The style guide:
concrete advice on writing the text

Bruce Yabsley

PBF Book Gen. Eds / Belle / University of Sydney High Energy Physics group

"Physics of the B-Factories",
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Outline

Our aspirations

Tense, aspect, voice, and persona
  Tense (and aspect)
  Voice, and persona

Native speakers versus the rest

Evaluative speech

Combined or separate presentation of results?

Miscellaneous things

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- ▶ I apologise in advance for "stating the obvious":
  it comes with the territory

Tense (and aspect)

▶ use **present tense** for description of analysis
(since this takes place in "the eternal present")

  e.g. "The background is divided into five categories . . ."

▶ the **"present perfect"** can optionally be used
to introduce a range of approaches

  e.g. "Several different approaches to continuum suppression
  have been used . . ."

but swap back to the present for the individual descriptions.

▶ in a straightforward historical account, the **past** is fine

  e.g. "Early analyses used a very simple resolution function, of-
  ten a Gaussian of fixed width . . . Various refinements were
  added over time . . ."

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▶ For authors to say "we" in a Belle (BaBar) paper is one thing but in The Book, who is this "we"?: *this is the real problem*

Voice, and persona (2): a working proposal

- ▶ use a mixture of active and passive voice, and
- ▶ be guided by what is easiest / most straightforward;
  maybe, whether the agent can be specified:

1. Comparison of approaches? <u>Active</u>.

   "*Belle* uses a two-step procedure, first combining . . . "
   "*BaBar* combines all relevant quantities into a single PDF . . . "
   "*Some authors* use the Operator Product Expansion to . . . "

2. Summary of papers by a distinct group? <u>Active</u>.

   "instead of using the standard Belle "full reconstruction"
   (Section 5.x), *the authors* first select the signal candidate . . . "

3. Convenient fictitious person to hand? <u>Active</u>.

   "*A typical selection* then requires . . . "
   "Hamlet constructs a single discriminator from . . . "

4. Otherwise . . . default to <u>Passive</u>.

   "The following selection criteria *are then imposed*."
   "Contributions from all four diagrams *must be combined*."

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- ▶ **principle**: _physics_ and the _work done_ should drive content, not irrelevant distinctions and _certainly not_ the style guide
- ▶ **application**: if you have two potential contributors, divide the work according to their physics/work experience:

technically experienced, non-native:	_main writer_
first postdoc, native:	_support, correction,_

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  - [insert your experience here; share ideas around]

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- ▶ *within* an expt we assume the general trajectory is "upward"

- ▶ *between* experiments the default tone should be descriptive:
  "different approaches are used . . ."

Evaluative speech (2)

- ▶ some conflicts will not be avoidable, and should be faced:
    - ▶ descriptively
    - ▶ with evaluation as necessary (*i.e.* without a faux neutrality)
    - ▶ from a perspective above, and outside of the conflict,
      rather than a partisan one,
      even if one side is eventually preferred
- ▶ **example:** the vexed "$Z(4430)^+$" of Belle in $B \rightarrow K\pi\psi'$
    - ▶ "not confirmed" by BaBar
    - ▶ subject to unresolved dispute about analysis method
    - ▶ unlikely to be resolved by end 2011

> "The question of how to test for states in the exotic channel $\pi^+\psi'$ is controversial. The core of the disagreement lies in the way contributions to the conventional channel $K^-\pi^+$ are determined ..."

- ▶ we will probably need some guidelines for theory,
  in the same spirit

Combined or separate presentation of results?

Consider a basic section layout that proceeds as

▶ Motivation (, introduction, theory)

▶ Methods, analyses and results

▶ Interpretation/conclusions

Should BaBar & Belle analyses be described together, or in series?

▶ again, a one-size-fits-all answer is not really practical

▶ case-by-case decision based on principles:

    1. the presentation should be driven by the content

    — are the approaches basically similar, or distinct?

    2. combined presentation is preferred, as far as possible

▶ one can set out three typical categories:

    1. fully combined presentation

    e.g. γ/ϕ_3 Dalitz analyses; $\exists$ strong consensus throughout

    2. combined introduction, with BaBar and Belle cases following

    e.g. y_{CP} charm mixing analyses; different methods are preferred

    3. presentation in series

    e.g. $\mathrm{B} \to \mathrm{K}\pi^+\psi'$ ($Z(4430)^+$) analysis; divergence throughout

Miscellaneous things

- cut-and-paste of existing papers?
    - cut-and-paste is NOT PERMITTED
    - not a matter just of style: journal publication rules
    - existing material will need to be paraphrased / re-written fresh
    - writing new text will anyway be a good discipline for us
    - *e.g.* group of related results:
      combined introduction and discussion, common method description . . .
    - *e.g.* single, dominant paper:
      challenge similar to conference review
- level of writing:
    - introductory sub-sections should be understandable to
        - an Honours student (UK/Australia/etc)
        - a starting Masters student (Europe)
        - a student in early grad school (US)
    - we will try to evolve guidance on later sections with experience

Miscellaneous things

- symbols file:
  bfactorysym.tex, being adapted from BaBar's file
- bibliographies:
  - three are foreseen: BaBar, Belle, other
  - the BaBar and Belle ones will double as an *index*
    showing the section where the paper is principally treated
  - citations will be modified from "Harvard style":
    - "proposed in [345]" becomes "proposed by Sinha (2008)"
    - separate treatment for Belle and BaBar papers
  - at least in draft: sections will begin with a mini-bibliography,
    in the style of the PDG end-section, for B-factory papers only
- availability:
  - the guide will be available soon on the web in various forms
  - standalone-compilation LaTeX template should be available
    by end of the workshop
  - we hope to have the full system on SVN next week
    $\longrightarrow$ Adrian's talk

