A Web Based Document Database

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Abstract

We will describe a document database developed for BTeV which has now been adopted for use by other collaborations within and without Fermilab. A single web based database and archival system is used to maintain public and private documents as well as documents for a related collaboration. The database performs archiving, versioning, access control, and easy remote access and submission. The talk will cover the technical and security requirements of the database and the implementation. Usage patterns, improvements in our collaborative style, and mis-steps along the way will also be discussed.

Outline

- Problems with our old solution
- Design Considerations
- Document Classification
- Implementation
- Effects on Collaboration
- Other Users and Lessons Learned
- Conclusions and URLs

BTeV

BTeV is an LHC era experiment scheduled to begin data taking in 2008. A reasonable expectation is that data taking will continue for about 5 years and that analysis may continue 5 or more years after that. So, we’d like a way of preserving our documentation until 2020 or so.

The system described here may not last that long, but it should be easily translated.

The Need for a New Database

BTeV had an old document catalog (saved URLs, not actual documents), but it was too limiting.

- Classified only by author-defined keywords.
- Updates replaced original.
- One author per document.
- One file per doc (two docs for PS and PDF).
- Separate lists for public and private documents (more duplication).
- From 1995–2001, created ∼110 private, ∼40 public docs. About 10 of these had disappeared.
- Drew some ideas from NuMI Notes.

Design of New Database

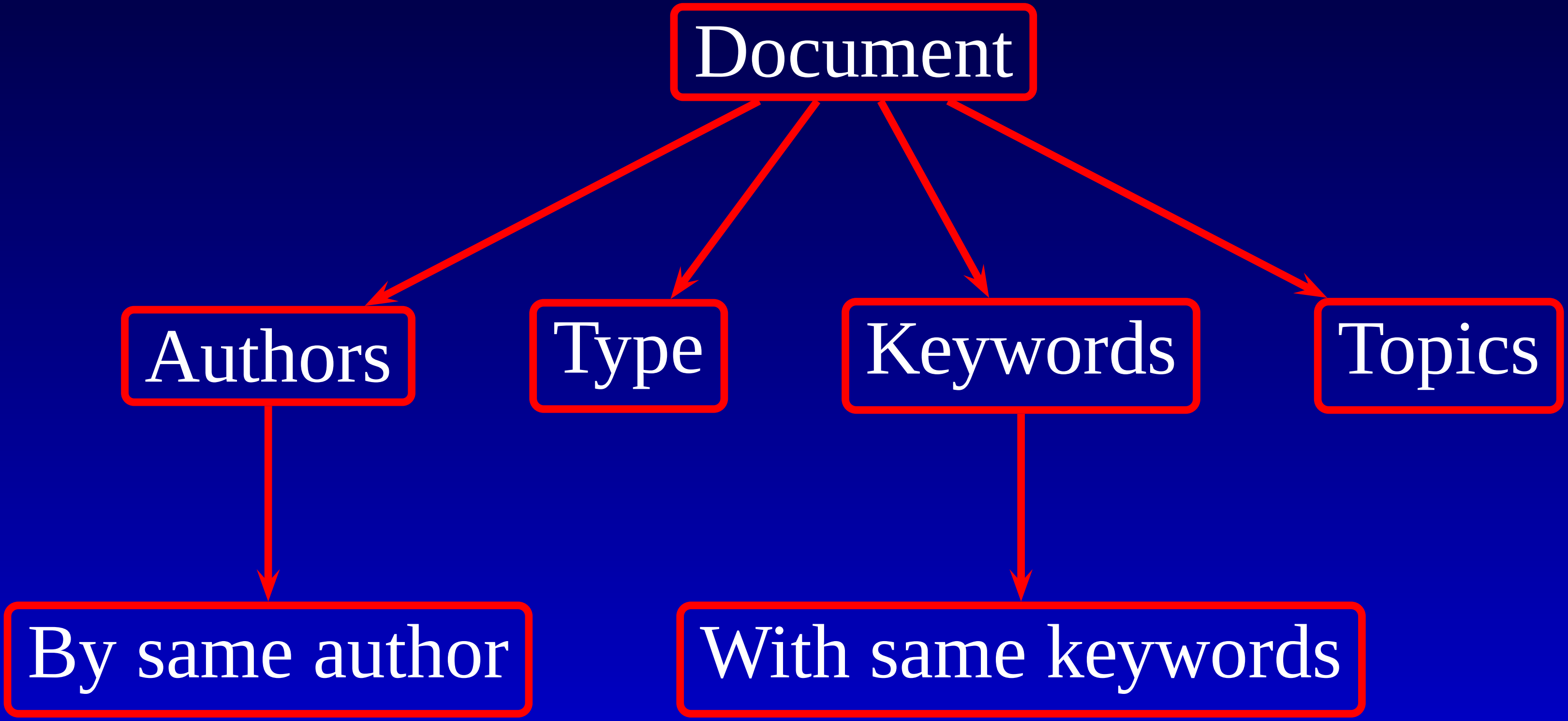
- All documents are kept on our web server, not scattered machines. No link rot.
- Each document can have multiple revisions and old revisions are still available.
- Each revision can have multiple files which accommodates different file types (source and presentable) and, *e.g.*, HTML trees.
- No limits on numbers of authors or topics.
- Document ID is just a number (no topics or public/private).
- A single database for talks from group meetings, conference documents, and publications *and* presents these special cases in special ways.

