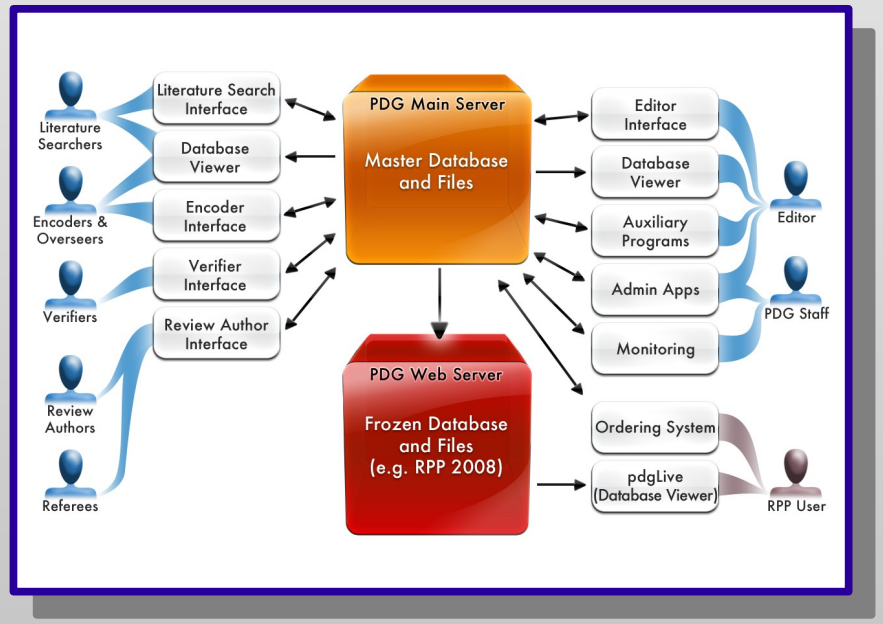
PDG Computing: Present and Future

J. Beringer
Particle Data Group
Lawrence Berkeley National Laboratory

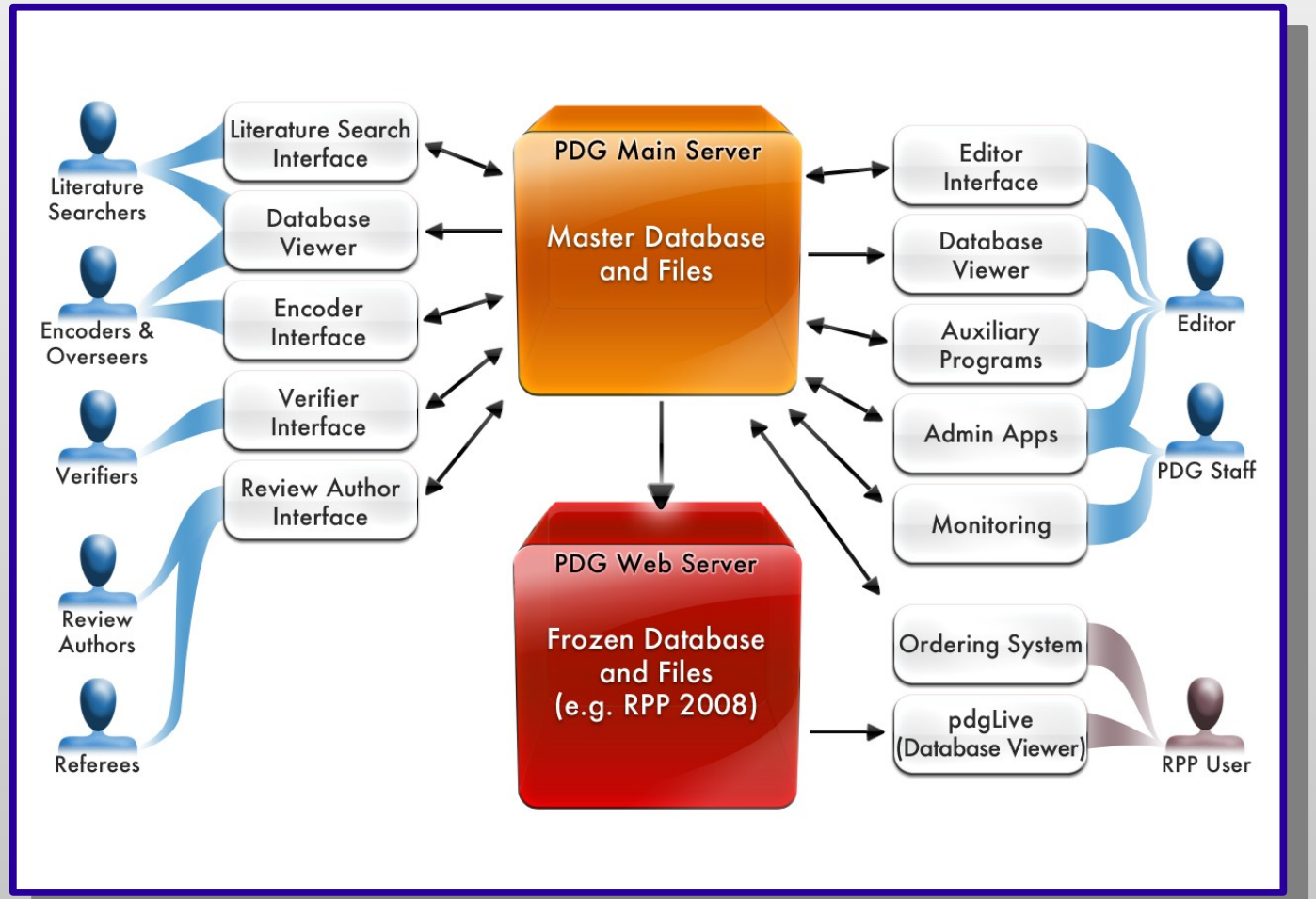


Outline:

- First full production cycle with the new computing system
- Computing support
- Plans for the future

Introduction

- **Computing upgrade completed in December 2011**
- **New system has now been used successfully for the first full production cycle (some parts have been used since 2010)**

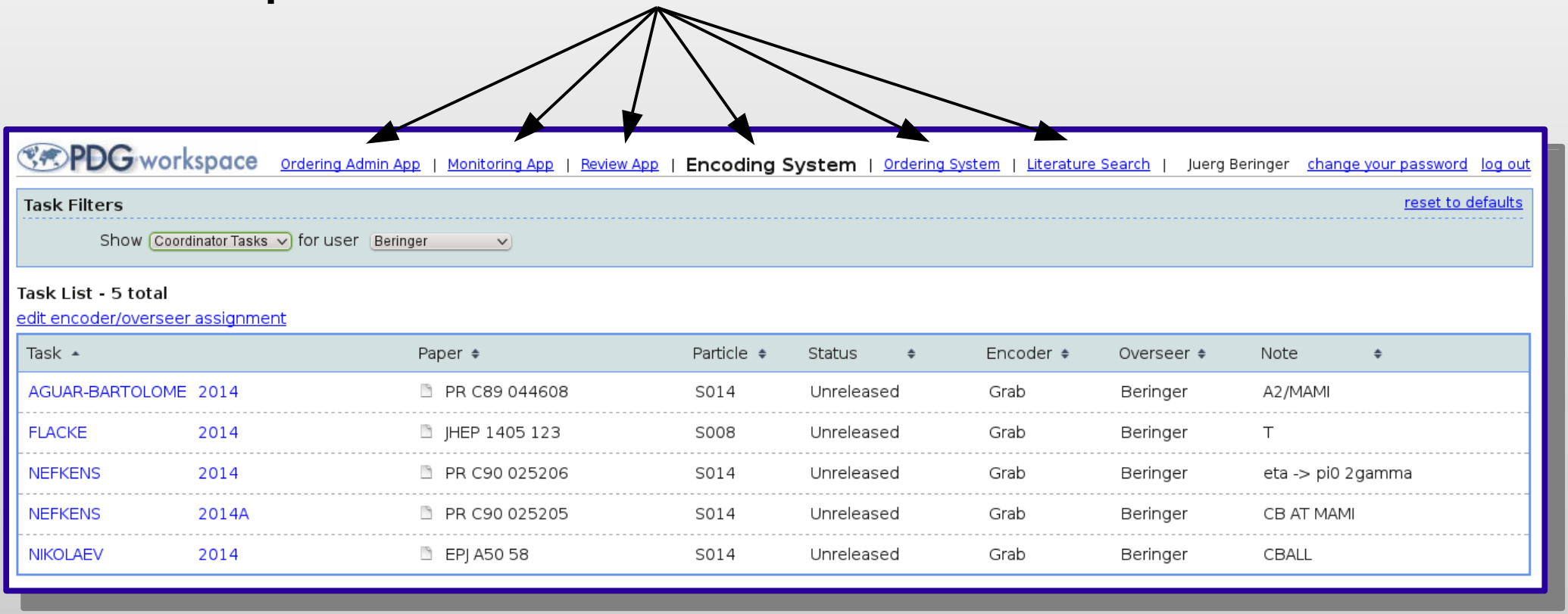


Deployment

- **After project completion in 2011, focus was on deployment**
  - **pdgLive** and **Ordering System** for PDG users
  - **PdgWorkspace** with different tools for collaborators
- **Starting in 2012, collaborators gradually invited to start using the new system**
  - Almost all review authors used the Review Authoring System
  - About half of encoders and overseers used Encoding System
  - As expected, received large number of bug reports and suggestions for improvements
    - Essential for improving our computing infrastructure

PdgWorkspace

- **Starting point for collaborators, login at https://pdgprod.lbl.gov/PdgWorkspace/**
- **Each person sees a list of tools tailored to their role**



PDG workspace | Ordering Admin App | Monitoring App | Review App | **Encoding System** | Ordering System | Literature Search | Juerg Beringer change your password log out

