

Collaboration with: Avraham Yaron, Weizmann Institute

Collaboration with: Neta Shlezinger, HU Bernhard Hube,Leibniz-HKI, Jena, Germany Petra Bacher, University of Kiel, Germany

Prof. Tsvee Lapidot

Prof. Edna Mozes

Prof. Roald Nezlin

Collaboration with: No

Prof. Israel Pecht

Collaboration with: Prof. Ole Farver, U. of Copenhagen, Denmark. Prof. Scot Wherland, Washington state university, Pullman , USA.

Collaboration with: Prof. J. Abramson, WIS.

Collaboration with: Pro.Mudi Sheves, WIS. Prof. D.Cahen, WIS.

Prof. Yair Reisner

Prof. Idit Shachar

Collaboration with: Dr Michal Haran, Kaplan Medical center

Dr. Liran Shlush

Collaboration with: Amos Tanay Omar abdel Wahab Jon Dick Mark Minden Hofer Thomas Elisa Laurenti Paaladinesh Thavendiranathan Hartmut Geiger Benny Geiger Dennis Kim MÃ¼ller-Tidow, Carsten Yinon Ben Neria

Faculty of Biochemistry

Department of Biomolecular Sciences

Department Head: Prof. Ravit Dikstein

The scientific activities in the department of Biomolecular Sciences span several areas in the Life Sciences. The common thread is the study of the biochemistry of life and disease. Emphasis is given to the examination of proteins, whether soluble or membrane-bound, and their key biological functions and we seek a molecular understanding of their evolution, cellular interactions, structures and functions. A variety of biochemical, biophysical, structural, molecular-biological, and state of the art imaging methodologies are employed in our department. Overlapping interests and inter-group cooperations signify the spirit of our research. The department has more than 20 research groups whose activities are centered around the following foci of interest:

Protein science and macromolecular machines. Several groups investigate the basic principles governing protein-protein interactions; composition, assembly, and architecture of multi-enzyme and other large complexes; catalytic mechanisms and the evolution of proteins and enzymes. A major aim is to understand how the findings relate to intricate biological processes.

  DNA and regulation of gene expression. Various aspects of nucleic acids research are addressed in our department including: DNA repair and mutagenesis in mammals; basal and activated transcription; mRNA translation; specific gene expression in the pancreas; phylogenetic analysis of accumulated somatic mutations.

  Structure, function, and biogenesis of membrane proteins. We investigate important integral membrane proteins on the biochemical, biophysical, structural, and physiological levels. This includes Na+ and K+ channels, Na+/K+ ATPase and its FXYD protein regulators, multidrug transporters, intra-membrane proteases, and peptides that integrate into membranes in various systems.

  Membranes, lipids, and organelle structure, function, and biogenesis. Studies in our department include the biosynthetic pathway of membrane proteins; intracellular protein traffic, especially during the process of autophagy; lysosome biogenesis and lipid homeostasis; Calcium homeostasis; and, assembly and function of membrane proteins involved in the immune response, infectious diseases, and viral envelopes.

  Signaling within and between cells. Several researchers in the department are interested in problems related to signal transduction. Cell guidance and navigation; axon guidance; cell death and tissue damage; long distance intracellular signaling; regulation of expression of virulence factors; regulation of the circadian rhythm; epigenetic gene silencing; epigenetics and developmental regulation.

  Molecular basis of disease. Many research programs in our department involve human disorders, diseases, and syndromes. This includes inflammation, infections by various pathogens and antibiotic resistance, organophosphate detoxification, obesity and diabetes, cancer, and lysosomal storage diseases. Many of these disorders are investigated at the molecular level. A variety of methodologies are being utilized, with an emphasis on biochemistry, biophysics, molecular genetics, advanced light microscopy, computation methods, and structural tools (such as crystallography, atomic force microscope, mass spectrometry). Additional information can be obtained in the department's Home Page.

Research activities

Prof. Gad Asher

Dr. Ori Avinoam

Collaboration with:

Collaboration with: Prof. Benny Shilo

Collaboration with:

Prof. Ed Bayer

Collaboration with: Raphael Lamed, Tel Aviv University Yuval Shoham, Technion, Haifa Itzhak Mizrahi, Ben-Gurion University, Beer Sheva Oded Livnah, Hebrew University of Jerusalem Yitzhak Hadar, Hebrew University of Jerusalem Shi-You Ding, Michigan State University Nicole Koropatkin and Eric Martens, University of Michigan Rafael Bernardi, Auburn University Hermann Gaub, Ludwig Maximilian University Don C. Lamb, Ludwig Maximilian University Bryan White, University of Illinois Klaus Schulten, University of Illinois Bernard Henrissat, Marseille Mirjam Czjzek, Rostok, France Yingang Feng, Ya-Jun Liu and Qiu Cui, Qingdao, China Yannick Bomble, Martin Keller and Michael Himmel, NREL, Golden CO Victor De Lorenzo, Madrid Mariano CarriÃ³n-VÃ¡zquez, Spanish National Research Council Carlos Fonts, University of Lisbon Marek Cieplak, Polish Academy of Sciences Damien Thompson, University of Limerick Henri-Pierre Fierobe, CNRS, Marseille Harry Flint, University of Aberdeen Harry Gilbert, Newcastle University Gideon Davies, York University Dimitris Hatzinikolaou, University of Athens

Prof. Eitan Bibi

Collaboration with: Gert Bange, Marburg University, Marburg, Germany.

Prof. Rivka Dikstein

Collaboration with: Yuki Yamaguchi, Idit Shachar, Nahum Sonenberg, Yuri Svitkin, Franck Martin, Katsura Asano, Igor Ulitsky, Michael Walker, Neta Regev-Rudsky

Prof. Michael Eisenbach

Prof. Zvulun Elazar

Prof. Michael Fainzilber

Dr. Sarel-Jacob Fleishman

Collaboration with: Dan Tawfik Deborah Fass Gilad Haran Eitan Bibi

Dr. Nir Fluman

Prof. Anthony H. Futerman

Prof. Steven J.d Karlish

Prof. Zvi Livneh

Prof. David Mirelman

Collaboration with: Rivka Bracha

Collaboration with: Aharon Rabinkov, Elena Appel

Dr. Neta Regev-Rudzki

Prof. Ziv Reich

Dr. Ruth Scherz-Shouval

Prof. Yechiel Shai

Prof. Michal Sharon

Prof. Yoram Shechter

Prof. Michael Walker

Prof. David Wallach

Prof. Meir Wilchek

Collaboration with: retired, Dr. Talia Miron.