Security Considerations

- Reviewers need access to selected documents but cannot create or modify.
- BTeV has “associated groups” that need to create documents and view selected documents.
- Want documents that are only accessible to sub-groups like the executive council.
- Users only know that a document exists if they have privileges to view it.
- Wanted the ability to easily move documents, or just certain versions of documents, from restricted to public and vice-versa.
- Access control via standard HTTP authorization.

Document Classification

Each way of classifying a document is hyperlinked to other documents of the same kind.



Can quickly navigate, find documents of interest.

Other Document Information

There are several other pieces of information we store:

- Title and Abstract
- Creation and modification times
- Groups that may view/modify the document
  - As an option, these lists can be different.
- Hyperlinked references (journals, arXiv.org, etc.)
- Additional publication information

These and the classifications are all searchable.

Implementation

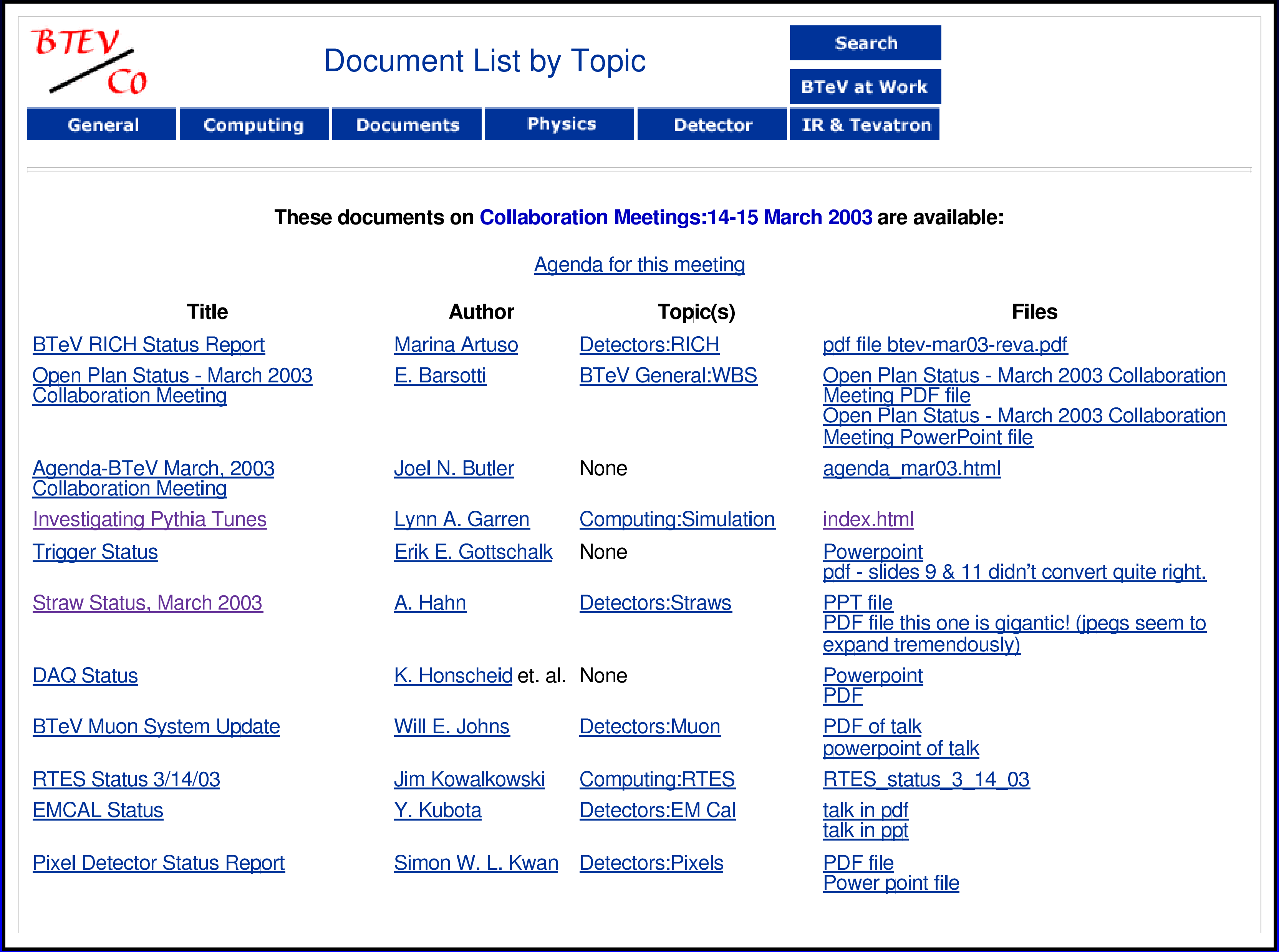
The system consists of three parts:

