The increments of science

Particle physics rarely makes headline news, but that doesn't mean it isn't continually making progress. As in all sciences, research progresses through a series of incremental advances, with the occasional breakthrough that changes the way scientists think. Even those breakthroughs, however, are generally enabled by incremental work that is rarely acknowledged.

In this issue of *symmetry*, we celebrate the increments of science, focusing in particular on the Result of the Week column from *Fermilab Today* (see page 10). It is probably quite remarkable for most people to hear that there is such a continual flow of results. The last time Fermilab made front-page news around the world was for the discovery of the top quark in 1995. But that is neither the latest discovery, nor even the latest really important advance at Fermilab. Essentially all laboratories and scientific institutions work this way—daily or weekly progress gradually helps build a better understanding of the universe.

Along with dogged determination, progress in science can come from an unexpected confluence of interests. Mix a quantum of particle physics with a bolt of meteorology, and throw in a splash of hydrogeology; the result is a new way to look at weather measurement (see page 24). The approach developed by this creative combination of expertise might not yet be the dominant way to make the weekend's forecast, but it provides an extra tool in the kit. For now, it is bringing scientists to a much more powerful understanding of the relationship between the Earth's weather and climate and how they interact with some of the most fundamental physical processes in nature.

Also crossing fields of science and different scales, scientists are piecing together quite a mysterious puzzle by exploring rare isotopes, or atoms with unusual numbers of neutrons in their cores (see page 18). One by one, scientists find new isotopes. Each in itself is an intriguing scientific curiosity with the potential to tell us about, say, the geological evolution of the Earth or the life cycles of stars, but their greatest power comes in the story they tell when combined. The whole picture, once visible, is bound to contain revelations about how the interrelationships of subatomic particles drive the physical evolution of everything in the universe.

Photo: Reidar Hahn, Fermilab

The small steps might not be front-page news, but they are the heart of the fascination science holds, and the promise of future blockbuster discoveries that the whole world will talk about.

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