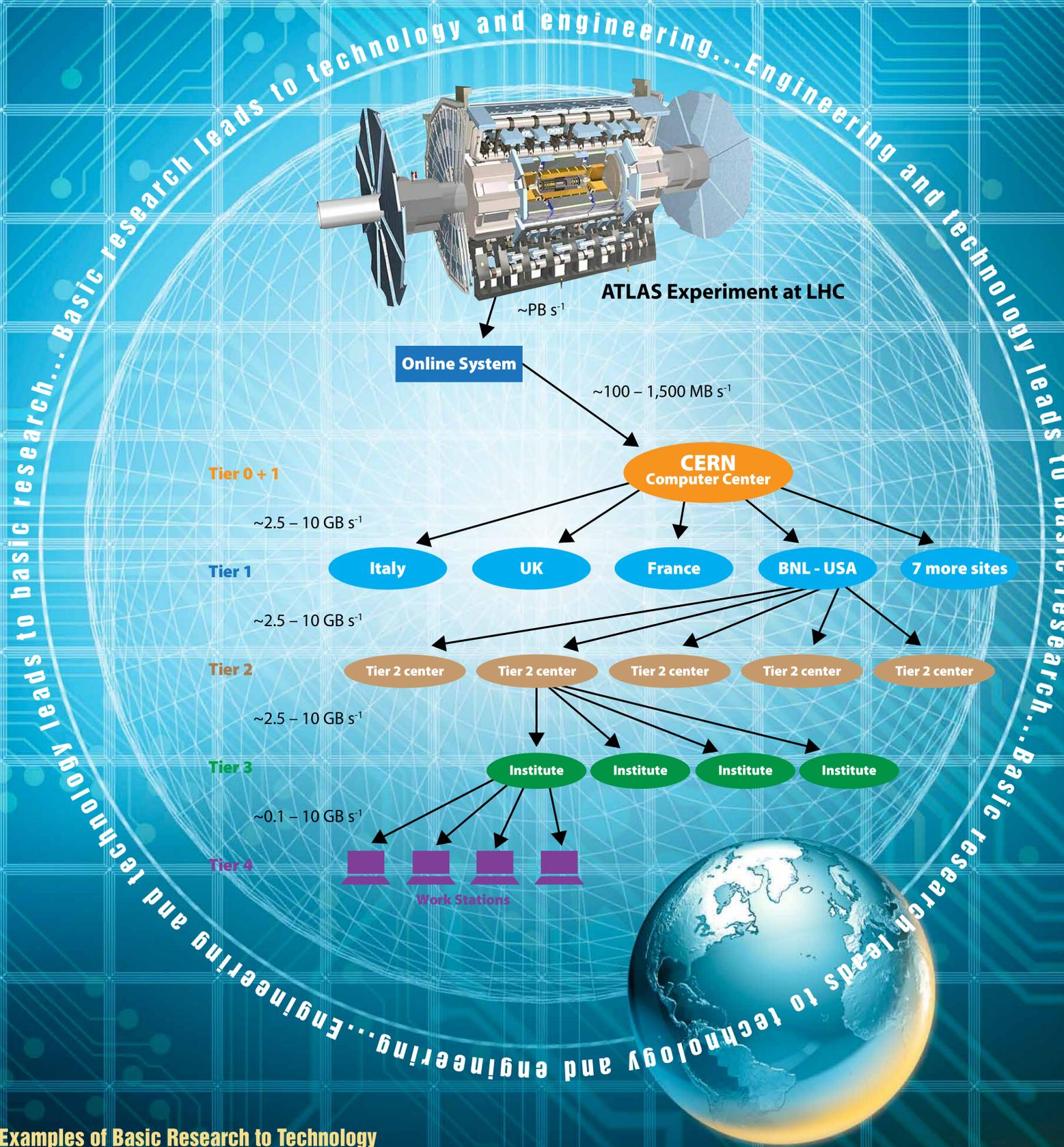


Brookhaven National Laboratory



Two Examples of Basic Research to Technology

First Nuclear Weapon

- 1931 - Discovery of the neutron by James Chadwick
- 1933 - Leó Szilárd theorized neutron driven fission of heavy atoms could create a chain reaction
- 1934 - Enrico Fermi bombards uranium and finds heavier elements
- 1938 - Discovery of fission by Hann and Strassmann

Basic Research in Nuclear Physics

- 1939 - Szilard composed the letter to President Roosevelt signed by Albert Einstein

Transition to Engineering Inevitable

Stealth Technology

- 1962 - Russian Physicist Petr Ufimtsev developed theory to predict the scatter of electromagnetic waves from two-dimensional and three-dimensional objects
 - Considered of no military or economic value, Ufimtsev published in the open scientific literature
 - P. Ya. Ufimtsev, Method of Edge Waves in the Physical Theory of Diffraction, Soviet Radio, Moscow, 1962
 - This theory is now well known as the Physical Theory of Diffraction (PTD).

- 1971 - Translated into English by USAF

- 1981 - First flight



Brookhaven National Laboratory

A Basic and Applied Laboratory Open, User Facility

Scientific Staff and User Community are a reflection of the global scientific community (in our areas of expertise)

Nuclear and High energy Physics, Accelerator S&T, Theoretical Physics, Photon Sciences, Energy Science, Smart Grid, Life Science, Material Science, Large Scale Computation and Data Management, and other disciplines

Grid Computing and the LHC

The LHC poses vast computing challenges

The solution to this big data problem is Grid Computing

- The Open Science Grid is a distributed computing infrastructure connecting over 90 institutions to manage the data and analysis

Worldwide Collaborations

Foreign National Scientists from 39 countries are currently employed by BNL

Scientists from 108 countries are currently registered as Users or Guests

Selected Countries

Country	Registered Guests/Users	Employees
China	922	105
India	326	21
Japan	208	13
Korea, Republic of	175	14
Russian Federation	160	22
Brazil	64	3
Israel	43	4
Argentina	14	-
Egypt	12	2

The US contributes 34 percent of the worldwide computing capacity for the ATLAS experiment, and more than 53 percent of the capacity for the CMS experiment.

Tier-1 centers at Brookhaven National Laboratory and Fermilab provide more than 13.7 petabytes of data storage and 175,000 hours per day of computation time.

Capabilities

BNL could help the IC look over the horizon where trends in basic science are heading and how and when it may be applied

- BNL is making the state-of-the-art in our areas of expertise
- Can help prevent technological surprise

We now have a SCIF and access to JWICS and SIPRnet

A small group of Q-cleared scientists, and some with SCI

The Tier-2 centers, from fifteen universities and one national laboratory, together offer more than three petabytes of data storage and 283,000 hours per day of computing capacity