Task Filters reset to defaults

Show Coordinator Tasks for user Beringer

Task List - 5 total

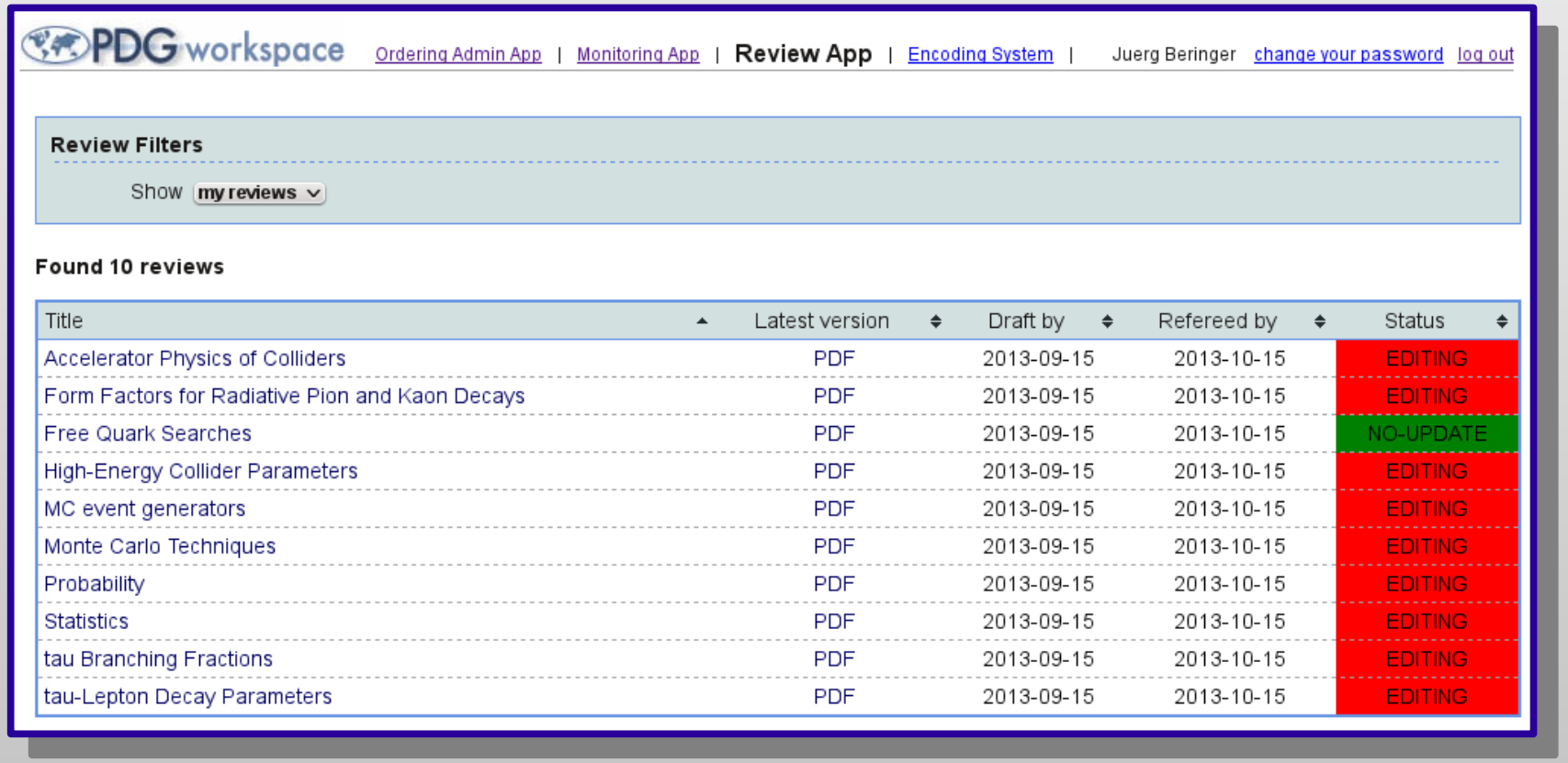
edit encoder/overseer assignment

Task	Paper	Particle	Status	Encoder	Overseer	Note
AGUAR-BARTOLOME 2014	PR C89 044608	S014	Unreleased	Grab	Beringer	A2/MAMI
FLACKE 2014	JHEP 1405 123	S008	Unreleased	Grab	Beringer	T
NEFKENS 2014	PR C90 025206	S014	Unreleased	Grab	Beringer	eta -> pi0 2gamma
NEFKENS 2014A	PR C90 025205	S014	Unreleased	Grab	Beringer	CB AT MAMI
NIKOLAEV 2014	EPJ A50 58	S014	Unreleased	Grab	Beringer	CBALL