Prof. Avraham Yaron

Department of Molecular Genetics

Department Head: Prof. Yitzhak Pilpel

The molecular basis of genetics and related biological processes are under investigation in our Department. The investigators approach these processes from the most reduced

and reconstructed systems up to more systemic and computational analysis. Different organisms are employed including virus, yeast, Drosophila, mouse and human. These animal models and cell culture systems are used to study the mechanisms of;
a. Basic processes in gene expression, such as transcription, translation and protein degradation.
b. Cellular responses to various stimuli, such as cytokines, growth factors and exposure to DNA-damage.
c. Regulation of cell growth, senescence, differentiation and death.
d. Development; Mechanistic view of zygote to embryo transition and development of various organs, such as brain, muscles, bones and pancreas.
e. Genetic and acquired diseases such as cancer and virus infection. Embryonic stem cell biology, early development and advance human disease modeling.
f. Study of pluripotent stem cell biology and epigenetic reprogramming.
g. Computational and system biology. The function/evolution of genes and their diversification.

Research activities

Dr. Yaron Antebi

Prof. Eli Arama

Prof. Naama Barkai

Prof. Ari Elson

Prof. Jeffrey Gerst

Collaboration with: Prof. Robert Singer (Albert Einstein College of Medicine) Prof. Markus Landthaler (Max Delbruck Center for Molecule Medicine) Prof. Andre Levchenko (Yale University) Prof. Yitzhak Pilpel (Weizmann Institute of Science)

Dr. David Gokhman

Prof. Yoram Groner

Collaboration with: The Proprioceptive System Masterminds Spinal Alignment: Insight into the Mechanism of Scoliosis. Blecher R, Krief S, Galili T, Biton IE, Stern T, Assaraf E, Levanon D, Appel E, Anekstein Y, Agar G, Groner Y, Zelzer E. Dev Cell. 2017 Aug 21;42(4):388-399.e3. doi: 10.1016/j.devcel.2017.07.022. PMID: 28829946 Similar articles Select item 28621410 2. The Leo Sachs' legacy: a pioneer's journey through hematopoiesis. Lotem J, Groner Y. Int J Dev Biol. 2017;61(3-4-5):127-136. doi: 10.1387/ijdb.160262yg. PMID: 28621410 Similar articles Select item 28299669 3. Runx3 in Immunity, Inflammation and Cancer. Lotem J, Levanon D, Negreanu V, Bauer O, Hantisteanu S, Dicken J, Groner Y. Adv Exp Med Biol. 2017;962:369-393. doi:

10.1007/978-981-10-3233-2_23. Review. PMID: 28299669 Similar articles Select item 28007784 4. An ensemble of regulatory elements controls Runx3 spatiotemporal expression in subsets of dorsal root ganglia proprioceptive neurons. Appel E, Weissmann S, Salzberg Y, Orlovsky K, Negreanu V, Tsoory M, Raanan C, Feldmesser E, Bernstein Y, Wolstein O, Levanon D, Groner Y. Genes Dev. 2016 Dec 1;30(23):2607-2622. doi: 10.1101/gad.291484.116. PMID: 28007784 Free PMC Article Similar articles Select item 26697350 5. Genomic-wide transcriptional profiling in primary myoblasts reveals Runx1-regulated genes in muscle regeneration. Umansky KB, Feldmesser E, Groner Y. Genom Data. 2015 Sep 1;6:120-2. doi: 10.1016/j.gdata.2015.08.030. eCollection 2015 Dec. PMID: 26697350 Free PMC Article Similar articles Select item 26414766 6. Runx3 specifies lineage commitment of innate lymphoid cells. Ebihara T, Song C, Ryu SH, Plougastel-Douglas B, Yang L, Levanon D, Groner Y, Bern MD, Stappenbeck TS, Colonna M, Egawa T, Yokoyama WM. Nat Immunol. 2015 Nov;16(11):1124-33. doi: 10.1038/ni.3272. Epub 2015 Sep 28. PMID: 26414766 Free PMC Article Similar articles Select item 26275053 7. Runx1 Transcription Factor Is Required for Myoblasts Proliferation during Muscle Regeneration. Umansky KB, Gruenbaum-Cohen Y, Tsoory M, Feldmesser E, Goldenberg D, Brenner O, Groner Y. PLoS Genet. 2015 Aug 14;11(8):e1005457. doi: 10.1371/journal.pgen.1005457. eCollection 2015 Aug. PMID: 26275053 Free PMC Article Similar articles Select item 25641675 8. Runx3 at the interface of immunity, inflammation and cancer. Lotem J, Levanon D, Negreanu V, Bauer O, Hantisteanu S, Dicken J, Groner Y. Biochim Biophys Acta. 2015 Apr;1855(2):131-43. doi: 10.1016/j.bbcan.2015.01.004. Epub 2015 Jan 30. Review. PMID: 25641675 Free Article Similar articles Select item 25605327 9. Loss of osteoblast Runx3 produces severe congenital osteopenia. Bauer O, Sharir A, Kimura A, Hantisteanu S, Takeda S, Groner Y. Mol Cell Biol. 2015 Apr;35(7):1097-109. doi: 10.1128/MCB.01106-14. Epub 2015 Jan 20. PMID: 25605327 Free PMC Article 10. Carcinogen-induced skin tumor development requires leukocytic expression of the transcription factor Runx3. Bauer O, Hantisteanu S, Lotem J, Groner Y. Cancer Prev Res (Phila). 2014 Sep;7(9):913-26. doi: 10.1158/1940-6207.CAPR-14-0098-T. Epub 2014 Jun 24. PMID: 24961879 Free Article Similar articles Select item 24469826 11. Pioneer of hematopoietic colony-stimulating factors: Leo Sachs (1924-2013). Sela M, Groner Y. Proc Natl Acad Sci U S A. 2014 Feb 4;111(5):1664-5. doi: 10.1073/pnas.1324228111. Epub 2014 Jan 27. No abstract available. PMID: 24469826 Free PMC Article Similar articles Select item 24421391 12. Transcription factor Runx3 regulates interleukin-15-dependent natural killer cell activation. Levanon D, Negreanu V, Lotem J, Bone KR, Brenner O, Leshkowitz D, Groner Y. Mol Cell Biol. 2014 Mar;34(6):1158-69. doi: 10.1128/MCB.01202-13. Epub 2014 Jan 13. PMID: 24421391 Free PMC Article Similar articles Select item 24236182 13. Runx3-mediated transcriptional program in cytotoxic lymphocytes. Lotem J, Levanon D, Negreanu V, Leshkowitz D, Friedlander G, Groner Y. PLoS One. 2013 Nov 13;8(11):e80467. doi: 10.1371/journal.pone.0080467. eCollection 2013. PMID: 24236182 Free PMC Article Similar articles Select item 24204843 14. Transcriptional reprogramming of CD11b+Esam(hi) dendritic cell identity and function by loss of Runx3. Dicken J, Mildner A, Leshkowitz D, Touw IP, Hantisteanu S, Jung S, Groner Y. PLoS One. 2013 Oct 15;8(10):e77490. doi: 10.1371/journal.pone.0077490. eCollection 2013. PMID: 24204843 Free PMC Article Similar articles Select item 24055056 15. Addiction of t(8;21) and inv(16) acute myeloid leukemia to native RUNX1. Ben-Ami O, Friedman D, Leshkowitz D, Goldenberg D, Orlovsky K, Pencovich N, Lotem J, Tanay A, Groner Y. Cell Rep. 2013 Sep 26;4(6):1131-43. doi: 10.1016/j.celrep.2013.08.020. Epub 2013 Sep 19. PMID: 24055056 Free Article Similar articles Select item 23717578 16. Cell-autonomous function of Runx1 transcriptionally regulates mouse megakaryocytic maturation. Pencovich N, Jaschek R, Dicken J, Amit A, Lotem J, Tanay A, Groner Y. PLoS One. 2013 May 23;8(5):e64248. doi: 10.1371/journal.pone.0064248. Print 2013. PMID: 23717578 Free PMC Article Similar articles Select item 22903063 17. Positional differences of axon

