What is WALTA?

Imagine the kinetic energy of a Randy Johnson fastball concentrated in a single proton. On average, subatomic particles that energetic strike a 100 km2 area of the earth's surface once a year. Where do they come from and what is their nature? *The aim of the WALTA project is to bring this question into the classroom, with teachers and students as co-investigators.*

When they do arrive, these high energy cosmic rays smash a nucleus in the upper atmosphere, causing a "shower" of secondary particles, some of which reach sea level. In order to study these events, it is necessary to build a *very* big detector. An Extensive Air Shower (EAS) array will be constructed by placing small individual particle detectors on middle and high school rooftops throughout the Puget Sound region. These small detectors will send information to a PC that will be placed at the school. The PCs will download data through the Internet at regular intervals to a data analysis center at the University of Washington. By observing the pattern of particles detected in the EAS array we can reconstruct the arrival direction and the energy of the original cosmic ray particle.

Meanwhile, students and teachers at the school site will be active collaborators on the research project. They will be able to analyze both the data they are contributing and the overall data pool, providing opportunities for learning experiences in physics, math, and computer applications. UW faculty and graduate students will be actively engaged in working with the students and teachers at the schools, to help integrate the opportunities provided by this project with the normal requirements and goals of the school curriculum. In addition, the detectors stations at the schools will include some basic sensors for gathering weather related data. The PCs will allow students and teachers to record, examine and analyze these data as well, providing real data for the earth and physical science classroom!

WALTA and WASL

We believe that there is a strong potential connection between the goals of the WALTA project and our state's Essential Academic Learning Requirements. The authors of the science EALRs state: "*Learning in science depends on actively doing science. Active engagement in hands-on, minds-on science learning experiences enables students to make personal sense of the physical world and to solve problems.*".

Involvement in the WALTA project gives students and teachers a chance to become truly involved in *doing* science and in using mathematics to understand the world around them.

Examples of connections in the science Essential Learnings:

2. *The student knows and applies the skills and processes of science and technology*

<u>2.1 Develop abilities necessary to do scientific inquiry:</u>

- Designing & conducting investigations
- Explanation
- Modeling:

3. *The student understands the nature and contexts of science and technology.*

<u>3.1 Understand the nature of scientific inquiry:</u>

- Dealing with inconsistencies:
- Evolution of scientific ideas:

If you are interested in learning more about WALTA, please call Jeffrey Wilkes at the University of Washington

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WALTA home page:
www.phys.washington.edu/~walta/

Open Questions:

- How/where are cosmic rays made?

- What process accelerates them to such high energies?
Supernova shocks?
Compact binary systems?
Active Galactic Nuclei?

- Why don't the highest energy cosmic rays point toward something interesting?

- Why are there kinks in the cosmic ray energy spectrum?

- How can the highest energy cosmic rays (>1020 eV) ever reach us? The GZK cutoff should stop them.

University of Washington
Department of Physics

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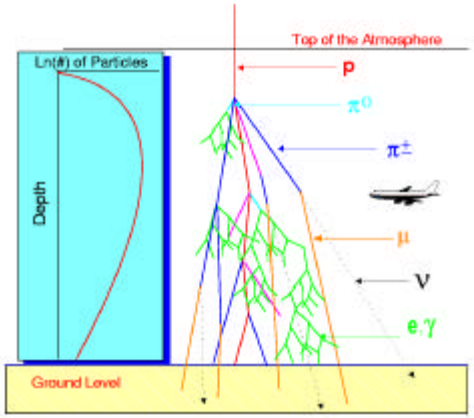
WALTA:

Washington Large-area Time-coincidence



Array

WALTA is a project to investigate the highest energy cosmic rays with the participation of middle and high school students and teachers throughout the Seattle area. WALTA aims to provide teachers and students the opportunity to become active participants in forefront scientific projects.

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