

Writing a book for Institute of Physics Publishing using L^AT_EX

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Preface

This article describes the use of the L^AT_EX and the ‘iopbk’ or ‘iopnbk’ style files for the preparation of books to be published under the Institute of Physics Publishing imprint. Authors who use these style files correctly should find that the writing of their books is easier, since they will be freed from the task of writing formatting commands. In addition, the book should be produced more quickly, and with less chance of typographic error, since it will already be in house style.

After a brief introduction in chapter 1 to the style files and the method of preparing the book, we discuss in chapter 2 the preparation of the preliminary pages. In chapter 3 we consider the text and its basic structures. In chapter 4 we discuss the use of L^AT_EX in typesetting mathematics and in chapter 5 we present the rules for preparing figures and tabular material. Chapter 6 contains information on references and reference lists while chapter 7 contains a description of the tools available for preparing indexes, and the final chapter discusses the procedures that will be followed in publishing the book. In the appendices we give a list of author-usable macros.

The style files have been developed at IOP Publishing mainly by Tony Cox, but building on earlier work by Robert Harding and Doug Quinney of Keele University and Mark Manning of Cambridge University.

In the `iopnbk` style considerable use is made of the material provided by the American Mathematical Society for use with L^AT_EX; in particular the Mittelbach and Schöpf font selection scheme and the AMS option files `amstext.sty`, `amsbsy.sty`, `amsfonts.sty` and `amssymb.sty` which allow the AMS extension fonts to be used easily with L^AT_EX. We are indebted to them for making their work publicly available.

A J Cox
5 October 1992

Chapter 1

Introduction

This article describes the preparation of a book for the Institute of Physics Publishing imprint using the `iopbk` and `iopnbk` style files in L^AT_EX. It covers the use of the style file provided by commissioning editors, house style for Institute of Physics Publishing (IOP) and also the procedures followed during production. If read carefully and adhered to, it will hopefully result in trouble-free editing and publication, as well as ensuring that the final product is of high quality. It should be read in conjunction with the IOP booklet *Notes for Authors*, which contains more general information related to preparing a manuscript, but which is still relevant when using L^AT_EX. Authors submitting to IOP journals should request the documentation and style files (Cox *et al* 1992) from the Managing Editor of the appropriate journal.

1.1 The IOP books style files

The Electronic Production Manager, possibly via the Commissioning Editor, will have provided the IOP books styles (`iopbk.sty`, `iopbk10.sty` and `iopnbk.sty`, `iopnbk10.sty`) which will format the book in the desired way. These files should be placed in the current working directory or the directory that contains your other L^AT_EX style files, e.g. `book.sty` and `bk10.sty`. The style files contain commands to set the page size, running heads, section and subsection headings, appendices and references. There are also a number of miscellaneous commands that can be used to simplify the typing process.

The style file `iopbk.sty` is designed for use with the standard version of L^AT_EX with standard fonts available in most versions of T_EX. It does not allow the use of the extra fonts provided in the AMSFonts package so some Computer Modern fonts are not available at small or large sizes. It

should, however, meet the requirements of most book authors. For authors who are producing highly mathematical works with considerable use of vectors, matrices, fraktur or open-face characters the style file `iopnbk.sty` is provided, this allows the AMSFonts to be used conveniently and provides the mechanisms for using other maths fonts easily and economically.