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Collaboration with: Amos Tanay Department of Computer Science & Applied Mathematics Eli Zelzer department of Molecular Genetics

Dr. Dvir Gur

Dr. Jacob (Yaqub) Hanna

Prof. Eran Hornstein

Prof. Chaim Kahana

Prof. Adi Kimchi

Prof. Doron Lancet

Collaboration with: Prof. Rafi Zidovetzki, University of California Riverside Prof. Philippe Schmitt-Kopplin, Helmholz Center Munich Prof. Daniel Segre, Boston University

Dr. Orly Laufman

Prof. Shmuel Pietrokovski

Prof. Yitzhak Pilpel

Prof. Orly Reiner

Prof. Michel Revel

Collaboration with: J. Chebath

Collaboration with: J. Chebath

Collaboration with: J. Chebath

Prof. Menachem Rubinstein

Collaboration with: Gideon Schreiber

Prof. Maya Schuldiner

Collaboration with: Dr. Einat Zalckvar

Dr. Schraga Schwartz

Prof. Yosef Shaul

Collaboration with: Charles Rice the Rockefeller university

Prof. Rotem Sorek

Dr. Noam Stern-Ginossar

Prof. Talila Volk

Prof. Ernest Winocour

Prof. Elazar Zelzer

Department of Plant and Environmental Sciences

Department Head: Prof. Yuval Eshed

Plants offer the world its only renewable resource of food, alternative energy and biotherapeutic compounds. Plants have highly sophisticated short and long-term adaptive mechanisms to the environment as a result of the simple fact that they cannot alter their location during environmental change. Basic understanding of how plants react to the environment and why they grow the way they do are central to devising a rational approach to address three important global challenges, namely to secure more and healthier food, to develop novel plant-based products associated with biotherapeutics and to produce alternative energy resources in the form of biofuels. Research activities in the Department of Plant Sciences are associated with all of the above-mentioned global challenges and range from studies on the function and regulation of isolated genes to their interactive behavior in the context of the whole plant. We have developed extensive in-house genomic, bioinformatics and transgenic infrastructure that enables us to isolate novel genes by gene trapping, knockout or map-based cloning. Cloned genes are manipulated and studied by transgenic analysis to establish their potential in the whole plant. Our research as listed below integrates methodologies of molecular biology, protein modeling, genomics, metabolomics, bioinformatics, system biology, genetics, biochemistry and physiology.

Harnessing light energy and energy transduction in the plant cell: Research is carried out on the basic biophysical phenomenon of photon absorption by chlorophyll through transduction of this energy to ATP and the regulation of energy flux by the plant redox state.

Adaptive response in the plant to the biotic and abiotic environment: Molecular mechanisms that drive the cellular response are investigated under environmental perturbation. Research is directed in understanding the elements that play a role in the recognition of pathogens and the subsequent mounting of plant defense responses as well as in the response of plants to abiotic stresses, such as salt stress.

Plant metabolism and growth: Research is centered around elucidating regulatory metabolic networks for production of essential primary and secondary metabolites as well as understanding gene expression and hormonal networks that control plant metabolism, growth, reproduction and productivity.

Plant genome organization: Molecular tools have been developed to examine the fluidity of the plant genome, as described by transposon element, and the evolution of polyploid plants.

Research activities

Prof. Asaph Aharoni

Prof. Marvin Edelman

Collaboration with: Barak Cohen, Ron Vunsh

Prof. Moshe Feldman

Collaboration with: Prof. Avi Levy

Prof. Robert Fluhr

Dr. Assaf Gal

Prof. Jonathan Gressel

Collaboration with: Michael Burnet

Dr. Tamir Klein

Prof. Ron Milo

Prof. Avigdor Scherz

Prof. Assaf Vardi

Faculty of Chemistry

Department of Chemical and Biological Physics

Department Head: Prof. Lucio Frydman

The Chemical and Biological Physics Department provides an interdisciplinary home to a broad range of topics spanning Physics, Chemistry and Biology. The Department is composed by over 20 tenured and tenure-track physicists and chemists, evenly split between theorists and experimentalists, and working on the following broad areas Fundamental quantum frontiers are explored with advanced theoretical tools, including topics in the quantum control of atomic and molecular dynamics (Ilya Averbukh, Eli Pollak, David Tannor); light-matter interactions (Ilya Averbukh, Gershon Kurizki, David Tannor, Efi Shahmoon); fundamental issues in quantum information, control and thermodynamics (Gershon Kurizki, David Tannor, Efi Shahmoon); ab-initio quantum chemistry and surface scattering (Eli Pollak); and real time quantum dynamics methods (Eli Pollak, David Tannor). The department has a strong program at the interface between classical physics, chemistry and biology. Eran Bouchbinder studies the plasticity of disordered systems, glassy phenomena, dynamic fracture, frictional interfaces and biophysics. Itamar Procaccia studies turbulence, as well as the physics of fractals, glass formation and mechanical properties of amorphous systems. Theoretical biological physics is the main thrust of research of Nir Gov, who models with predictive power emerging phenomena ranging from cellular shapes to the collective behavior of insects. Samuel Safran employs statistical thermodynamics to study the structure, phase behavior and dynamics of soft matter in biology.   The chemistry/biology interface is also studied and evaluated experimentally by Roy Bar-Ziv, who develops and explores living-like systems in cell-free environments, and by Michael Elbaum, who employs advanced microscopic tools to elucidate the complex behavior of cells and biomolecules. Experimental atomic and molecular spectroscopies are also mainstays of the Department. Quantum optics is the focus of Barak Dayanâ€™s experiments on atom mediated photon-photon interactions. Light matter interaction, nonlinear laser spectroscopy and plasmonics are the focus of the experimental research of Yehiam Prior. Edvardas Narevicius is a leader in using magnetic field control and the slowing down of molecular beams to study quantum effects in sympathetically cooled systems. Oren Tal has developed unique methods for the study of single molecule conductors, including electronic, spintronic and thermal conductivity effects. Molecular electronics and spin-chemistry are also main themes of research for Ron Naaman, who investigates these using organic-inorganic interfaces via self-assembled monolayers. Single molecule spectroscopy and its application to a broad range of topics, from protein dynamics to nanoplasmonics, are at the center of the experimental program of Gilad Haran. Baran Eren exploits new forms of microscopy and spectroscopy, to understand the chemistry and electronic behavior of solid surfaces under relevant conditions with unprecedented accuracy. A centerpiece of the combined experimental/theoretical program in the Department rests on Magnetic Resonance research. Amit Finkler bridges this topic with optics, in a program relying on optically-detected magnetic resonance as an emerging form of quantum sensing.Lucio Frydman and his group focus on developing and utilizing new concepts and techniques in NMR and MRI, with applications ranging from Physics to Biology and Medicine. Assaf Tal's group focuses on developing new spectroscopy and imaging tools for understanding the brain's physiology in-vivo. Shimon Vega and Daniella Goldfarb are developing and utilizing dynamic nuclear polarization methods for NMR and EPR research, with the Vega group also deeply involved in solid state NMR, and the Goldfarb research also focused on