- Meta-data is stored in a MySQL database.
- The files in a document are served by a web server from the regular file system.
  - Contents of files are not directly searchable, may change by incorporating a search engine like **htdig**.
- A web interface for adding, changing, searching, and viewing documents (Perl/CGI).
  - Easy to use for non-technical users.
  - Flexibility to allow for changing, fixing mistakes.
  - Presentation is configurable to user preferences.

Web Interface

- For modifying documents, lots of options:
  - Reserve a slot for a future document
  - Create a new document
  - Create an updated version
  - Update meta-data for a document
  - Add or *replace* files in a document
  - *Can* circumvent versioning, haven't seen this.
- User has several ways of supplying files
  - Upload from the users computer
  - Fetch URLs (SSL or password protected too)
  - tar/zip files (good for photo collections, HTML, etc.)

List of Documents



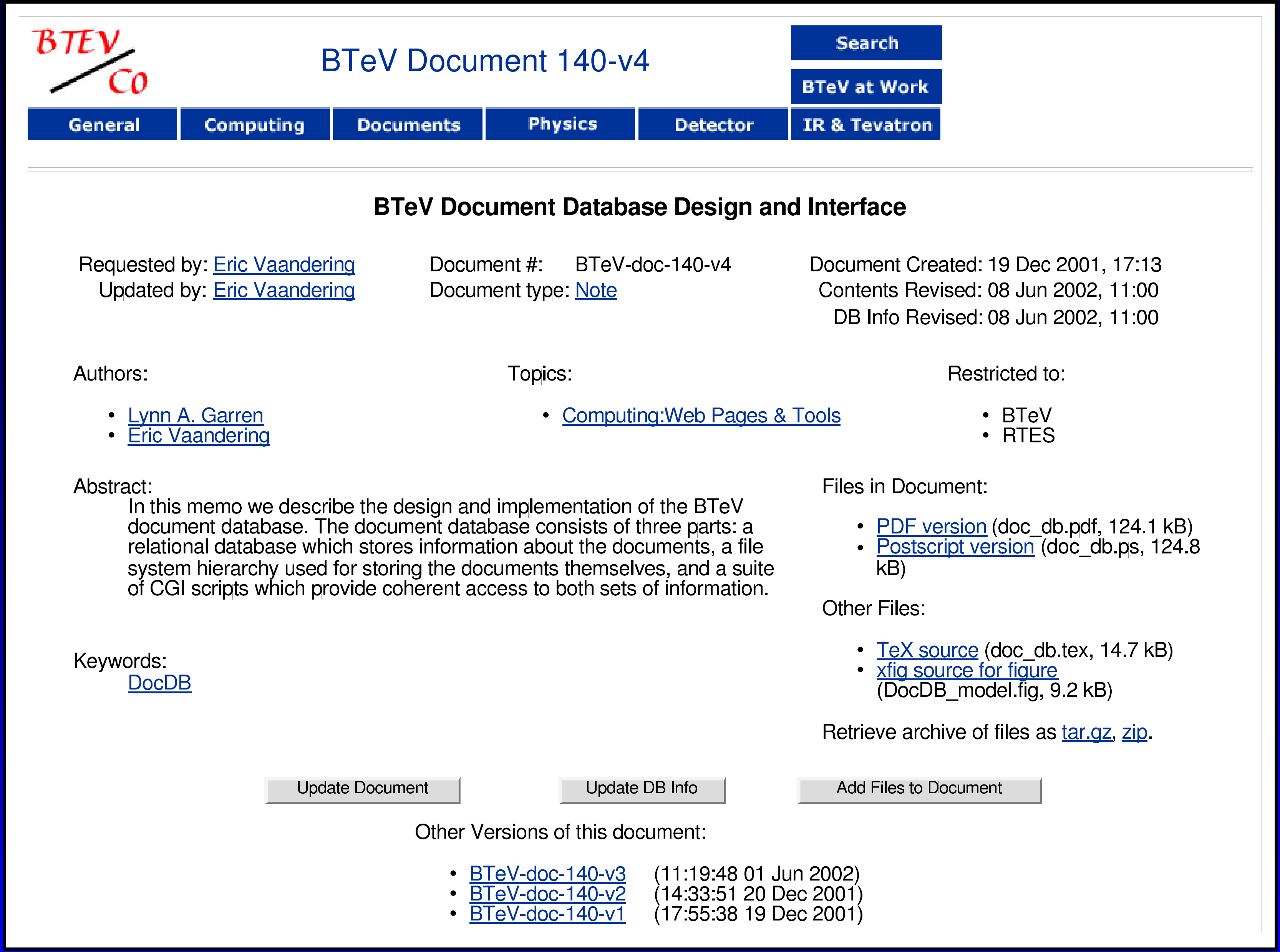
Document List by Topic

These documents on Collaboration Meetings:14-15 March 2003 are available:

Agenda for this meeting

Title	Author	Topic(s)	Files
BTeV RICH Status Report	Marina Artuso	Detectors:RICH	pdf file btev-mar03-reva.pdf
Open Plan Status - March 2003 Collaboration Meeting	E. Barsotti	BTeV General:WBS	Open Plan Status - March 2003 Collaboration Meeting PDF file Open Plan Status - March 2003 Collaboration Meeting PowerPoint file
Agenda-BTeV March, 2003 Collaboration Meeting	Joel N. Butler	None	agenda_mar03.html