- **In following, will only discuss few selected applications**

Review Authoring System

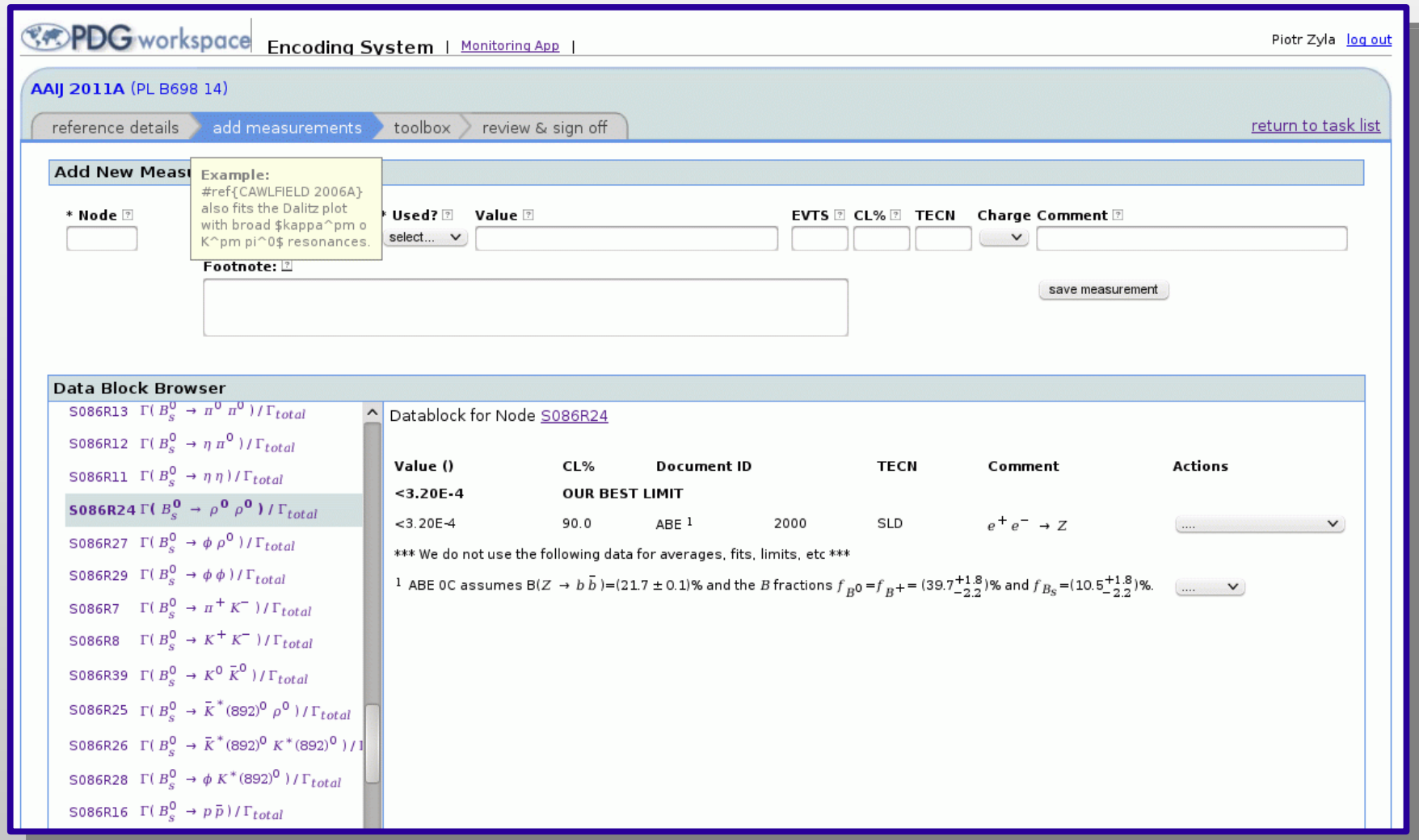
- **Subversion (SVN) repository to aid in review authoring**
- **Can also get tar archive with source files and edit locally, as in the past**
  - Important: before starting to update a review, always get latest version of source files!



Title	Latest version	Draft by	Refereed by	Status
Accelerator Physics of Colliders	PDF	2013-09-15	2013-10-15	EDITING
Form Factors for Radiative Pion and Kaon Decays	PDF	2013-09-15	2013-10-15	EDITING
Free Quark Searches	PDF	2013-09-15	2013-10-15	NO-UPDATE
High-Energy Collider Parameters	PDF	2013-09-15	2013-10-15	EDITING
MC event generators	PDF	2013-09-15	2013-10-15	EDITING
Monte Carlo Techniques	PDF	2013-09-15	2013-10-15	EDITING
Probability	PDF	2013-09-15	2013-10-15	EDITING
Statistics	PDF	2013-09-15	2013-10-15	EDITING
tau Branching Fractions	PDF	2013-09-15	2013-10-15	EDITING
tau-Lepton Decay Parameters	PDF	2013-09-15	2013-10-15	EDITING

