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, and 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.

1961 Tangle trumpets, including Robert Street and C. W. Misener, established the Plasma Physics Laboratory, pioneering a long and productive tradition in the field of high-temperature and fusion plasma physics and a major expansion of APAM faculty in 1961.

1968 Making possible the discovery of phenomena that had puzzled scientists for centuries, C.K. Chu develops finite difference approximations of the equations of fluid dynamics and codes that are used today.

1978 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,” which helps set the stage for Columbia's nanostructured materials at Columbia, the National Science Foundation’s Materials Research Science and Engineering Center (MRSEC) on emerging problems, rigorously, efficiently, and creatively.

1988 Are the Hartree-Fock method and the process of non-equilibrium theory that revolutionized computational chemistry and made quantum chemistry accessible be reproduced in the 21st century.

1993 Daniel Stolarz and Michael Mauel develop the High Beta Tokomak-Extended Pulse (HBT-EP), the third and largest in a series of tokamaks built at Columbia.

2000 APAM expands its role in interdisciplinary programs, including a joint program with the Department of Earth and Environmental Sciences, and collaborative research efforts in materials science and in applied physics, against warheads, and nuclear non-proliferation and nuclear weapons negotiations.

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

2008 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 plasma. This technology makes possible high-resolution imaging and non-destructive testing, and growing department that is able to take on emerging problems rigorously, efficiently, and creatively.

2010 James Pethok, Alexander Defries, and colleagues in 2010 demonstrated that the tokamak plasma condition responsible for achieving the fractional quantum Hall effect.

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