

Scientific Knowledge Discovery
Combining results into Knowledge—the Particle Data Group
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Preface:

A complete picture of the state of knowledge in any given physics domain often requires a synthesis of results, data and information from multiple sources. In this challenge, we outline the state of one domain's current methodology to synthesize results into knowledge and to widely distribute that knowledge.

High Energy Physics:

The Review of Particle Physics has been called the bible of particle physics; over the years, it has been cited in 30,000 papers. The summaries are published in even-numbered years as a now 1340-page book, the Review of Particle Physics. The Review is published in a major journal, and in addition the PDG distributes 16,000 copies of it and 31,000 copies of the Booklet is available online. The Review includes a compilation and evaluation of measurements of the properties of the elementary particles.

In the 2008 Review, the listings include 2,778 new measurements from 645 papers, in addition to 24,559 measurements from 7,104 papers that appeared in earlier editions. Evaluations of these properties are abstracted in summary tables.

Compiling, evaluating and performing statistical combinations necessary for the Review is a labor intensive process. The Particle Data Group (<http://pdg.lbl.gov/>) an international collaboration charged with summarizing Particle Physics, as well as related areas of Cosmology and Astrophysics. In 2008, the PDG consists of 170 authors from 108 institutions in 20 countries. Assignments must be made and the contribution of each collaborator has to be tracked. The system works well; however is dependent on a population that is approaching the end of the career.

Issues:

- The construction of the current PDG Review of Particle Physics is effectively ‘crowd-sourced’ over a population of that is roughly 3% of the active researchers in the field of particle physics.
- The business model for publications is rapidly changing with subscription revenue declining and charges to authors increasing. A comprehensive Review based solely on results published peer reviewed journals may not be possible as the journal publication landscape changes.
- This opens up the possibility of developing of processes which would enable the construction of an online ‘Review’ that similarly uses crowd-source for data input and validation This issue is not unique: Other domains also support various Review and/or ‘Atlas’ of results. This gives the potential to generalize the infrastructure as well as to research the most effective UX to make the knowledge contained in the reviews as accessible and useable a possible.
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