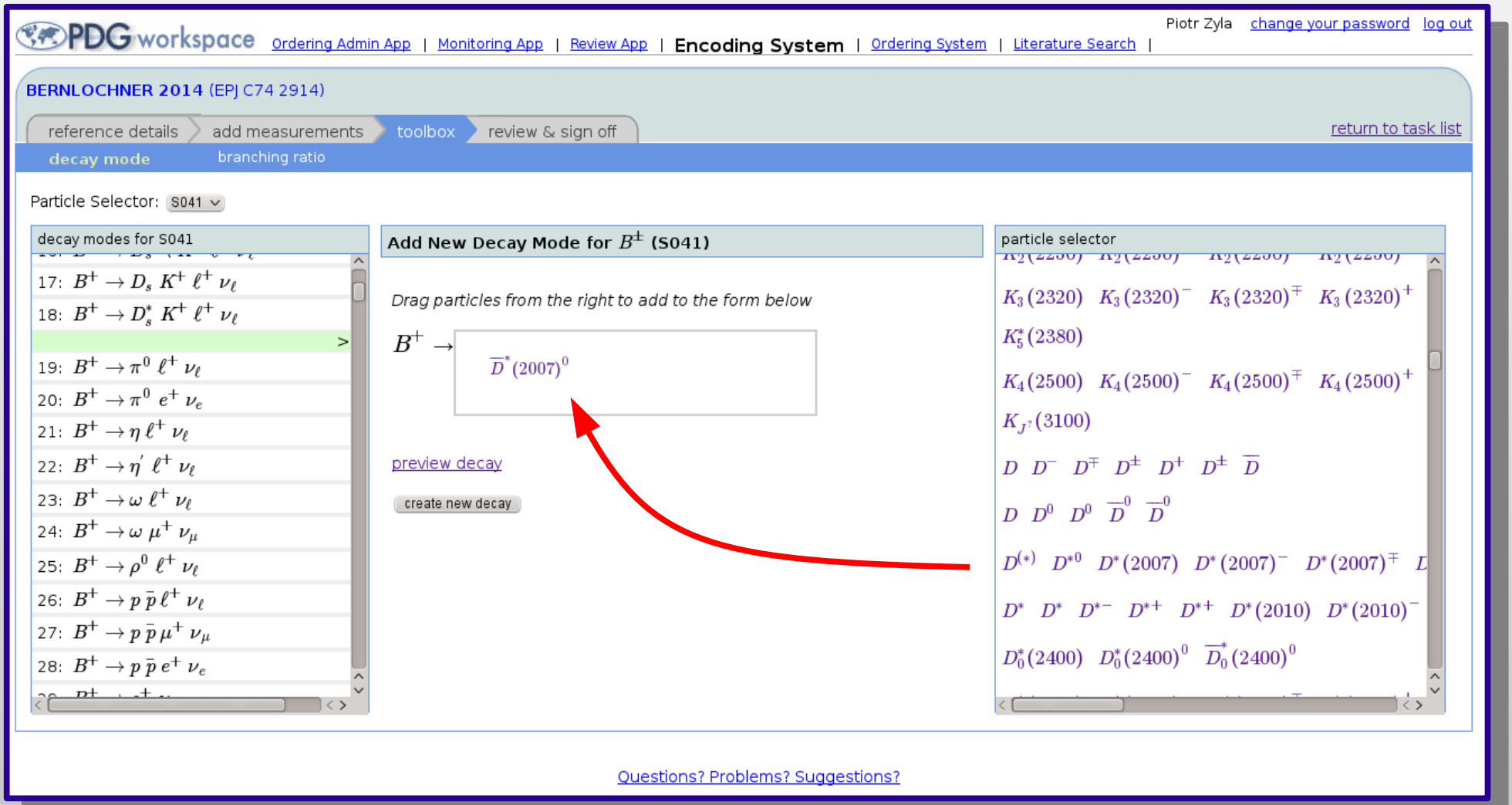
Encoding System

- Guides collaborators through adding of published results
- Knows responsibilities of each collaborators



UI Design

- **How can collaborators correctly enter items involving math?**
  - Solution: drag and drop



pdgLive – New Features

- **Print-like quality display of TeX on the web**

Γ_6	$B^+ \to \overline{D}^*(2007)^0\, \ell^+\, \nu_\ell$
Γ_7	$B^+ \to \overline{D}^*(2007)^0\, \tau^+\, \nu_\tau$

- **Improved presentation of branching ratios**

$B^+ \to \overline{D}^0\, \ell^+\, \nu_\ell$ INSPIRE search

$\Gamma(B^+ \to \overline{D}^0\, \ell^+\, \nu_\ell)/\Gamma_{total}$	$\Gamma_4/\Gamma^{B^\pm}$
$\Gamma(B^+ \to \overline{D}^0\, \ell^+\, \nu_\ell)/\Gamma(B^+ \to D\, \ell^+\, \nu_\ell$ anything $)$	Γ_4/Γ_3
$\Gamma(B^+ \to \overline{D}^0\, \ell^+\, \nu_\ell)/\Gamma(B^+ \to \ell^+\, \nu_\ell$ **anything** $)$	Γ_4/Γ_1

Value ()	Document ID		TECN	Comment
0.255 ± 0.013	**OUR AVERAGE**			
$0.255 \pm 0.009 \pm 0.009$	AUBERT [1]	2010	BABR	$e^+\, e^- \to \Upsilon(4S)$

*** We do not use the following data for averages, fits, limits, etc ***

[1] Uses a fully reconstructed B meson on the recoil side.