multiple-resonance high-field EPR techniques applied to biophysics and materials science. The diverse interests as represented above have created an atmosphere of outstanding scientific creativity. Members of the Department have overlapping interests and collaborations among themselves, with other scientists throughout the Weizmann Institute, and with scientists throughout the world. New training opportunities for students and postdocs are always emerging, at whose conclusion participating scientists will have been exposed to a broad spectrum of challenges and acquired state-of-the-art knowledge. If you are interested in joining this elite group of researchers as a M.Sc., Ph.D or postdoctoral trainee, do not hesitate to contact the expert(s) of your choice.

Research activities

Prof. Ilya Averbukh

Prof. Roy Bar-Ziv

Prof. Eran Bouchbinder

Collaboration with: Prof. Alain Karma (Northeastern University, USA) Prof. Jay Fineberg (Hebrew University, Israel)

Collaboration with: Dr. Efim Brener (Forschungszentrum Juelich, Germany) Prof. Jean-FranÃ§ois Molinari (EPFL, Switzerland)

Collaboration with: Prof. Edan Lerner (University of Amsterdam, Netherlands)

Collaboration with: Prof. Chris Rycroft (Harvard University, USA) Prof. Edan Lerner (University of Amsterdam, Netherlands) Prof. Jan Schroers (Yale University, USA)

Collaboration with: Prof. Haguy Wolfenson (Technion, Israel)

Prof. Barak Dayan

Prof. Michael Elbaum

Dr. Baran Eren

Dr. Amit Finkler

Collaboration with: Durga Dasari, University of Stuttgart

Collaboration with: Danna Freedman, Northwestern University

Collaboration with: Michael Stern, Bar-Ilan University Eyal Buks, Technion

Prof. Lucio Frydman

Prof. Nir Gov

Prof. Gilad Haran

Collaboration with: Amnon Horovitz, Weizmann, Ron Naaman, Weizmann, Axel Mogk, University of Heidelberg, George Stan, University of Cincinnati

Collaboration with: Ronen Alon, Weizmann, Frank Brown, UCSB, Andres Alcover, Pasteur Institute

Collaboration with: Ora Bitton, Weizmann, Lothar Houben, Weizmann, Lev Chuntonov, Technion, Javier Aizpurua, San Sebastian

Prof. Gershon Kurizki

Prof. Ron Naaman

Collaboration with: Yossi Paltiel, Hebrew University David H. Waldeck, University of Pittsburghm USA Claudio Fontanessi, Modena University, Italy E. W. Meijer, Eindhoven, Netherland Michael Therien, Duke University, USA Moh El Naggar, USC, USA Jonas Fransson, Uppsala, Sweden

Prof. Yehiam Prior

Collaboration with: Ilya Averbukh

Prof. Itamar Procaccia

Collaboration with: George Hentschel, Bhanu Bhowmik, Harish Charan

Collaboration with: Valery Ilyin, George Hentschel, Prasenjit Das, Chandana Mondal, Saikat Roy, Avanish Kumar

Collaboration with: Eviatar B. Procaccia, Arik Yochelis

Collaboration with: Avanish Kumar, Prasenjit Das

Collaboration with: Victor L'vov, Anna Pomyalov

Prof. Samuel Safran

Collaboration with: Dennis Discher, Univ. Pennsylvania - DNA damage in migrating cells as a model of metastasis. Talila Volk, Weizmann Institute - muscle cells and nuclear deformation. Gary Karpen, Berekely - phase separation in the cellular nucleus: experiments; Frank Juilicher - MPI Dresden - phase separation theory. Prof. Zheng Gang Wang - CalTech - thoery of polymer interactions applied to chromosome ovelap. Tony Hyman - MPI Dresden - phase separation in cells.

Dr. Ephraim Shahmoon

Prof. David Tannor

Department of Structural Biology

Department Head: Prof. Deborah Fass

The functions of biological systems emerge from & depend on the structures of macromolecules, their conformational dynamics, and their higher order assembly. Determination of biomolecular structures and an understanding of their conformational changes and assembly properties provide great insights into biological mechanisms. Much of the research in structural biology at the Weizmann Institute is carried out in the Faculty of Chemistry, using a diverse set of cutting-edge research tools and methods. Investigators in the Structural Biology Department rely on the primary techniques for experimental structure determination, namely X-ray crystallography, NMR, and electron microscopy, but they also employ a variety of other specialized and emerging spectroscopic methods combined with creative molecular engineering to explore macromolecular structures, energetics, and dynamics. Experimental strategies are complemented by computational and theoretical approaches. Among the specific subjects of research in the department are ribosomes, protein chaperones, viruses, extracellular matrices, and biominerals. Processes being investigated include protein aggregation in cells, conformational dynamics of enzymes, formation of skeletal tissues, cell penetration by viruses, DNA recognition by proteins, and protein folding. Efforts are also directed towards the design of potential drugs. The wide variety of research activities in the department are based on a shared appreciation for the physical and chemical foundations of biological activities.

Research activities

Prof. Lia Addadi

Collaboration with: S. Weiner

Collaboration with: B. Geiger

Prof. Jacob Anglister

Collaboration with: F. Naider

Collaboration with: F. Naider

Collaboration with: J. Piehler

Collaboration with: M. Gurevitz, D. Gordon

Prof. Ron Diskin

Prof. Deborah Fass

Prof. Amnon Horovitz

Collaboration with: Ron Unger (Bar Ilan University)
Collaboration with: Keith Willison (Imperial College, London); Michal Sharon;
Collaboration with: Gilad Haran

Prof. Koby Levy

Dr. Rina Rosenzweig

Prof. Zippora Shakked

Collaboration with: Donald Crothers (Yale University)

Dr. Moran Shalev-Benami

Collaboration with: Peter McCormick; Ofer Yizhar
Collaboration with: Schraga Schwartz;

Prof. Joel Sussman

Collaboration with: Israel Silman
Collaboration with: Dan Tawfik & Israel Silman
Collaboration with: Israel Silman
Collaboration with: Israel Silman
Collaboration with: Israel Silman
Collaboration with: Tony Futerman & Israel Silman
Collaboration with: Jaime Prilusky & Israel Silman

