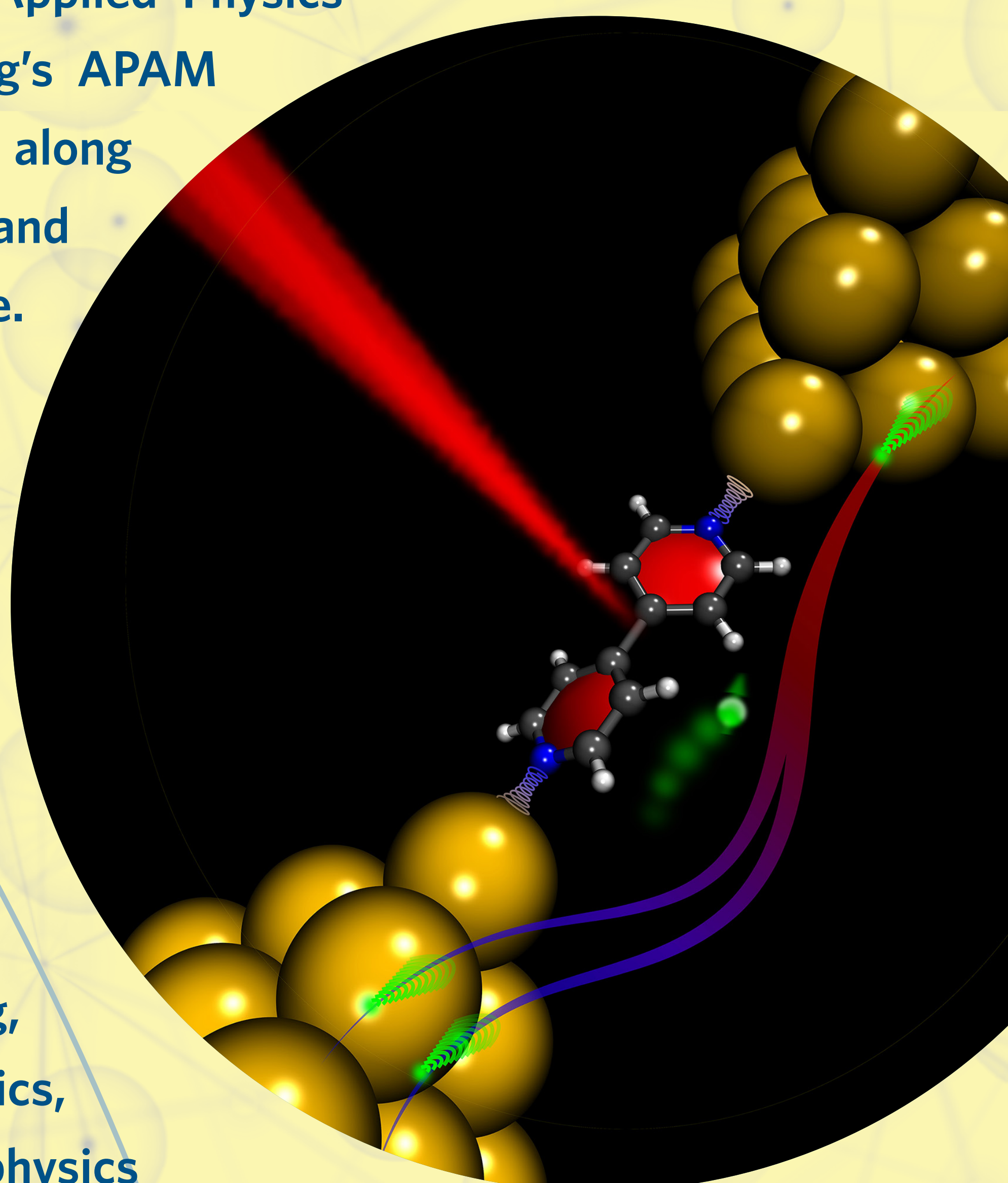


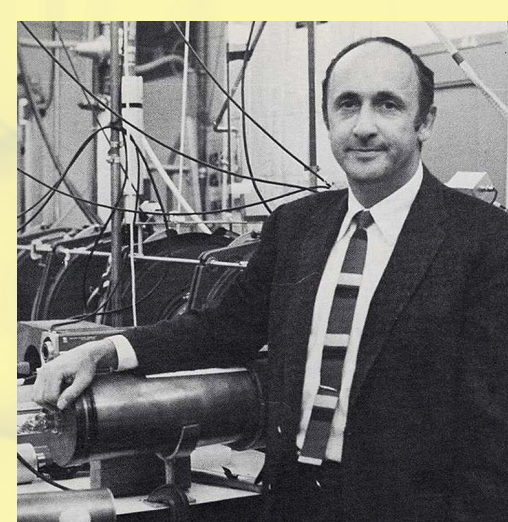
APPLIED PHYSICS AND APPLIED MATHEMATICS

While many schools offer study and research in Applied Physics and in Applied Mathematics, Columbia Engineering's APAM Department is unique in housing these disciplines, along with programs in Materials Science and Engineering and Medical Physics, within a single, unified structure. This arrangement promotes dynamic cross-fertilization of ideas, collaborative work, and multidisciplinary research resulting in a vibrant and growing department that is able to take on emerging problems rigorously, efficiently, and creatively. Researchers from numerous disciplines collaborate on diverse projects, including advanced computational analysis, nanoscience, energy and the environment, imaging and non-destructive testing, atmospheric and earth sciences, optical physics, condensed matter and materials physics, and biophysics and biomathematics. APAM faculty, many of whom hold joint appointments, work closely with each other and with researchers from other departments, schools, national laboratories and companies within the United States and internationally.



Single-molecule circuits: A platform to probe mechanics, optoelectronics, spintronics and thermoelectrics.
Credit: Sishasha Aridhyo and Latha Venkataraman

1961 Founding faculty, including Robert Gross and C.K. (John) Chu, establish the Plasma Physics Laboratory, beginning a long and prominent tradition at the forefront of high-temperature and fusion plasmas aided by a major expansion of APAM's fusion efforts in 1975.



