# Statement from the INSPIRE Advisory Board to the P5 panel

Particle physics has a uniquely effective information infrastructure, based on the services INSPIRE, Particle Data Group, arXiv, and HepData. Of these, the first two rely on funding from the US DOE. As these services aid you in preparing the P5 report, please remember to recommend their continued support.

We are writing to convey input from the INSPIRE Advisory Board to the P5 deliberations. The INSPIRE Advisory Board is a group of high energy physicists active in research who are asked to give advice to the INSPIRE Collaboration. In our research and administrative activities, we are also constantly using other particle physics information resources.

In particle physics, we are blessed to have a set of very effective organizations that supply us with *a complete and curated body of information* on the physics results and the supporting papers that are produced in our field. These include the Particle Data Group, INSPIRE, arXiv, and HEPData. Of these, the first two receive support from the DOE Office of High Energy Physics; the continuation of this support depends on the decisions of P5.

We have this infrastructure because we invented it. In 1958, Arthur Rosenfeld at LBL organized a central repository to give order to the increasing number of observed hadronic resonances. In 1969, Louise Addis at SLAC invented the modern system of preprint distribution and announcement. In 1991, Paul Kunz at SLAC gave Addis' system, organized in the SPIRES database, a WWW interface, creating the first web search engine. Also in 1991, the string theorist Paul Ginsparg at LANL created the first automated preprint (eprint) server, which evolved into the current arXiv.

The PDG and INSPIRE services are among the most widely used in particle physics. The several volumes of the "Review of Particle Properties" are by far the most cited references in the particle physics literature. A graph of the citation counts by issuing year is shown in Fig. 1. The total number of citations to the four PDG volumes from 2016 on is 21,016. For comparison, the total citation count for Weinberg's 1967 paper on his weak interaction theory is 13,927. A graph of the monthly usage of INSPIRE for the past few years is shown in Fig. 2. The service has had more than 500,000 visits per month, corresponding to about 100,000 unique visitors.

Many adminstrators will tell you that these tools are now obsolete, replaced by automated information-gathering programs such as Google Scholar and soon to be overwhelmed by ChatGPT and its competitors. We working scientists disagree. In a field such as ours that requires technical correctness, it is important to have access to *all* measurements and *all* papers that report and discuss them. A large fraction of the references can be gathered automatically. The repair of gaps and errors can be crowd-sourced. The PDG relies on an extensive group of volunteer contributors, and INSPIRE relies on the large network of its users to report needed corrections. But evaluating this information and presenting it in the

most useful format still requires a core team of knowledgeable humans. The standard of complete and curated information is crucial to us as scientists and cannot be obtained in any other way.

For younger physicists, INSPIRE is a central tool of reseach. In addition to traditional author and title searching, they can do citation-based searching, working backwards from a current paper to the original, seminal paper that first presented its key ideas, or working forward from a prominent review article to the latest developments. Young theorists also obsess over their own citation counts, which they conisder crucial to obtain an academic appointment, and are very active in reporting needed corrections to the INSPIRE record.

Young experimenters want to see themselves credited in collaboration lists. Even if you are author # 1207 on an ATLAS paper, that paper might be the most important one of your career, so it must be guaranteed that you are included. In INSPIRE, the correctness of collaboration author lists is the responsibility of a person—Margaret Miller at Fermilab.

Senior scientists such as myself are using INSPIRE almost constantly. Every person who comes to my office with a physics question goes away with a list of the most useful papers to read, culled from INSPIRE. I refer to INSPIRE for the needed background when I write letters of recommendation and when I am asked to review promotions and grant proposals. The members of P5 will appreciate the power of INSPIRE much better after they have used this tool to assemble and verify the details of the P5 report.

The PDG and INSPIRE teams are small, and, maybe just for that reason, they are constantly endangered. The PDG has run with 3.5 FTE of scientific staff and 3.2 FTE (soon to increase to 3.8 FTE) of professional staff, so far including only a single software developer. Most staff are based at LBNL and funded primarily by DOE OHEP, with important contributions from INFN and Japan. The PDG received a shock in 2012 when the NSF dropped its long-established support, but the organization has now restructured and recovered.