Prof. Stephen Weiner

Collaboration with: Ron Shahar, Hebrew University of Jerusalem
Collaboration with: Elisabetta Boaretto,
Collaboration with: L. Addadi, Leeor Kronick, Dan Oron

Prof. Ada Yonath

Department of Earth and Planetary Sciences

Department Head: Prof. Yehoshua Kolodner

The research in this department is dedicated to understanding the complex inter-relationships among the major Earth Systems and on the human impact on the Earth's environment and climate. In addition, research is conducted on planetary

atmospheres and planetary geomorphologies. The Department's research activities have several general areas of activities. One focuses on water and includes hydrology, geochemistry, land-plant-atmosphere interactions, and oceanography. A second activity is in the use of stable isotopes for reconstructions of paleoclimatic and of biosphere-atmosphere dynamics, and a third is in the area of atmospheric chemistry and dynamics, and cloud physics. The fourth area of research is in planetary sciences.   Our research requires knowledge of the interdependent components that together constitute the "environment", as well as a commitment to protect this environment by improving the manner in which air, water, land, and energy are utilized by humans. The Department is distinguished by the interactions among scientists from different backgrounds and expertise, which is critical for achieving a comprehensive understanding of the global environment and planetary sciences. The department promotes international collaborations based on short- and long-term visits for research and training by scientists who complement existing expertise in the Department. The interdisciplinary nature of the Department is well reflected in the academic training of the research students. Their backgrounds vary from physics, chemistry, and mathematics through geology to biology. We encourage the participation of students who are interested in not only investigating in depth a specific subject but who are also interested in a broader and integrative approach to science.

Research activities

Prof. Oded Aharonson

Prof. Brian Berkowitz

Dr. Itay Halevy

Prof. Yohai Kaspi

Dr. Yael Kiro

Prof. Ilan Koren

Collaboration with: Dr. Graham Feingold - NOAA Prof. Alex Kostinski - MTU Prof. Alexander Khain - HUJI Prof. Vanderlei Martins - UMBC Prof. Zev Levin - TAU Dr. Lorraine Remer - NASA Prof. Yoav Schechner - Technion Dr. Eitan Hirsch - IIBR Dr. Eyal Agassi - IIBR

Collaboration with: Prof. Eli Tziperman - Harvard Dr. Graham Feingold - NOAA Prof. Alex Kostinski - MTU Dr. Mickael Chekroun - Weizmann

Collaboration with: Prof. Assaf Vardi - Weizmann Prof. Emmanuel Boss - University of Maine Prof. Yinon Rudich - Weizmann

Collaboration with: Prof. Alex Kostinski - MTU Prof. Vanderlei Martins - UMBC Dr. Lorraine Remer - NASA Prof. Yoav Schechner - Technion Dr. Eitan Hirsch - IIBR Dr.

Eyal Agassi - IIBR

Dr. Shira Raveh-Rubin

Collaboration with: Philippe Drobinski, CNRS

Prof. Yinon Rudich

Collaboration with: Prof. Ralf Zimmermann - Helmholtz Center Munich and University of Rostock, Germany Prof. Astrid Kiendler-Scharr - Hemholtz Ceter Juelich, Germany

Collaboration with: Prof. Ido Braslvski - Hebrew University

Collaboration with: Dr. Steve Brown - NOAA, Boulder CO Prof. Alexander Laskin - Purdue University

Prof. Dan Yakir

Department of Organic Chemistry

Department Head: Prof. Jiirko van der Boom

The areas of research in the Department of Organic Chemistry include synthetic and mechanistic organic and organometallic chemistry, novel reactions for organic synthesis, bond activation by metal complexes, polymeric reagents and catalysis. Bioorganic chemistry includes the studies of plant antiviral agents, the molecular mechanism of action of rhodopsin, artificial ion carriers and molecular sensors. Biological chemistry includes studies on structure,function, and mode of action of biologically active peptides and proteins; thermophilic enzymes; enzymes involved in DNA repair, DNA and RNA processing; studies of ordered, compact states of nucleic acids; and biomedical applications of EPR and NMR. Computational chemistry deals with the prediction of molecular properties by first principles (ab initio) and semiempirical quantum mechanical calculations..

Research activities

Prof. Mario D. Bachi

Prof. Yigal Burstein

Collaboration with: Moshe Peretz, Orly Dym, Linda Shimon

Collaboration with: Zippora Shakked, Oren Zimhony, Ron Diskin, Moshe Peretz, Shira Albeck, Yoav Pelleg, Orly Dym

Prof. Matityahu Fridkin

Collaboration with: Y. Koch I. Gozes (TAU) I. Offek (TAU) R. Catane (TEL-HASHOMER)

Collaboration with: Y. Shechter

Collaboration with: M. Youdim (Techni0n)

Dr. Nir London

Prof. Gershom (Jan) Martin

Collaboration with: D. Milstein, M. van der Boom, R. Neumann, M. A. Iron, L. Kronik, J. L. Sussman

Prof. David Milstein

Prof. Ronny Neumann

Prof. Boris Rybtchinski

Prof. Abraham Shanzer

Department of Materials and Interfaces

Department Head: Prof. Leeor Kronik

Activities in the Department span a wide range of topics from soft, composite and hard materials to energy research, nanoscience, and biological materials. A unifying theme is the study of material functionality and its relation to fundamental properties at multiple scales. These properties may be mechanical, structural, chemical, electronic, magnetic, optical, and more. Some examples are: How do shapes and sizes of nm-sized particles affect their properties? How can we tune the properties of solar cells by manipulating their material interfaces? How does friction in knee and hip joints depend on polyelectrolytes that lubricate them? How can we design self-assembling (bio)chemical systems?   THE RESEARCH IS BASED ON AN INTERDISCIPLINARY APPROACH, and indeed the scientists bring complementary experience in chemistry and physics, including both theory and experiment.

Research activities

Prof. David Cahen

Collaboration with: @WIS: S. Cohen, G. Hodes, L. Kronik, L Houben, D. Oron; A. Kahn (Princeton); M. BÃ¤r (Helmholtz Centre Berlin, HZB and Erlangen); H. Bolink (Valencia);P. Nayak (TIFR-H); S Avashti (IISc); H. Ishii (Chiba); P. Schultz, JF. Guillemoles (IPVF-CNRS); T. Kirchartz (Duisburg-JÃ¼lich).