From October: Section mini-bibliography

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AUBERT       08B    PR D77 011102R
AUBERT       08Y    PR D77 111101R
ABULENCIA    07E    PRL 98 132002
ABULENCIA    06B    PRL 96 102002
AUBERT       06     PR D73 011101R
AUBERT       06E    PRL 96 052002
AUBERT,BE    06M    PR D74 071101R
GOKHROO      06     PRL 97 162002
PDG          06     JPG 33 1
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Review

Cosmic microwave background and first molecules in the early universe

Monique Signore[1,a]**, Denis Puy**[2,b]

[1]Observatoire de Paris, LERMA, 75014 Paris, France
[2]University of Montpellier II, CNRS UMR 5024, GRAAL CC72, 34000 Montpellier, France

Abstract Besides the Hubble expansion of the universe, the main evidence in favor of the big-bang theory was the discovery, by Penzias and Wilson, of the cosmic microwave background (hereafter CMB) radiation. In 1990, the COBE satellite (Cosmic Background Explorer) revealed an accurate black-body behavior with a temperature around 2.7 K. Although the microwave background is very smooth, the COBE satellite did detect small variations—at the level of one part in 100000—in the temperature of the CMB from place to place in the sky. These ripples are caused by acoustic oscillations in the primordial plasma. While COBE

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Table 1.1 Orders of magnitude of important epochs in the history of the universe, according to the ΛCDM model

Epoch	Time	Temperature	Redshift	Physics
Planck epoch	10^{-43} s	10^{19} GeV	10^{32}	limit of spacetime
Cosmic inflation	10^{-32} s	10^{16} GeV	10^{29}	unstable vacuum
Creation of light	10^{-26} s	10^{14} GeV	10^{27}	conversion of vacuum to radiation energy
Electroweak epoch	10^{-10} s	100 GeV	10^{15}	electroweak unification
The strong epoch	10^{-4} s	200 MeV	2×10^{12}	quark–hadron transition
Weak decoupling	1 s	1 MeV	10^{12}	neutrinos decouple
e^+–e^- annihilation	5 s	0.5 MeV	5×10^{9}	electron heat dumped into photons
Nucleosynthesis	100 s	100 keV	10^9	nuclei formation
Spectral decoupling	1 month	500 eV	10^6	end of efficient photon production
Matter/radiation equality	10 000 years	10 000 K	3 300	matter dominates mass density
Last scattering epoch	0.3 My	3 000 K	1 000	universe transparent to light
Molecular epoch	15 My	1 500 K	500	formation of molecules
Dark ages	1 Gy	20 K	65	first small objects coalesce
Bright ages	2–13 Gy	3–10 K	10–30	large-scale gravitational instability
Present epoch	13 Gy	2.725 K	0	new astrophysics and physics

• *The decoupling of the weak interactions* ($t \sim 1$ s, $T \sim 1$ MeV).

It follows that the neutron-to-proton ratio is fixed and that the present universe is dominated by hydrogen. The cosmic neutrinos decoupled—as well as several other possible forms of dark matter—and have their density fixed at this time

This review summarizes the present knowledge of the CMB radiation, and some of the details of the generation of its possible distortions and anisotropies. The existence of other fossils—such as light nuclei—is also discussed with particular attention to the arrival of the first molecules in the universe. Earlier general reviews on CMB can be found in [8, 10] and on primordial chemistry in [11].

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In fact, there were only some traces of beryllium-9 and boron-11. The primordial nuclear reactor was short-lived.

In the framework of the SBBN model, as the temperature dropped below $T < 30$ keV, when the universe was close to 20 min old, Coulomb barriers suppressed all nuclear reactions. Afterwards, until the first stars formed, no new nuclides were created.

Before presenting the predictions of the SBBN model, let us note that the dominant product of big-bang nucleosynthesis was ^{4}He, and its abundance was very sensitive to the $(n/p)_{nuc}$ ratio. Introducing $n_{tot} = [n + p]_{nuc}$, the abundance of helium ^{4}He that forms is

$$Y(^4\mathrm{He}) = \frac{n_{^4\mathrm{He}}}{n_{tot}} = \frac{2(n/p)_{nuc}}{1 + (n/p)_{nuc}} \sim 0.25, \tag{3.13}$$

i.e. an abundance of ^{4}He close to 25% by mass. Lesser amounts of the other light elements were produced: D at the level of about 10^{-5} by number and ^{7}Li at the level of 10^{-10} by number.

3.1.3 Predicted abundances of light elements

In the SBBN model with $N_\nu = 3$, the only free parameter is the density of baryons, Ω_b or η, the ratio of the number of baryons n_b to the number of photons n_γ:

$$\eta = \frac{n_b}{} \tag{3.14}$$
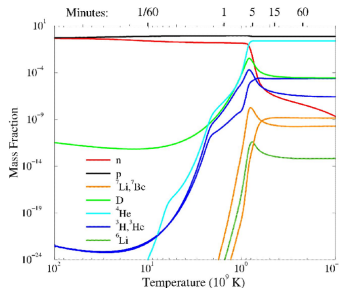
Fig. 3.2 Time–temperature evolution of the primordial nucleus in standard cosmological model (from Burles and Nollett [51]). Let us note that at very high temperatures the number of protons should be equal to the number of neutrons

The four curves of Fig. 3.3 represent the abundance ratio predicted by SBBN: the top curve is the helium-4 mass as a fraction of the mass of all baryons, while the three lower curves are the number fractions of deuterium, helium-3 and lithium-7 with regard to hydrogen.

In the standard model with $N_\nu = 3$, the only free para-