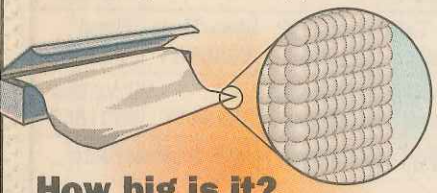
Splitting atoms

The world of the atom is almost incomprehensible – a world so small that it would take 10 billion atoms to equal the length of a meter stick. The atom makes up all matter, yet the atom itself is mostly empty space.



How big is it?

All matter is made up of extremely small units called atoms. A sheet of aluminum foil, for example, is about 250,000 atoms thick.

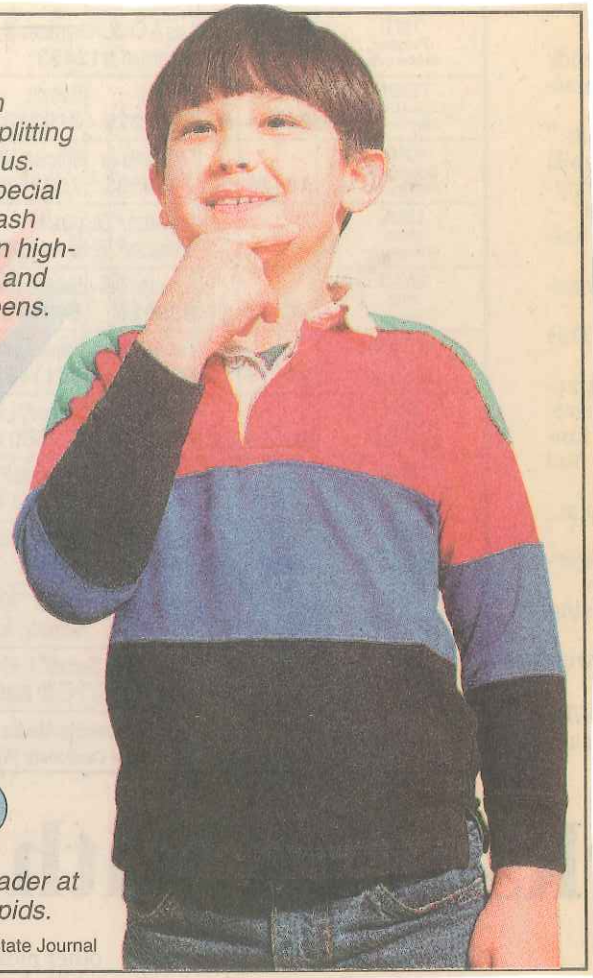
It is this world that David Rathbun opened up with his questions, "How big is an atom? How do they split an atom?"

Dr. Konrad Gelbke, professor of physics at Michigan State University and director of its cyclotron, explained that atoms are made up of a dense nucleus surrounded by an electron cloud. Although the nucleus – composed of protons and neutrons – is less than one ten-thousandth the size of an atom, it contains more than 99 percent of its mass.

The volume of an atom is mostly nothing, according to Dr. Wolfgang Bauer, professor of physics at MSU and director of its theory group. Individually, an atom appears flimsy, Bauer said. In a solid, atoms are packed tightly together, so close they touch at their electron clouds.

To split an atom, scientists need a tool smaller than the atom and lots of energy, Gelbke said. These tools are pieces of atoms accelerated to tremendous speeds. In special machines called accelerators scientists use electric fields to speed up nuclei and crash them into each other, studying the after-effects with special detectors.

Splitting an atom usually means splitting the atom's nucleus. Scientists use special machines to smash nuclei together in high-speed collisions and study what happens.



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