1968 Helping to unlock the secrets of phenomena that had puzzled scientists for centuries, C.K. Chu develops finite difference approximations of the equations of fluid dynamics and coins the now-standard phrase, "Computational Fluid Dynamics."



1984 C.K. Chu spearheads the department's expansion into solid state physics and applied mathematics. In 1990, the nuclear engineering program ended, and APNE became the Department of Applied Physics.

1978 Dean Peter Likins' proposal combines the Plasma Physics Committee, an interdepartmental doctoral program, with the existing Division of Nuclear Science and Engineering to form the Applied Physics and Nuclear Engineering (APNE) Department.

1985 Thomas Marshall, a pioneer in developing free electron lasers, publishes the first book on this subject.

1988 Gertrude Neumark develops and patents the process of non-equilibrium doping that enables significant advances in light-emitting and laser diodes, particularly in the blue-green region, which many companies later use to improve consumer products, including to develop sharper laser printers, increased-capacity DVDs, and better traffic lights, mobile-phone screens and flat-screen TVs.

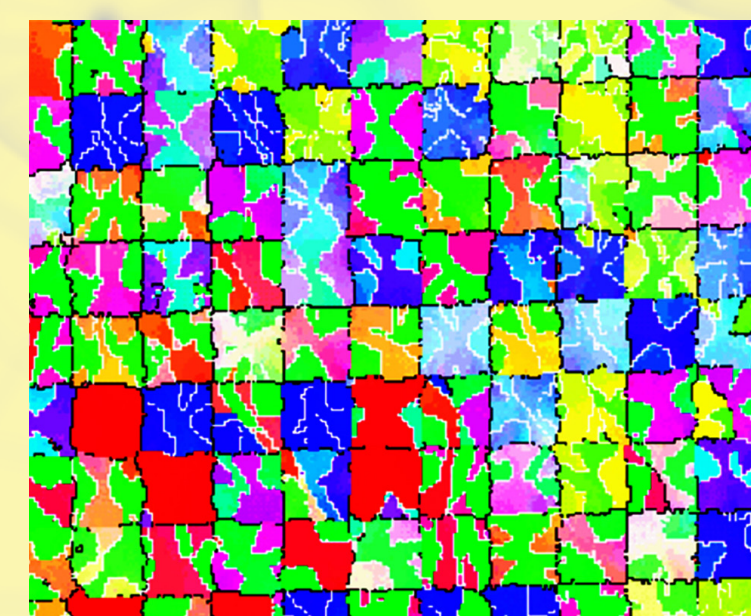


1990 Michael Mauel and Gerald Navratil conduct the first joint experiments with the Tokamak Fusion Test Reactor at the Princeton Plasma Physics Laboratory (PPPL) and achieve the highest poloidal beta operation of a tokamak. In 1993, they participate in the world's first demonstration of fusion energy production using a deuterium-tritium plasma in the PPPL's Tokamak Fusion Test Reactor.

1993 Gerald Navratil and Michael Mauel complete the High Beta Tokamak-Extended Pulse (HBT-EP), the third and largest in a series of tokamaks built at Columbia.