Investigating Pythia Tunes	Lynn A. Garren	Computing:Simulation	index.html
Trigger Status	Erik E. Gottschalk	None	Powerpoint pdf - slides 9 & 11 didn’t convert quite right.
Straw Status, March 2003	A. Hahn	Detectors:Straws	PPT file PDF file this one is gigantic! (jpegs seem to expand tremendously)
DAQ Status	K. Honscheid et. al.	None	Powerpoint PDF
BTeV Muon System Update	Will E. Johns	Detectors:Muon	PDF of talk powerpoint of talk
RTES Status 3/14/03	Jim Kowalkowski	Computing:RTES	RTES_status_3_14_03
EMCAL Status	Y. Kubota	Detectors:EM Cal	talk in pdf talk in ppt
Pixel Detector Status Report	Simon W. L. Kwan	Detectors:Pixels	PDF file Power point file

Example Document View



BTeV Document 140-v4

BTeV Document Database Design and Interface

Requested by: Eric Vaandering
Updated by: Eric Vaandering

Document #: BTeV-doc-140-v4
Document type: Note

Document Created: 19 Dec 2001, 17:13
Contents Revised: 08 Jun 2002, 11:00
DB Info Revised: 08 Jun 2002, 11:00

Authors:

- Lynn A. Garren
- Eric Vaandering

Topics:

- Computing:Web Pages & Tools

Restricted to:

- BTeV
- RTES

Abstract:
In this memo we describe the design and implementation of the BTeV document database. The document database consists of three parts: a relational database which stores information about the documents, a file system hierarchy used for storing the documents themselves, and a suite of CGI scripts which provide coherent access to both sets of information.

