

## Weakly Interacting Massive Particle....

April 11 2000

Last month a nuclear particle physics laboratory, deep under a mountain in northern Italy, announced the discover of a WIMP. Physicists will not get too excited over this weird particle until another laboratory confirms its reality by finding a second one.

So what is a WIMP? It is a Weakly Interacting Massive Particle. Oodles of them are thought by some astrophysicists to account for missing mass in galaxies. It is quite a clever idea- far more sensible than some theories that have been bandied around. I say this because we already know about what I'll call WILP's, better known as neutrinos. Neutrinos are extremely light weakly interacting sub-atomic particles.

Neutrinos interact very weakly with matter. They were suggested in the early 1930's to balance the equations governing some radioactive decay processes - those involving electrons and positrons. They are so elusive that it took a quarter of a century to prove their existence.

But neutrinos sure are plentiful. About 80 million of them, mostly from the Sun, pass through every square centimeter of your body (and mine) every second of every day. We are totally unconscious of the nuclear bombardment because all bar the odd one pass straight on through us without doing any harm. In fact most neutrinos pass right on through the Earth and out the other side without much loss. The average neutrino can pass through a block of lead a light-year thick without being absorbed. That's why they were so hare to catch and reveal themselves. It's all due to the weakness of their interaction with matter. The mass of neutrinos is so small and hard to measure that physicists lack a good value and one (possibly) netted so far it is too early to say exactly how heavy.

While the concept of WIMP'S has its attractions, there are many aspects that worry me. If they provide up to ninety percent of the mass of a galaxy, to keep stars from escaping, why don't they in turn provide a similar fraction of the mass of a galaxy, to keep stars from escaping, why don't they in turn provide a similar fraction of the mass of stars and planets? Maybe they are too hot, meaning they possess too much energy to remain trapped in objects small than galaxies. Even so, my limited grasp of thermodynamics suggests that some will have low enough energy to be trapped, if not to any great extent in stars, as least in the cores of galaxies. There, as they accumulated, they would initiate the formation of black holes. And there is strong evidence that the hearts of galaxies, including our own, do in fact contain black holes. When and if the mass of a typical WIMP is eventually measured, it will become possible to calculate roughly how many pass through our bodies every second without our knowledge. It could be a very large number indeed. What a scandalous invasion of privacy!