References

Document Id		Journal Name
AUBERT	2010	PRL 104 011802

$\Gamma(B^+ \to \overline{D}^0\, \tau^+\, \nu_\tau)/\Gamma(B^+ \to \overline{D}^0\, \ell^+\, \nu_\ell)$	Γ_5/Γ_4

Integration with INSPIRE

PDG particle data group Live

Send Feedback

Home | pdgLive | Summary Tables | Reviews, Tables, Plots | Particle Listings

pdgLive Home >

2013 Review of Particle Physics.
Please use this CITATION: J. Beringer *et al.* (Particle Data Group), Phys. Rev. D**86**, 010001 (2012) and 2013 partial update for the 2014 edition.

INSPIRE search

$B^+ \to \overline{D}^0 \ell^+ \nu_\ell$

- $\Gamma(B^+ \to \overline{D}^0 \ell^+ \nu_\ell)/\Gamma(B^+ \to \ell^+ \nu_\ell \text{ anything})$ — Γ_4/Γ_1
- $\Gamma(B^+ \to \overline{D}^0 \ell^+ \nu_\ell)/\Gamma(B^+ \to D\ell^+ \nu_\ell \text{ anything})$ — Γ_4/Γ_3
- $\Gamma(B^+ \to \overline{D}^0 \ell^+ \nu_\ell)/\Gamma_{total}$ — $\Gamma_4/\Gamma^{B^\pm}$

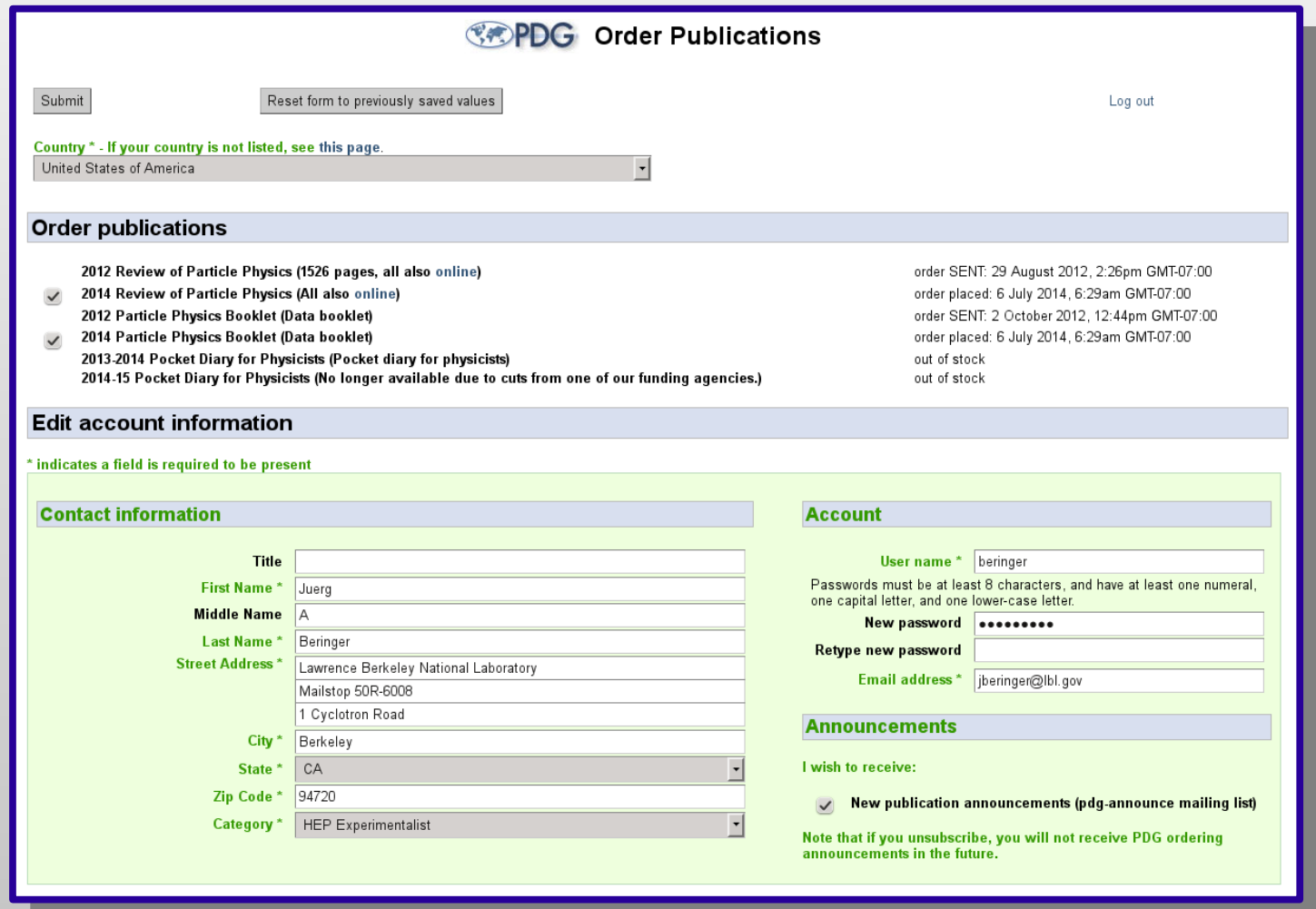
``OUR EVALUATION'' is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account correlations between the measurements. $\ell = e$ or μ, not sum over e and μ modes.