The evolution of the INSPIRE team is shown in Table 1. INSPIRE was forced to organize in 2008 because the former SPIRES team lost support in the reorganization when SLAC transfered from DOE OHEP to DOE Basic Energy Sciences. Since that time, CERN has taken the main responsibility for the INSPIRE organization, and the INSPIRE servers run in the CERN cloud. Support through SLAC has recently gone to zero without an appreciable increase at Fermilab. New member labs have joined INSPIRE—IHEP and IN2P3—but the support of the INSPIRE group at DESY is now in question.

Please join with the many users of PDG and INSPIRE in calling to maintain the core groups that provide these services by recommending their continued support in the P5 report.

members of the INSPIRE Advisory Board:

Alberto Accomazzi, Project Manager, NASA Astrophysics Data System,
Harvard-Smithsonian Center for Astrophysics (ADS)
John Beacom (Chair), Professor (Ohio State U.)
Kyle Cranmer, Professor (New York University)
Yonit Hochberg, Assistant Professor (Hebrew University)
Rob Kutschke, Senior Scientist (Fermilab)
Kendall Mahn, Associate Professor (Michigan State U)
Michelangelo Mangano, Senior Theoretical Physicist (CERN)
Michael Peskin, Professor, Theoretical Physics Group (SLAC)
Jürgen Reuter, Theoretical Particle Physics (DESY)
Qiang Zhao, Professor, Deputy Director of Theory Division (IHEP)
Silvia Zorzetti, Quantum Computing (Fermilab)

| Year | CERN | DESY | Fermilab | IHEP | IN2P3 | SLAC | total |
|---|---|---|---|---|---|---|---|
| 2012 | 5.5 | 5.3 | 2.2 | 0 | 0 | 6.0 | 19.0 |
| 2016 | 12.0 | 4.5 | 4.0 | 2.5 | 1 | 3.3 | 27.3 |
| 2019 | 9.5 | 3.4 | 2.5 | 2.5 | 1 | 1.5 | 20.4 |
| 2023 | 6.0 | 3.2 | 3.25 | 2.5 | 1 | 0 | 15.95 |

Table 1: INSPIRE personnel at each member laboratory, in FTE. Staffing varies from year to year with the arrival and departure of students and other part-time workers. The higher counts for CERN in the intermediate years reflect additional software developers for the new INSPIRE format and backend.