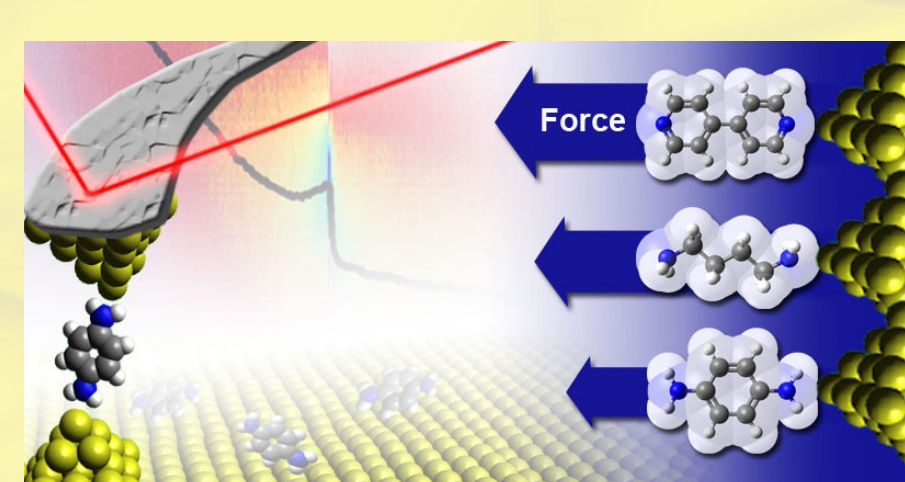
1996 James Im receives the first of many patents on advanced laser-crystallization of silicon thin films. This technology makes possible high-resolution screens featured in products manufactured by Apple, Samsung, Blackberry, and Nokia, among others.



2000 APAM expands its role in mathematical earth science by creating two jointly budgeted faculty members with the Department of Earth and Environmental Sciences (DEES) in the Graduate School of Arts & Sciences.

Adam Sobel develops the weak temperature gradient approximation method for modeling tropical precipitation, revolutionizing scientists' understanding of tropical weather patterns and opening a new avenue for computer modeling and simulation.

Dean Zvi Galil places the Materials Science and Engineering Program of the Henry Krumb School of Mines within APAM, thereby creating a collaborative, multidisciplinary department with research interests in applied physics, applied mathematics, and materials science and engineering.



2007 Latha Venkataraman transforms break junction measurements into a reliable procedure, setting the stage for her important discoveries that have advanced understanding of the electrical conductance of single molecules.

2011 Lorenzo Polvani shows the first link between ozone depletion and climate change in the Southern Hemisphere, which follows his 2008 study suggesting that winds in the Southern Hemisphere will be greatly impacted by the projected recovery of the ozone hole in the latter 21st century.

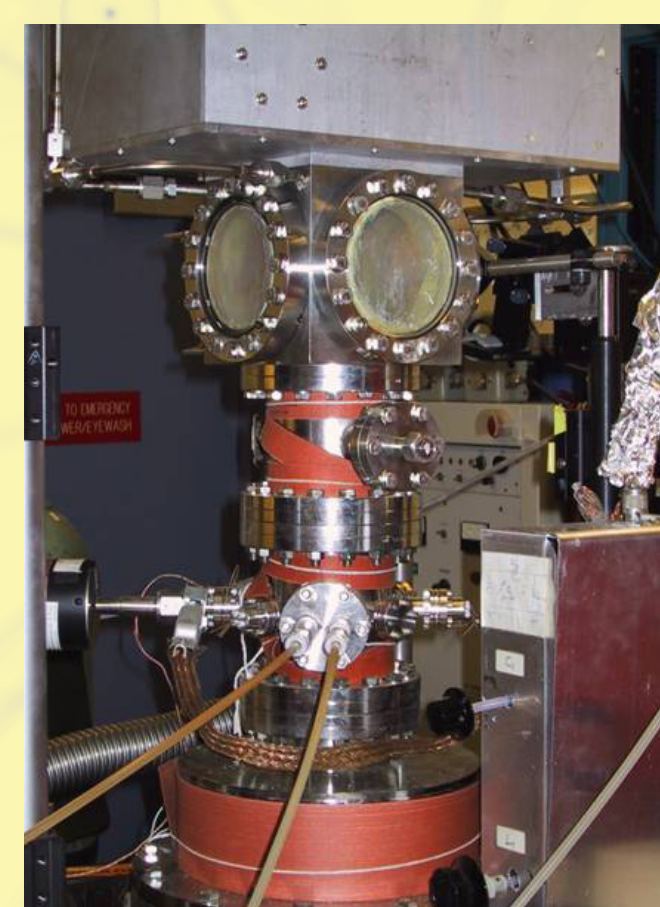
2012 Adam Sobel takes a leading role explaining the science behind Superstorm Sandy to the media and the public, and embarks upon research exploring Sandy's relationship to our present climate and what is likely to happen in the future.

1998 The Applied Physics Department changes its name to the Department of Applied Physics and Applied Mathematics (APAM) to reflect the faculty's commitment to disciplines on a scale made possible by The Fu Foundation's generous endowment to the School.