Collaboration with: @ WIS: M. Sheves, I. Pecht M. Tornow (TU-Munich); G. Vattya (Budapest); J. Blumberger (Imp. College); L. Zotti (Sevilla); JC Cuevas (Madrid); H. Chen (Zhejiang U);

Prof. Gary Hodes

Collaboration with: D. Cahen (WIS)

Prof. Ernesto Joselevich

Prof. Jacob Klein

Collaboration with: Sam Safran

Prof. Leeor Kronik

Prof. Meir Lahav

Collaboration with: Prof Igor Lubomirsky Dr.David Ehre

Prof. Leslie Leiserowitz

Dr. Michal Leskes

Prof. Igor Lubomirsky

Collaboration with: Prof. Meir Lahav

Dr. Sivan Refaely-Abramson

Collaboration with: Sara Barja, Centro de FÃ-sica de Materiales, CSIC-UPV/EHU and DIPC

Prof. Jacob Sagiv

Prof. Reshef Tenne

Collaboration with: Dr. R. Arenal, Laboratorio de MicroscopÃ-as Avanzadas, Instituto de Nanociencia de AragoÌ•n, Universidad de Zaragoza, 50018 Zara-goza, Spain Dr. Luc Lajaunie, Departamento de Ciencia de los Materiales e IngenierÃ-a MetalÃºrgica y QuÃ-mica InorgÃ¡nica, Facultad de Ciencias, Uni-versidad de CÃ¡diz, Campus RÃ-o San Pedro S/N, Puerto Real 11510, CÃ¡diz, Spain Prof. Ernesto Joselevich, Department of Materials and Interfaces, Weizmann Institute, Rehovot 76100, Israel Dr. Lothar Houben, Chemical Research Support Department, Weizmann Institute, Rehovot 76100, Israel Prof. Alla Zak, Holon Institute of Technology, Israel Prof. Shmuel Kenig and Prof. Hanna Dodiuk, Shenkar College, Israel Prof. Yoshihiro Iwasa, University of Tokyo and the Riken Institute. Japan Prof. Janina Maultzsch, Department of Physics, FAU Erlangen-NÃ¼rnberg, 91058 Erlangen, Germany Dr. Iddo Pinkas, Chemical Research

Support Department, Weizmann Institute, Rehovot 76100, Israel

Faculty of Mathematics and Computer Science

Department of Computer Science and Applied Mathematics

Department Head: Prof. Ahuva Bash

The principal interests of the department lie in the areas of computer science and applied mathematics. Research areas include (but are not limited to) algorithms, their design and analysis; biological applications, bioinformatics, system biology, biological modeling; computational complexity, probabilistic proof systems, hardness of approximation, circuit complexity, combinatorial games; computer vision, image processing; cryptography; differential equations; distributed and parallel computing; dynamical systems; fluid dynamics; logic of programs, specification methodologies; machine learning and mathematical statistics; numerical analysis; randomness and its relation to computation; robotics and motion control; visual perception and brain modeling.

The departmental computer facilities include multiple PCs, multiple unix servers, two Linux clusters with multiple nodes, and large data storage systems. In addition, the vision laboratories, robotics laboratories and computational biology laboratories have a combination of experimental equipment and large-scale computing clusters.

Research activities

Prof. Achi Brandt

Prof. Irit Dinur

Prof. Yonina Eldar

Prof. Uriel Feige

Prof. Tamar Flash

Prof. Aviezri S. Fraenkel

Collaboration with: David Klein, Jamie Simpson

Collaboration with: Urban Larsson, Lior Goldberg, Haiyan Li, Sanyang Liu, Wen An Liu , Udi Peled, Vladimir Gurvich, Clark Kimberling, Nhan B. Ho, Eric Duchene

Collaboration with: George Andrews, James Sellers

Prof. Oded Goldreich

Prof. Shafrira Goldwasser

Prof. David Harel

Prof. Michal Irani

Prof. Robert Krauthgamer

Prof. Boaz Nadler

Prof. Moni Naor

Dr. Merav Parter

Prof. David Peleg

Prof. Vered Rom-Kedar

Collaboration with: M. Radnovic, A. Rapoport, E. Shlizerman, D. Turaev

Collaboration with: R. Malka, E. Shochat.

Collaboration with: R. Aharon, H. Gildor

Prof. Adi Shamir

Dr. Ohad Shamir

Prof. Ehud Shapiro

Collaboration with: E. Shapiro, V. Adalsteinsson, H. Brodi, M. Minden, R. Halaban, C. Klein, M. Meyerson, C. Wu, T. Zukerman, R. Shalom

Prof. Edriss S. Titi

Prof. Shimon Ullman

Department of Mathematics

The principal research interests of the department lie in the broadly understood areas of analysis, probability, algebra, and geometry.

Topics covered in **Analysis** include operator and matrix theory, spectral theory, linear and nonlinear ordinary and partial differential equations, functional and harmonic analysis, ergodic theory and dynamical systems, control theory in its various manifestations, optimization, game theory, approximation and complexity of functions, numerical analysis, singularity theory and robotics. Research in **Probability** theory covers random walks and graphs, motion in random media, percolation, random matrices, Gaussian fields and other probabilistic models in mathematical physics.

Areas of **Geometric** research include the structure of finite and infinite dimensional spaces, analytic, real algebraic and semi-algebraic geometry, typology of foliations and complex vector fields.

The **Algebraic** direction includes some aspects of algebraic geometry, geometric group theory, Lie Theory, representation theory, quantum groups, number theory, automorphic forms, ring theory, statistics of Young diagrams, algebraic combinatorics and enveloping algebras, invariants and crystals.

For the research done at our sister department, the Department of Scomputer Science and Applied Mathematics, see here.

Research activities

Prof. Avraham Rami Aizenbud

Collaboration with: Nir Avni, Raf Cluckers, Dmitry Gourevitch

Collaboration with: Nir Avni, Dmitry Gourevitch, Shachar Carmeli, Eitan Sayag.

Collaboration with: Dmitry Gourevitch, Shachar Carmeli, Raf Cluckers

Prof. Itai Benjamini

Prof. Vladimir Berkovich

Prof. Ehud Friedgut

Prof. Stephen Gelbart

Prof. Maria Gorelik

Collaboration with: Dimitar Grantcharov, Victor Kac, Vera Serganova.

Dr. Dmitry Gourevitch

Collaboration with: Avraham Aizenbud, Eitan Sayag, Siddhartha Sahi, Eyal Kaplan

Collaboration with: Siddhartha Sahi, Avraham Aizenbud, Eitan Sayag, Eyal Kaplan

Collaboration with: Henrik P. A. Gustafssonb; Axel Kleinschmidt; Daniel Persson; Siddhartha Sahi

Prof. Anthony Joseph

Collaboration with: Yasmine Fittouhi

Prof. Yakar Kannai

Prof. Boaz Klartag

Prof. Gady Kozma

Prof. Erez Lapid

Prof. Dmitry Novikov

Prof. Amitai Regev

Collaboration with: Allan Berele, Doron Zeilberger

Prof. Gideon Schechtman

Dr. Ran Tessler

Collaboration with: Dr. Chaim Even Zohar Mr. Tsviqa Lakrec Dr. Xavier Blot Dr. Sybille Rosset Dr. Yizhen Zhao Mr. Elad Tzalik. Prof. Tali Kaufman

Prof. Sergei Yakovenko

Prof. Yosef Yomdin

Prof. Ofer Zeitouni

Faculty of Physics

Department of Condensed Matter Physics

Department Head: Prof. Israel Bar-Joseph

The scientific activity of the department is mainly concentrated around the experimental and theoretical research in quantum solid state physics. It includes experimental research of mesoscopic physics, quantum Hall physics, topological states of matter, high temperature superconductors, two and one dimensional superconductors, metal-insulator transition, carbon nanotubes, semiconductor nanowires, and study of material growth. The theoretical efforts concentrate on similar subjects with added work on disordered materials, cold atoms, and quantum optics.