Direct links to paper in INSPIRE

Value ()	Docum			ent
0.0223 ±0.0012	OUR EVAL			
0.0229 ±0.0008	OUR AVERA			
0.0229 ±0.0008 ±0.0009	AUBERT [1]	2010	BABR	$e^+e^- \to \Upsilon(4S)$
0.0234 ±0.0003 ±0.0013	AUBERT	2009A	BABR	$e^+e^- \to \Upsilon(4S)$
0.0221 ±0.0013 ±0.0019	BARTELT [2]	1999	CLE2	$e^+e^- \to \Upsilon(4S)$

Ordering System

- **Single ordering system for all users (and collaborators)**
  - Half of orders still fulfilled by CERN (but transparent to user)
  - Mailing list to contact all users of PDG products



PDG Order Publications

Submit | Reset form to previously saved values | Log out

Country * - If your country is not listed, see this page.
United States of America

Order publications

	2012 Review of Particle Physics (1526 pages, all also online)	order SENT: 29 August 2012, 2:26pm GMT-07:00
☑	2014 Review of Particle Physics (All also online)	order placed: 6 July 2014, 6:29am GMT-07:00
	2012 Particle Physics Booklet (Data booklet)	order SENT: 2 October 2012, 12:44pm GMT-07:00
☑	2014 Particle Physics Booklet (Data booklet)	order placed: 6 July 2014, 6:29am GMT-07:00
	2013-2014 Pocket Diary for Physicists (Pocket diary for physicists)	out of stock
	2014-15 Pocket Diary for Physicists (No longer available due to cuts from one of our funding agencies.)	out of stock

Edit account information

* indicates a field is required to be present

Contact information

Title	
First Name *	Juerg
Middle Name	A
Last Name *	Beringer
Street Address *	Lawrence Berkeley National Laboratory
	Mailstop 50R-6008
	1 Cyclotron Road
City *	Berkeley
State *	CA
Zip Code *	94720
Category *	HEP Experimentalist

Account

User name * beringer

Passwords must be at least 8 characters, and have at least one numeral, one capital letter, and one lower-case letter.

New password ••••••••••

Retype new password

Email address * jberinger@lbl.gov

Announcements

I wish to receive:

☑ New publication announcements (pdg-announce mailing list)

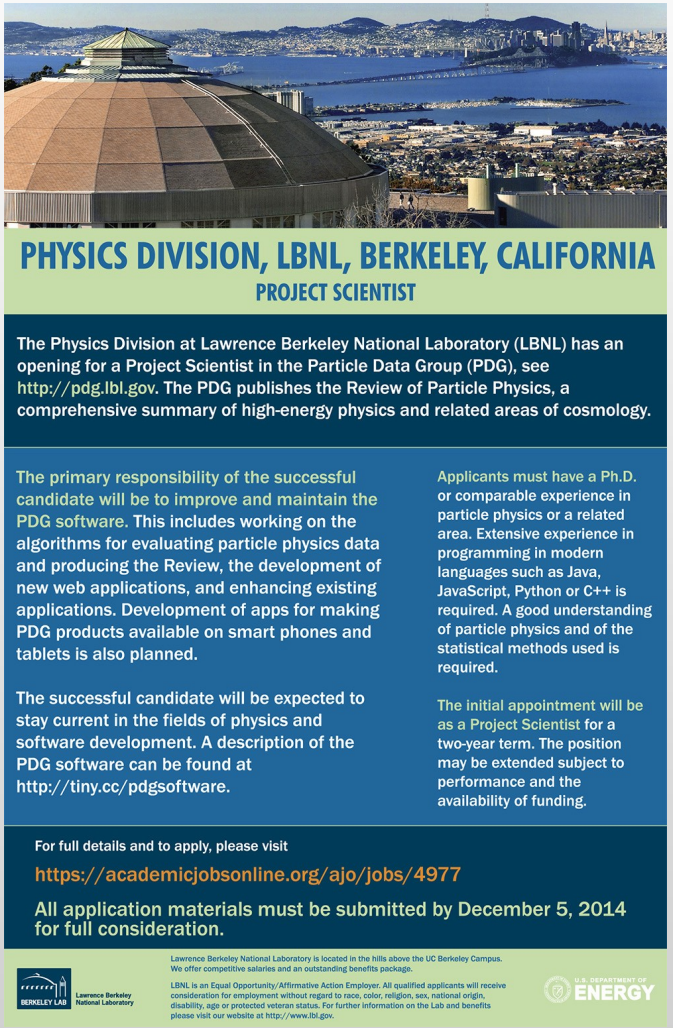
Note that if you unsubscribe, you will not receive PDG ordering announcements in the future.