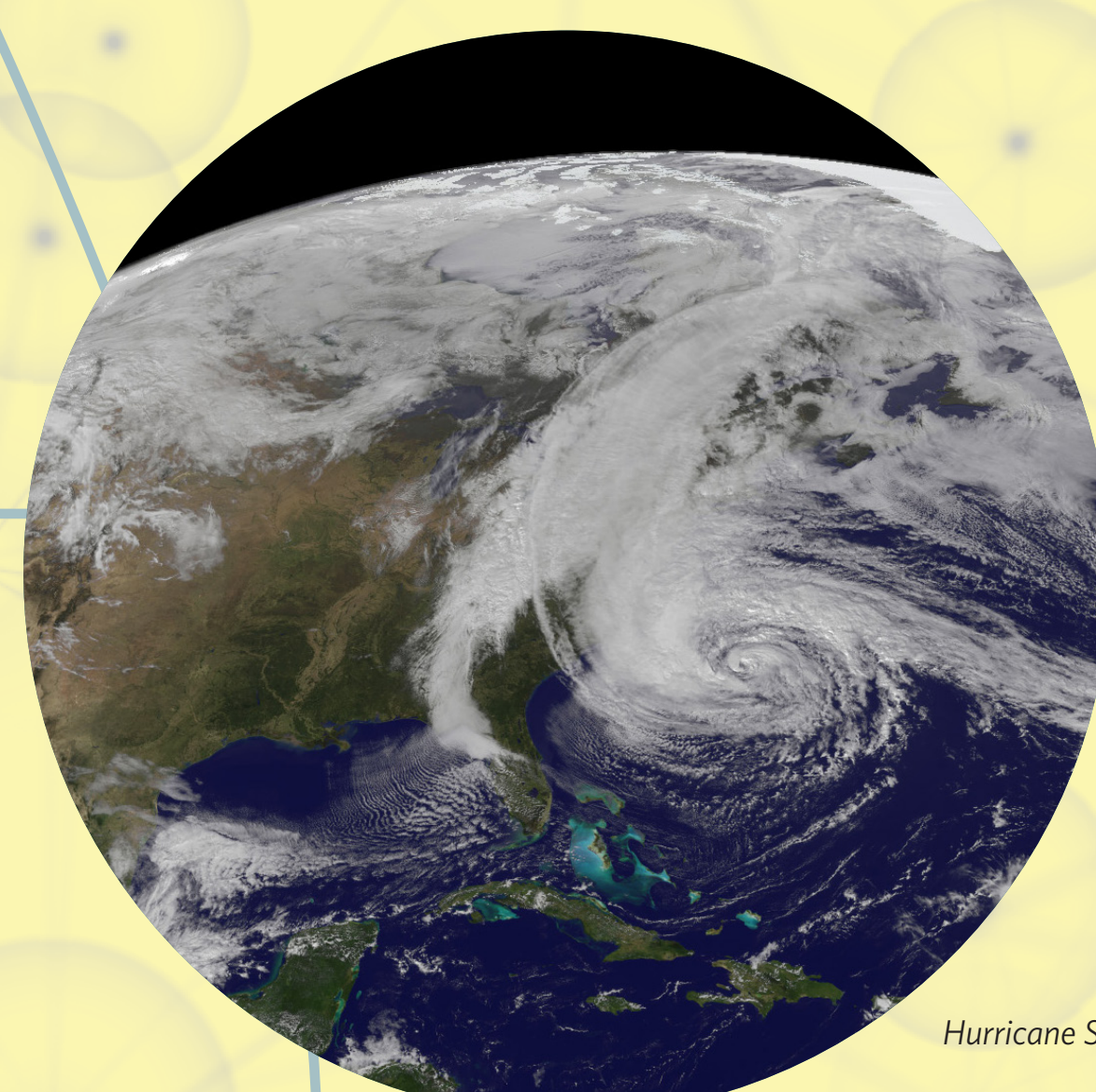
Horst Stormer shares the Nobel Prize in Physics with two others "for their discovery of a new form of quantum fluid with fractionally charged excitations," the fractional quantum Hall effect.

The National Science Foundation establishes the Materials Research Science and Engineering Center (MRSEC) on nanostructured materials at Columbia, which helps set the stage for Columbia's prominence in nanoscience; Irving P. Herman is named director.



2002 Gerald Navratil extends Columbia's active feedback stabilization for tokamaks to the General Atomics DIII-D tokamak, bringing practical fusion energy a step closer, and which leads to his sharing the 2007 Dawson Prize for his pioneering work.

2010 Making an advance with extensive research applications, Michael Mauel and collaborators at MIT demonstrate that the plasma physics of planetary magnetospheres can be reproduced in laboratory settings by magnetically levitating a million ampere superconducting current ring for a number of hours.



Hurricane Sandy in 2012.



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