The Braun Center for sub micron research is an integral part of the department. It is a modern and well equipped center, with growth (three MBE's) and characterization systems, which allows to conduct experiments on sub micron semiconductor structures under high magnetic fields, conventional and high temperature superconductors, and nanowires made of carbon nanotubes and semiconductor nanowires.

Research activities

Prof. Israel Bar-Joseph

Dr. Haim Beidenkopf

Prof. Erez Berg

Prof. Alexander Finkelstein

Prof. Yuval Gefen

Prof. Moty Heiblum

Prof. Shahal Ilani

Prof. Shimon Levit

Prof. Yuval Oreg

Dr. Serge Rosenblum

Prof. Adi Stern

Prof. Binghai Yan

Prof. Eli Zeldov

Department of Particle Physics and Astrophysics

Department Head: Prof. Ran Budnik

The Department of Particle Physics and Astrophysics is engaged in both experimental and theoretical research, in various directions. These include elementary particle physics, field theory, string theory, theoretical astrophysics, observational astrophysics, particle astrophysics, relativistic heavy ion physics, molecular physics, nuclear physics, plasma physics, and radiation detection physics.

Research activities

Prof. Ofer Aharony

Collaboration with: D. Kutasov, A. Giveon, N. Itzhaki, S. Dubovsky, N. Barel

Collaboration with: F. Benini, O. Mamroud, P. Milan

Collaboration with: S. Chester, E. Urbach, T. Solberg, T. Sheaffer

Collaboration with: L. Yung, T. Sheaffer

Collaboration with: E. Palti, Y. Breitstein

Dr. Sagi Ben-Ami

Collaboration with: Yossi Shvartzvald

Prof. Micha Berkooz

Dr. Kfir Blum

Prof. Amos Breskin

Dr. Shikma Bressler

Collaboration with: RD51 collaboration

Dr. Ran Budnik

Prof. Ehud Duchovni

Prof. Avishay Gal-Yam

Prof. Doron Gepner

Prof. Eilam Gross

Collaboration with: Students: Michael Pitt and Jonathan Shlomi

Prof. Shmuel Gurvitz

Collaboration with: Xin-Qi Li, D. Sokolovski

Collaboration with: A. Aharony, O. Entin-Wohlman, Xin-Qi Li, Wei-Min Zhang

Prof. Haim Harari

Prof. Uri Karshon

Collaboration with: ZEUS Collaboration, DESY, Hamburg

Collaboration with: ZEUS Collaboration, DESY, Hamburg

Collaboration with: ZEUS Collaboration, DESY, Hamburg

Dr. Boaz Katz

Dr. Doron Kushnir

Prof. Yitzhak Maron

Collaboration with: Cornell Univ. , Princeton Univ. , Sandia National Laboratories , Naval Research Laboratory, University of Jena in Germany , HZDR Institute-Dresden , Michigan State Univ. , Univ. of CA in San Diego , LLNL- NIF facility

Collaboration with: University of Jena and HZDR-Dresden in Germany , LLNL - National Ignition facility, Sandia National Laboratories.

Prof. Giora Mikenberg

Collaboration with: E. Duchovni, E. Gross, L. Levinson, D. Lellouch

Collaboration with: E. Duchovni, E. Gross, L. Levinson, D. Lellouch

Prof. Mordehai Milgrom

Prof. Alexander Milov

Dr. David Mross

Prof. Yosef Nir

Collaboration with: Marta Losada, Elina Fuchs

Collaboration with: Marta Losada, Gilad Perez

Collaboration with: Maytal Eran-Jona, Daphna Birenbaum-Carmeli, Sharon Diamant-Pick

Prof. Eran Oded Ofek

Prof. Gilad Perez

Dr. Noam Tal Hod

Collaboration with: NIKHEF, The University of Michigan, University of Wuppertal

Collaboration with: Multiple institutions (mostly from Canada, Chile, Russia, China and the USA)

Collaboration with: DESY, Albert-Ludwig Universitaet Freiburg, Max-Planck Institute of Structure and Matter, Helmholtz-Zentrum Jena, Friedrich-Schiller Universitaet Jena, Queens University Belfast, University College London, University of Plymouth, Tel Aviv University, Technion

Prof. Igal Talmi

Collaboration with: Shalom Shlomo, Texas A & M University

Prof. Itzhak Tserruya

Collaboration with: I. Ravinovich

Collaboration with: I. Ravinovich

Collaboration with: I. Ravinovich

Prof. Vladimir Usov

Collaboration with: G.Z. Machabeli

Collaboration with: A.K. Harding, D.B. Melrose, M. Milgrom, A.G. Muslimov, A.E. Shabad

Collaboration with: A.E. Shabad

Collaboration with: K.S. Cheng, T. Harko, M. Milgrom, F.Weber

Collaboration with: N.N. Pilyugin

Prof. Eli Waxman

Collaboration with: Avishay Gal-Yam, Boaz Katz, Doron Kushnir, Eran Ofek, Yossi Shvartzvald

Collaboration with: Sagi Ben-Ami, Avishay Gal-Yam, Eran Ofek, Yossi Shvratzvald

Dr. Barak Zackay

Collaboration with: Matias Zaldarriaga - IAS princeton Tejaswi Venumadhav - UCSB

Collaboration with: Tsevi Mazeh - Tel Aviv University

Collaboration with: Thomas Prince - Caltech Victoria Kaspi - McGill university

Prof. Daniel Zajfman

Collaboration with: Oded Heber

Department of Physics Core Facilities

Department Head: Prof. Ran Budnik

The Department of Particle Physics and Astrophysics is engaged in both experimental and theoretical research, in various directions. These include elementary particle physics, field theory, string theory, theoretical astrophysics, observational astrophysics, particle astrophysics, relativistic heavy ion physics, molecular physics, nuclear physics, plasma physics, and radiation detection physics.

Department of Physics of Complex Systems

Department Head: Prof. Elisha Moses

The Department of Physics of Complex Systems has research programs in fundamental and applied physics. Research in optics and atomic physics includes nonlinear optics, ultra fast optics and high harmonic generation, quantum optics, slow light, descrete optics, nano optics and nonlinear microscopy, laser cooling and trapping of atoms and ions, studies of Bose Einstein condensation, precision spectroscopy and quantum information processing. Theoretical and experimental research in soft condensed matter is concentrated on equilibrium and non-equilibrium statistical physics, clustering of data, bioinformatics and systems biology, electrokinetics of ions and charged particles in low dielectric liquids, colloids, soft materials and complex fluids. Experimental and theoretical hydrodynamics concentrates on turbulence, spatio-temporal chaos, turbulent

Rayleigh-Benard convection, liquids at interfaces, droplet impact, sedimentation and dynamics of single micro-objects, such as polymers, vesicles, capsules and hydrodynamics of their solutions. Turbulence theory is developed in general and in applications to cloud physics. Classical and quantum chaos, statistics of nodal lines in quantum systems and turbulence are studied theoretically. Mathematical and computational methods for archaeological research are developed. Theoretical physical biology deals with modeling living information systems, their molecular components and the way they evolve. Experimental bio-physics deals with bio-molecules, neural cultures, neurophysics, physics of the brain, physics of bio-systems and decision making in ant colonies.

