Exploring the secrets of dark matter

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Even the biggest Star Trek fan would probably have trouble understanding the technical details of the research done by Queen's University Particle Astrophysics Professor Wolfgang Rau of Kingston, Canada.

Professor Rau is the only Canadian researcher among the group of 60 scientists involved in the Cryogenic Dark Matter Search experiment (CDMS) whose latest findings are published in the latest edition of *Science* magazine. Professor Rau says the project is among the top two or three most important experiments on this subject in the world.

He uses a simple analogy to explain his complex search for dark matter - the difficult-to-detect particles that played a central role in the evolution of the Universe and the formation of our galaxy.

"It's kind of trying to find a needle in a haystack. But we tend to do things a little differently in science. Instead of just digging for the needle, we are looking at getting rid of some of the hay," says Professor Rau, who also holds a Canada Research Chair position in particle astrophysics.

The needle would be an interaction between a dark matter particle with ordinary matter in a particle detector, while the hay would represent interactions of particles from other sources such as cosmic radiation, referred to as "background".

Two events recorded during the CDMS experiment had the

characteristics of an interaction involving dark matter particle.

"We do additional tests to see if these interactions have come from background sources or if they were indeed from dark matter particles," says Professor Rau. "We have seen these two events and so far we really can't say what it is. We have reached the limit of what our experiment can do with this configuration. Presently we are upgrading our detectors to improve our sensitivity, but eventually we plan to build a much bigger experiment at SNOLAB, the [Queen's affiliated] underground laboratory near Sudbury."

Understanding dark matter will help scientists answer basic questions about the origin of the universe.

"Dark matter makes up roughly 85 per cent of the matter in the universe and we don't know what it is," says Professor Rau. "Dark matter is responsible for us having galaxies in the first place and plays a very important role in the evolution of the universe. It is fundamental science what we are doing. If there was no dark matter, we wouldn't be here."

More information: Copy of the study is available at: www.sciencemag.org/cgi/rapidpd … cience.1186112v1.pdf

Provided by Queen's University

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