Keywords:
DocDB

Files in Document:

- PDF version (doc_db.pdf, 124.1 kB)
- Postscript version (doc_db.ps, 124.8 kB)

Other Files:

- TeX source (doc_db.tex, 14.7 kB)
- xfig source for figure (DocDB_model.fig, 9.2 kB)

Retrieve archive of files as tar.gz, zip.

Other Versions of this document:

- BTeV-doc-140-v3 (11:19:48 01 Jun 2002)
- BTeV-doc-140-v2 (14:33:51 20 Dec 2001)
- BTeV-doc-140-v1 (17:55:38 19 Dec 2001)

Other Features

- Very flexible search capability.
- E-mail notifications allow users to receive e-mail on changed documents.
  - Triggered by topics/subtopics, authors, and keywords user is interested in.
  - Any combination of these for immediate, daily, or weekly notification.
- A web interface for database administrators:
  - Modify authors, topics, groups, etc.
  - Delete documents.
  - Never (directly) touch SQL database — a big plus.

Impact on Collaboration

- Redefining what a “document” is:
  - Not just words written on a piece of paper, but any information you want to save and share.
  - We’ve been somewhat effective with this.
- More information is easily available.
  - In past, sub-group web pages maintained documents.
  - With an easier to use and more visible system, this information is now being placed in the database.
  - Users no longer feel their document has to reach some level of “importance” before placing it in the database.
  - Migration of “legacy” documents is slow.

Collaboration Meetings

BTeV has a video conference about every 6 weeks, about 20 talks per meeting.

- In the past, a secretary collected URLs, maintained agenda.
  - Difficult for weekend meetings, time lag problems.
  - Result: A flurry of e-mails and confusion for late arriving documents.
- Now, the whole process is much smoother.
  - Updates, reactions happen minutes before presentation.
  - Specialized view and (optional) entry form for talks.
  - Talks are available from same place as other documents.

Reviews

BTeV is under active review. The DocDB has been a great help here too.

- We have a read-only account for reviewers.
- Relevant documents are made accessible to reviewers.
- Keywords used effectively to categorize documents for reviews.
- Our latest review required 250 documents.
  - Many will remain the same or be updated for future reviews.

Usage observations

- Old system, 1995–2001: About 150 documents.
- New system went live at end of 2001.
- Currently $>$ 1600 documents:
  - Some 400+ of these are “legacy” documents.
  - Collaboration ($\sim$ 200 people) producing 3–4 docs/day.
- Statistics:
  - Average document: 1.6 versions
  - Each version: 1.5 authors, 1.8 topics, 1.8 files.
  - Total of almost 5000 files being tracked (5.2 GB).
- Number of “living documents” is small.

Other Users

Setting up this database takes a couple of hours, becoming easier.

- Fermilab Beams Division:
  - Began with Main Injector group, quickly adopted by division.
  - In active use for several months, now > 500 documents.
  - Seem to be more effective in enforcing organization.
  - Also helpful for reviews (less manual organization).
  - Previously lots of meetings were hard-copy only.
- US-CMS is evaluating.

What We’ve Learned

Overall this has been a very good experience, but you can always do better.

- Organization:
  - Concept of keywords was added later.
  - Some sub-groups have been very proactive in this regard, others less so.
  - Never had “official” guidance on use. This may be a good thing, may not be.
- Initially lacked some flexibility for fear of misuse.
- Wasn’t initially designed to be portable, but this wasn’t too hard to change.
- Obvious: Use a system like this early on.

