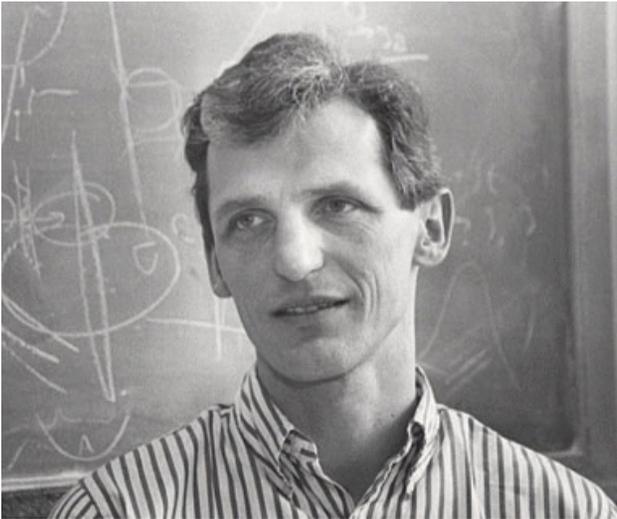


Really Cold Atoms



Wolfgang Ketterle
http://cua.mit.edu/ketterle_group/

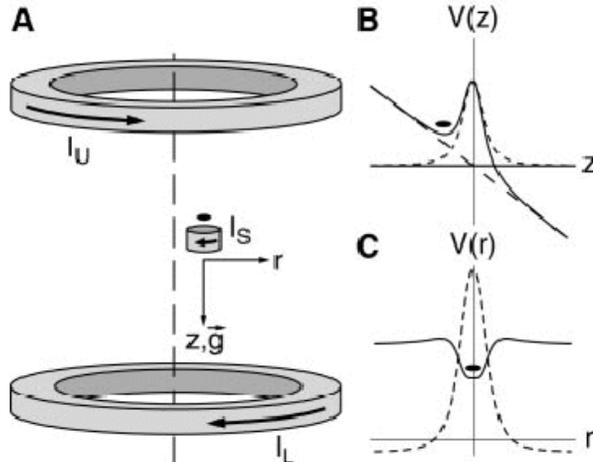
CAMBRIDGE, MASS. - Physicists in the U.S. say they have cooled sodium gas to the lowest temperature ever recorded – half-a-billionth of a degree above absolute zero.

The researchers say the milestone beats the previous record by a factor of six, and marks the first time a gas was cooled below one nanokelvin, or a billionth of a degree. One of the researchers is a Nobel laureate

At absolute zero, -273 degrees C, atomic motion stops as the cooling zaps all the energy from the particles. "To go below one nanokelvin is a little like running a mile under four minutes for the first time," said Nobel laureate Wolfgang Ketterle, co-leader of the physics team at the Massachusetts Institute of Technology.

Ultra-low temperature gases could lead to more precise measurements by **atomic clocks and sensors for gravity and rotation**, according to David Pritchard, an atom optics expert at MIT and co-leader of the team.

Atoms normally move at the speed of a jet airplane at room temperature. At the new record low temperature, atoms move a million times slower, taking 30 seconds to move an inch or 2.5 centimetres.



Ketterle shared the 2001 Nobel Prize in physics with Eric Cornell and Carl Wieman of the University of Colorado at Boulder. In 1995, they created the first Bose-Einstein Condensate, opening up a new area of research in low temperature physics. **Bose-Einstein Condensates are a new form of matter in which super-cooled gas particles "sing in unison" instead of solo.**

Indian physicist S.N. Bose and Albert Einstein mathematically predicted the existence of the matter in 1924. At such extremely low temperatures, atoms stick to the walls of physical containers so magnets are used to keep the gaseous cloud confined.

The MIT team has invented a new way to confine atoms, called a "gravito-magnetic trap." It uses magnetic fields and gravitational forces. The study appears in Friday's issue of the journal *Science* (Leanhardt, A.E. et al., *Science*, **2003**, 301, 1513-1515).

CBC News, <http://www.cbc.ca>, Fri. 12 Sep 2003