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RHIC Results – A Topic of Lively Discussion

- In January more than 650 physicists met in California for the Quark Matter 2004 conference to discuss the latest findings on heavy ion physics from facilities around the world.
- The Relativistic Heavy Ion Collider (RHIC) presentations were marked by various bits of corroborative evidence that collisions of gold ions at the Brookhaven accelerator are producing an extremely dense, “sticky” form of matter, quite possibly the postulated quark-gluon plasma which scientists believe last existed a few microseconds after the Big Bang.
- There was animated discussion about other intriguing physics results as well, including the possibility that RHIC experiments have detected the presence of another dense form of matter, known as color glass condensate, in RHIC’s gold ions before collisions take place, and possibly, also, an exotic type of particle containing five quarks.
- Hundreds of physicists from around the world will continue to use RHIC to study what the universe may have looked like during the first fractions of a second after the creation.



Interesting Fact: If quark-gluon plasma is formed in a RHIC collision, it will last less than 0.00000000000000000001 seconds.

About RHIC

- Have you had the chance to visit the Laboratory and see the Relativistic Heavy Ion Collider known as RHIC? RHIC is a world-class scientific research facility that began operation in 2000, following 10 years of development and construction.
- RHIC drives two beams of particles, such as gold ions, to intersect head on, in subatomic collisions. What physicists learn from these collisions may help us understand more about why the physical world works the way it does, from the smallest subatomic particles, to the largest stars. (More on the design of RHIC on the back page.)

(over)

Inside the RHIC Tunnel

#1



#2

#3



- The RHIC machine is enclosed in a 2.4-mile ring tunnel 12 feet under the ground. Two shiny tubes (1) act as giant refrigerators and contain the rings in which ion bunches race around RHIC in opposite directions.
- The collider's two rings are actually made of hundreds of magnets, similar to the one at the left (2), strung together like beads on a necklace. RHIC magnets are superconducting. When cooled to minus 452 degrees Fahrenheit, electricity flows through the magnets with almost no resistance, creating a tremendously powerful magnetic field. This is one of the technologies that allows RHIC to accelerate heavy ions to higher energies than any other machine in the world.
- This beautiful computer image (3) makes visible a magnetic field generated by a RHIC superconducting magnet. The focus of the field is at the center, where the ion beam travels. The magnetic field precisely guides the beam in its many laps around the collider ring.

A Safer Way to Make One Class of Superconductors

- Sangmoon Park, who is a scientist at Brookhaven National Laboratory, has developed a safer, easier, and more environmentally friendly way to create a certain experimental type of superconductor, a material that conducts electricity with zero resistance.
- This new process will facilitate the study of superconductors, which are already used in medical imaging machines and are expected to improve the efficiency of computer chips, electrical transmission lines, and other real-world devices.

Upcoming Events Open to the Public

Eric Forsyth Talk on Latest Voyage, Thursday, March 4, Noon, Berkner Hall: BNL retiree and yachtsman Eric Forsyth will talk and show slides of his latest voyage. All are welcome.

The Mentalist, Gerry McCambridge, The Entertainer to the Stars! Friday, March 19, 7:30 p.m., Berkner Hall: Nightclub act. Tickets are \$10 and available at the BERA Store (631-344-3347).

Due to heightened security, everyone 16 and older who enters the Laboratory site must have a photo ID.