Conclusions and URLs

- We have built and are successfully running a useful document database which has made real improvements to our collaborative style.
- It is being adopted by other groups; we're willing to help others as well.
- URLs
  - BTeV Public Server:

    `http://www-btev.fnal.gov/cgi-bin/public/DocDB/DocumentDatabase`
  - Beams Division (lots of public documents):

    `http://beamdocs.fnal.gov/cgi-bin/public/DocDB/DocumentDatabase`
  - Download, instructions, demo server (soon):

    `http://cepa.fnal.gov/DocDB/doc/install-docdb.html`

More Slides for Template

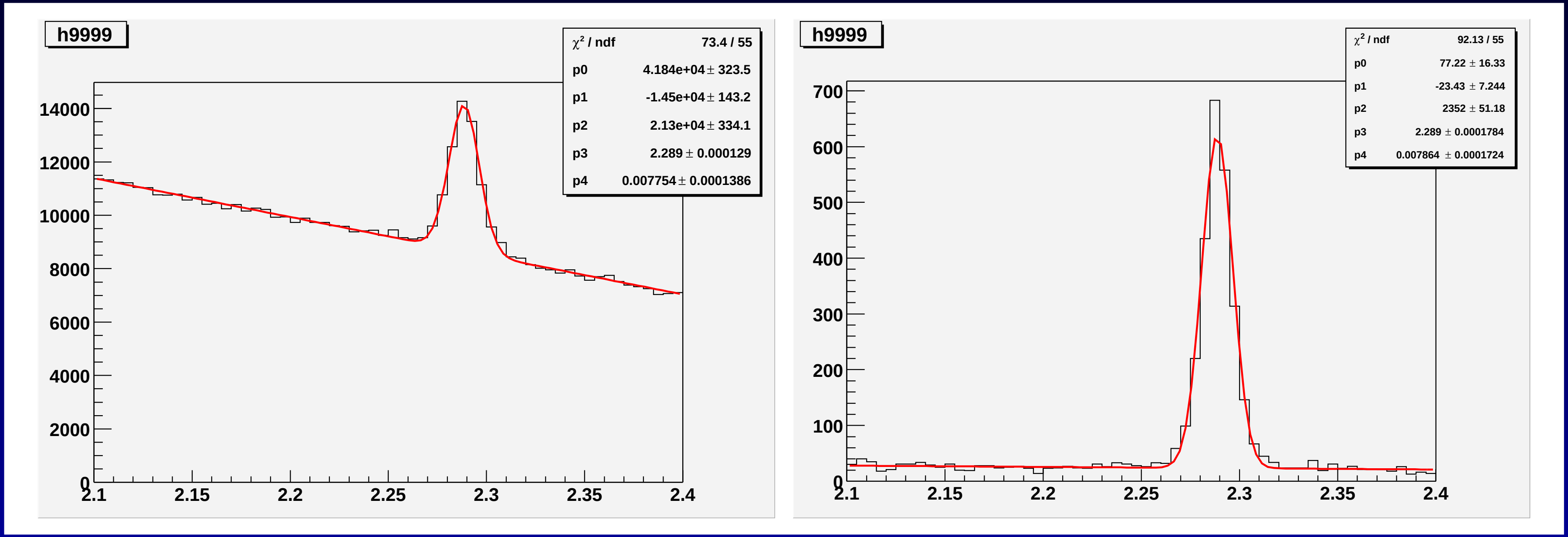
Efficiencies and Tagging

Requiring ≥ 2 tracks detached by $> 6\sigma$, we trigger on 1% of crossings and have these efficiencies ($\langle 2 \rangle$ int./crossing):

Decay	ϵ(%)	Decay	ϵ(%)
$B^0 \to \pi^+\pi^-$	63	$B^0 \to K^+\pi^-$	63
$B_s^0 \to D_s^+ K^-$	74	$B^0 \to J/\psi K_S^0$	50
$B^- \to D^0 K^-$	70	$B_s^0 \to J/\psi K^*$	68
$B^- \to K_S^0 \pi^-$	27	$B^0 \to K^* \gamma$	63

- Dilution $D \equiv (N_{\text{right}} - N_{\text{wrong}})/(N_{\text{right}} + N_{\text{wrong}})$
- Effective tagging efficiency $= \epsilon D^2$

Side-by-side plots $\Lambda_c^+ \rightarrow \boldsymbol{pK^-}\pi^+$



- Left plot: All events, $Y = 21300$, $S/N = 0.41$
- Right plot: Selected events, $Y = 2350$, $S/N = 16.6$
- No labels and text too small on figures