Research activities

Dr. Hillel Aharoni

Dr. Rotem Arnon-Friedman

Prof. Nir Davidson

Collaboration with: Ofer Firstenberg Ephi Sachmoon and Yaov Sagi

Collaboration with: Roee Ozeri

Collaboration with: Asher Friesem, Hui Cao, Oren Raz

Collaboration with: Ofer Firstenberg

Collaboration with: Ofer Firstenberg

Prof. Eytan Domany

Collaboration with: A. P. Young (UCSC)

Collaboration with: Several research groups at Weizmann, in the USA and in Europe; see below.

Prof. Nirit Dudovich

Prof. Efi Efrati

Prof. Gregory Falkovich

Collaboration with: Natalia Vladimirova, MIchal Shavit, Vladimir Lebedev

Collaboration with: Anna Frishman, Vladimir Lebedev, Natalia Vladmirova, Bjorn Hof.

Collaboration with: Michal Shavit, Natalia Vladimirova

Collaboration with: Leonid Levitov, Andrey Shytov, Andre Geim.

Dr. Ofer Feinerman

Prof. Ofer Firstenberg

Prof. Asher Friesem

Prof. Ulf Leonhardt

Prof. Victor Malka

Collaboration with: HZDR in Germany, Ecole Polytechnique in France, and UM from US

Dr. Ziv Meir

Prof. Elisha Moses

Prof. David Mukamel

Collaboration with: S. Ruffo A. Campa
Collaboration with: S. Majumdar G. Schehr M. Barma A. Kundu

Prof. Roee Ozeri

Dr. Alexander Poddubny

Collaboration with: Ofer Firstenberg
Collaboration with: Serge Rosenblum, Johannes Fink (IST Austria)
Collaboration with: Arno Rauschenbeutel (Humboldt University, Berlin)
Collaboration with: Marcus Aspelmeier (University of Vienna)

Dr. Oren Raz

Dr. Osip Schwartz

Prof. Adam Schwimmer

Prof. Uzy Smilansky

Prof. Joel Stavans

Prof. Victor Steinberg

Collaboration with: Prof. G. Falkovich, Prof. V. Lebedev, Prof. Y. Dubief, Prof. H. Stark

Dean for Educational Activities

Department of Science Teaching

Department Head: Prof. Anat Yarden

The Department of Science Teaching main interrelated missions are to advance the academic discipline of science and mathematics education, to enhance the quality and effectiveness of mathematics and science education in Israel, and to develop academic and practical leadership in science and mathematics education in Israel and overseas. The Department carries out educational research and development primarily for grades 7-12 in mathematics, physics, chemistry, computer science, earth sciences and life sciences, and in science and technology for junior high school. The Department targets both the general student population and those who are majoring in one or more of these disciplines. The Department carries out interrelated and continuous long-term academic activities, including research, development and implementation of innovative learning materials, pedagogical models, and teachers' professional development (PD). The Department has many avenues of collaboration with other departments on campus and with the educational system in Israel; it has a significant impact on science education research, practice, and policy in Israel and overseas. As the Department is currently shifting from mainly textual teaching and learning materials developed in the Department to primarily digital platforms, the demand for techno-pedagogical support has increased tremendously in recent years. This shift allows the incorporation of new methodologies for both teaching and learning, as well as in the way research is carried out in the Department. The large amount of data on teachersâ€™ and studentsâ€™ performance accumulating in databases promote the development and use of new research methodologies. AI tools are currently being developed to improve both the teaching and learning that take place on these platforms, as well as to expand the Departmentâ€™s research possibilities. These days Department is establishing a core facilities unit, entitled EduCore, that is expected to provide the needed services (e.g., software development, technological design, data science services, etc.) and to support both research and development in the various research groups, as well as other units and faculties at the Weizmann Institute that are in need of techno-pedagogical services.

Research activities

Prof. Abraham Arcavi

Collaboration with: Dr. Ronnie Karsenty

Collaboration with: Dr. Sue Magidson

Collaboration with: Dr. Nurit Hadas

Prof. Michal Armoni

Prof. Mordechai Ben-Ari

Collaboration with: Francesco Mondada, Ecole Polytechnique Federale de Lausanne

Prof. Ron Blonder

Prof. Ruhama Even

Prof. Bat Sheva Eylon

Collaboration with: U. Ganiel

Collaboration with: U. Ganiel

Collaboration with: E. Bagno, U. Ganiel

Collaboration with: Z. Scherz, I. Hopfeld, N. Orion, O. Kedem, Y. Ben-Hur

Collaboration with: Z. Scherz, N. Orion, S. Rosenfeld, U. Ganiel

Prof. David Fortus

Collaboration with: Yoni Yeshayahu, Head of Pediatrics and Juvenile Endocrinology, Samson Assuta Hospital

Collaboration with: Joe Krajcik - Michigan State University Knut Neumann - Leibniz Institute for Science and Mathematics Education (IPN), Germany Jeff Nordine - University of Iowa Bob Geier - Michigan State University

Collaboration with: Itai Berger - Head of Pediatric Neurology - Samson Assuta Hospital

Collaboration with: Troy Sadler - University of North Carolina at Chapel Hill

Prof. Avi Hofstein

Collaboration with: R. Mamlok

Collaboration with: Rachel mamlok-Naaman,

Prof. Nir Orion

Prof. Anat Yarden

Collaboration with: Prof. Zohar Livnat, Bar-Ilan University

Collaboration with: Prof. Ute Harms, IPN, Kiel, Germany

Collaboration with: Dr. Irit Sadeh, Ministry of Education

Collaboration with: Prof. Baruch Schwarz, Hebrew University; Prof. Boris Koichu, WIS; Prof. Michal Tabach, Tel-Aviv University; Dr. Einat Heyd-Metzuyanim, Technion

Collaboration with: Prof. Ruhama Even, Prof. Vered Rom-Kedar

Collaboration with: Dr. Giora Alexandron, Dr. Yael Shwartz, Prof. Ron Blonder

Prof. Edit Yerushalmi

Collaboration with: A. Hofstein, S. Livne, Y. Roth, R. Blonder, A. Yarden, S. Safran, B. Eylon, B. Geiger

Collaboration with: C. Singh, E. Cohen, E. Bagno, B. Eylon

Collaboration with: R. Safadi, E. Bagno, A. Rozen

Collaboration with: C. Henderson, K. Heller, P. Heller, V. Quo, E. Cohen