Computing Support

- **As expected for first large-scale deployment of complex system, many bugs and missing features were discovered**
- **Plan was to have long-term support at 0.5 FTE level from <u>one</u> of the original developers from the LBNL computing division**
  - Should have allowed to fix bugs and implement new features quickly
  - Did not work out due to personnel changes and pressure from other projects outside Physics Division
    - Effort split over more than one person → inefficient
    - Received less than 0.5 FTE (especially since 2013)
  - **Inadequate support situation resulted in large list of unresolved bug fixes and pending feature requests**
- **LBNL Physics Division convened Ad-hoc Committee in summer**
  - **Recommended urgent hire of programmer at 1.0 FTE level** to support PDG computing, in spite of dire budget situation
    - To be **hired into LBNL PDG group** (rather than computing division)
  - Support situation will improve dramatically as soon as new person comes up to speed

Open position at LBNL

- **Primary responsibility: Improve and maintain PDG software**
- **Please let qualified candidates know about this position!**
- **Application deadline: December 5, 2014**



PHYSICS DIVISION, LBNL, BERKELEY, CALIFORNIA

PROJECT SCIENTIST

The Physics Division at Lawrence Berkeley National Laboratory (LBNL) has an opening for a Project Scientist in the Particle Data Group (PDG), see http://pdg.lbl.gov. The PDG publishes the Review of Particle Physics, a comprehensive summary of high-energy physics and related areas of cosmology.

The primary responsibility of the successful candidate will be to improve and maintain the PDG software. This includes working on the algorithms for evaluating particle physics data and producing the Review, the development of new web applications, and enhancing existing applications. Development of apps for making PDG products available on smart phones and tablets is also planned.

The successful candidate will be expected to stay current in the fields of physics and software development. A description of the PDG software can be found at http://tiny.cc/pdgsoftware.

Applicants must have a Ph.D. or comparable experience in particle physics or a related area. Extensive experience in programming in modern languages such as Java, JavaScript, Python or C++ is required. A good understanding of particle physics and of the statistical methods used is required.

The initial appointment will be as a Project Scientist for a two-year term. The position may be extended subject to performance and the availability of funding.

For full details and to apply, please visit

https://academicjobsonline.org/ajo/jobs/4977

All application materials must be submitted by December 5, 2014 for full consideration.

Lawrence Berkeley National Laboratory is located in the hills above the UC Berkeley Campus. We offer competitive salaries and an outstanding benefits package.

LBNL is an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability, age or protected veteran status. For further information on the Lab and benefits please visit our website at http://www.lbl.gov.

Lawrence Berkeley National Laboratory

U.S. DEPARTMENT OF ENERGY

For full details and to apply:

http://academicjobsonline.org/ajo/jobs/4977

Towards the Future

"... the age of ink marks on dead tree carcasses is over."
(Comment from 2014 PDG Survey)

- **Books and booklet will still be in demand for some time**
- **Demand quickly increasing for electronic distribution, including for example**
  - Static web pages and PDF files ✓
  - Dynamic web pages (pdgLive - many extensions possible) ✓
  - Ebooks
  - App(s) for smartphones and tablets (all platforms)
  - API (access to PDG database by programs)
  - Downloadable PDG data (use of our data by others in their apps etc)
  - …
- **What does this mean for PDG?**

New Possibilities

- **Electronic distribution opens up new possibilities**
  - Compared to presentation oriented primarily around printed material
- **Possibilities we might discuss include e.g.**
  - Emphasis on searching and indexing, rather than navigation
  - Cross-linking with other services (pdgLive ↔ INSPIRE available)
  - pdgLive version for offline use (as an app)
  - Interactive plotting, data selection and evaluation, e.g.
    - Decay modes with an e^- and a K^+ in final state?
    - What fraction of B^0 decays have been measured?
  - Interactive presentation of review articles
  - More frequent partial updates (e.g. of Listings)
  - User tagging or display of contributed content (if desired by user)

Implementing some of these will require long-term effort
- Discuss and **prioritize** now
- But **must be realistic** as to what is possible with **very limited resources**

Technology

- **Tools to implement this available**
  - HTML(5), CSS and JavaScript libraries plus server-side infrastructure
  - Browser-centric implementation w/“responsive design” allows relatively easy support of multiple platforms
  - Much of this already used in new computing system!
- **PDF generated from TeX sources not ideal**
  - HTML more convenient on smartphones and tablets than PDF
  - LaTeX much easier to convert to HTML (or XML) than plain TeX
  - LaTeX would be greatly preferred by review authors
- **Current database aimed at production**
  - Augmenting database with cached precomputed data snippets that can directly be used by an app, API, or exported via XML or SQLite **would greatly simplify implementation of new features**

Key developments to increase electronic availability of PDG data
- Switch review sources to **LaTeX w/automatic HTML generation**
- Add **precomputed data** snippets to production database

Conclusions

- **In spite of inadequate computing support situation during last two years, the new computing system was successfully used during a full production cycle for the first time**
- **Support situation to improve substantially with hire of a full-time programmer for PDG computing**
  - Please advertise this position to qualified individuals
  - Application deadline is December 5, 2014
  - For details and to apply: http://academicjobsonline.org/ajo/jobs/4977
- **Trend and demand for PDG products shifting towards electronic distribution (but some form of book(let) will remain)**
  - Opens up **exciting new possibilities**
  - Key developments to support this are migrating review source files from TeX to LaTeX, and adding precomputed data snippets to the PDG database
  - Implementing some of these new features is a **long-term effort given our very limited resources**