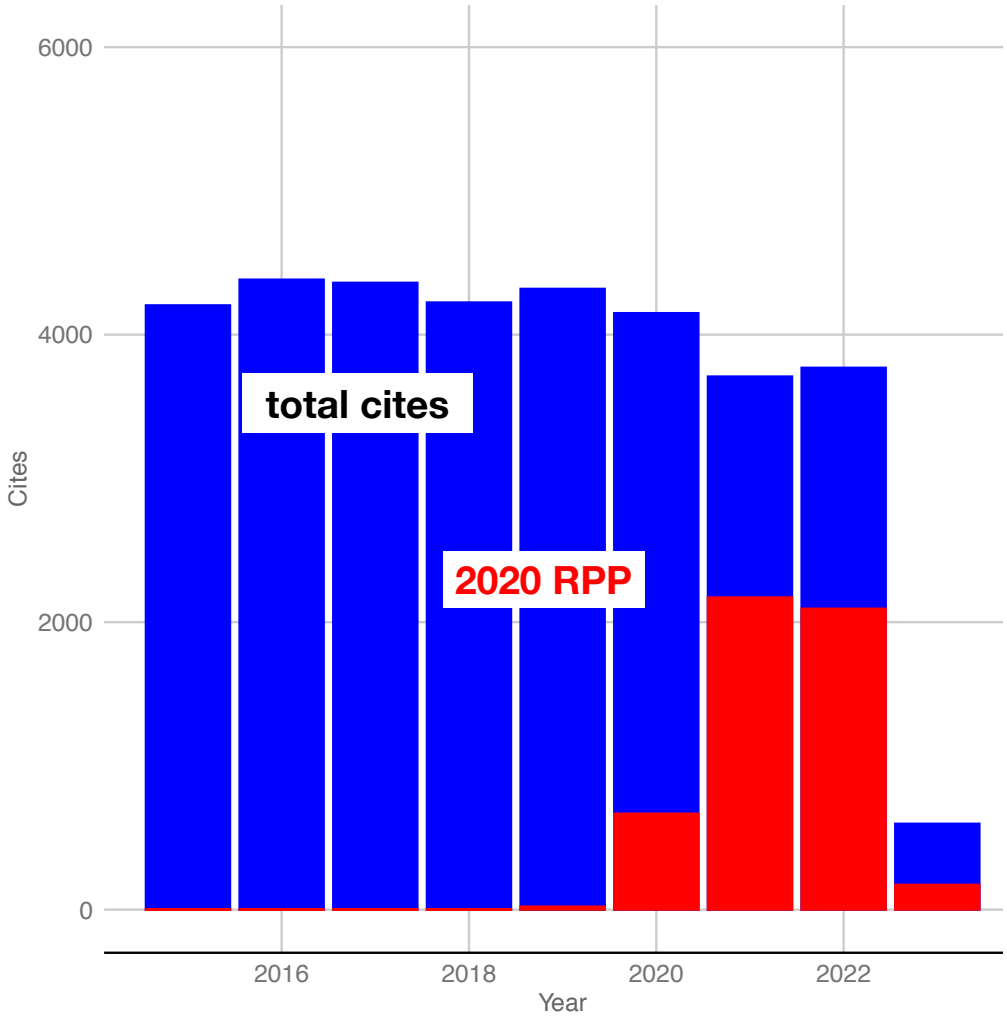


Figure 1: Total citations of the *Review of Particle Properties* by year, from INSPIRE. The red histogram shows the citations to the 2020 edition of the review.

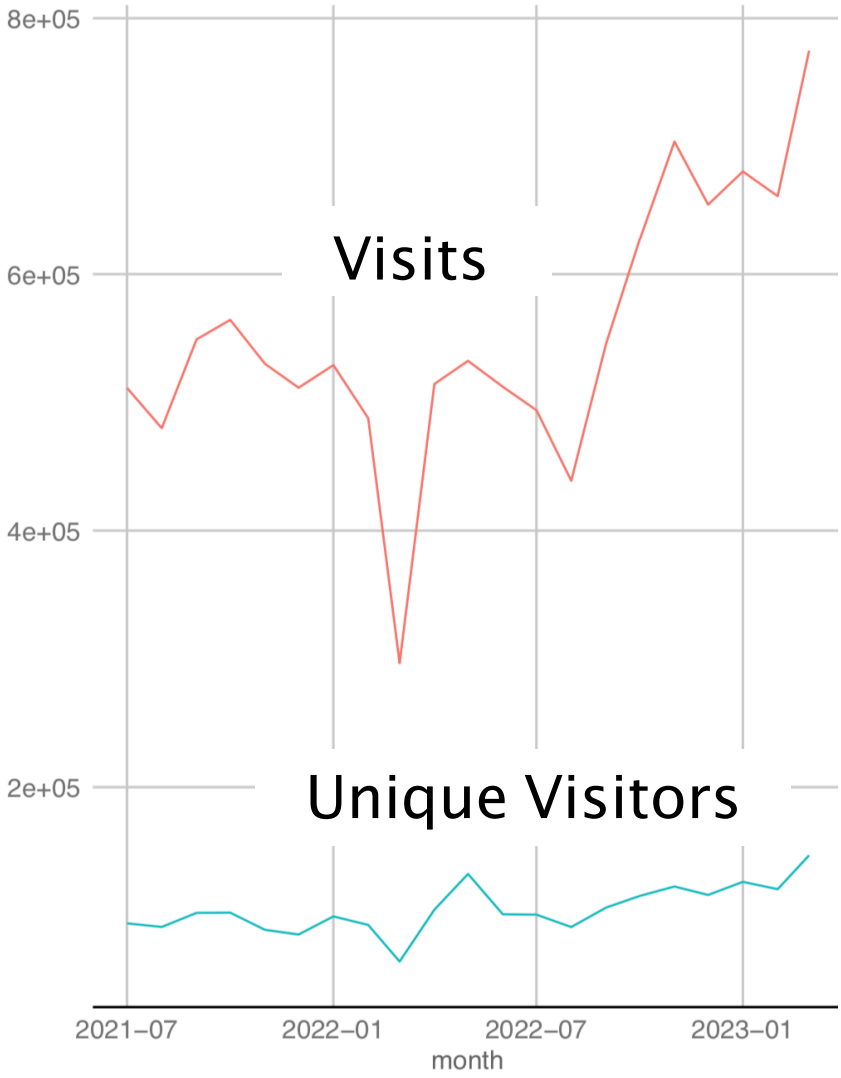


Figure 2: Recent usage of the INSPIRE-HEP platform, showing, month by month, the total visits and the number of unique visitors.