In order to use the `iopnbk` style file, authors will have a version of L^AT_EX installed with the new font selection scheme developed by Mittelbach and Schöpf to provide access to the AMSFonts and to give a reliable mechanism for making new maths fonts accessible to the user. There are a couple of significant differences in the way the new scheme handles fonts: (i) fonts (including maths fonts) do not need to be preloaded but can be loaded on demand; (ii) font are defined by a series of attributes (size, family, series, shape) and these can be changed individually. Full details of the scheme are given in Mittelbach and Schöpf (1990). In addition to the new font selection scheme authors also require the AMSFonts (version 2.0 or above) and certain files provided with the AMS-L^AT_EX package (`amstext.sty`, `amsfonts.sty`, `amsbsy.sty`, `amssymb.sty`). These files are extra option files and can be used independently of AMS-L^AT_EX. If desired the commutative diagrams option `amscd.sty` could also be loaded. All these extra files are in the public domain and can be obtained from the standard sources for T_EX and L^AT_EX, e.g. the T_EX archives, the T_EX Users' Group and the American Mathematical Society. More details of installing L^AT_EX with the new font selection scheme are found in the AMS-L^AT_EX User's Guide (1990). We provide a separate font definition file to accommodate the fonts normally used in IOP books (`fontdef.iop`), it should be used instead of `fontdef.tex` when creating the new format file. If other selections of fonts are being used elsewhere it may be necessary to have separate format files available under different names, so that say standard L^AT_EX is called by typing `latex filename` and the IOP version by typing `ltex filename`. See the file `nbkinst.tex` for brief details of how to set up L^AT_EX to use the new font selection scheme. Anyone having difficulty locating or installing the required files should contact the Electronic Production Manager at IOP for more details.

This document has been prepared using the IOP books style files (it has been prepared so that this file will run and produce similar output using either of the style files provided) and so illustrates the use of the styles and the output produced. The complete book from preliminary pages to index (apart from the actual figures) can be produced using L^AT_EX with the style files provided and staff at IOP will be glad to answer any queries you have relating to them, their use, or any other aspects of producing your book.

We strongly recommend that authors should use the style files provided, rather than any others that are available. The style files have

been designed to produce a book in the correct size and to a particular format. If authors use a style file that produces text according to a different page layout, this creates a great deal of extra work at IOP and can result in difficulties in the production of the book.

Authors can, if they wish, add their own macro definitions if they find that this simplifies the writing of their book. However, it is important that copies of these definitions are included with the text files, otherwise we will not be able to output the files. Also it is important to make sure existing names are not reused.

This document is not intended to be a comprehensive guide to L^AT_EX. Authors will need to be familiar with L^AT_EX and should refer to *L^AT_EX: a Document Preparation System* (Lamport 1986) for more details (see also Urban (1990) and Botway and Biemesderfer). For more details of the installation of the new font selection scheme and the AMSFonts see the AMS User's Guides (1990, 1991).

1.2 Preparing the book

When writing the book, rather than creating one long file, all chapters should be written in separate files. The complete book should be run from a master file which calls all chapters in turn or chapters can be processed selectively using the `\includeonly` command. It is recommended that until the book is complete the page number and chapter number should be set manually either at the start of each file or from within the master file, using, for example, `\setcounter{chapter}{2}` and `\setcounter{page}{35}`. When the book is complete most of these counter resettings can be removed and the book processed as a whole to generate the complete contents list and index. Detailed instructions for the preparation of the book, including notes on preparing text, mathematics, reference lists, index, tables and figures, are provided in the following chapters.

The first line of the file should be `\documentstyle{iopbk}` (or `\documentstyle{iopnbk}` if the alternative style is being used) and then `\title{#1}` and `\author{#1}`. The argument of `\title` is the title of the book and that of `\author` the list of authors and their address(es). Any other definitions required can then be entered before the `\begin{document}` command is given to start the book. An example of a master file for a book with five chapters and an appendix might be:

```
\documentstyle{iopbk}
\title{Physics in the 1980s}
\author{T J Smith\\[2pc]
Department of Physics\\
University of Bristol}
```

```
\makeindex
\begin{document}
\maketitle
\pagenumbering{roman}
\setcounter{page}{5}
\tableofcontents
\input preface
\pagenumbering{arabic}
\setcounter{page}{1}
\input chap1
\input chap2
\input chap3
\input chap4
\input chap5
\input appendix
\input refs
\end{document}
```

Using this method it is not necessary to specify the preamble at the start of each chapter and only one `.toc` file is generated although until the book is complete the page number and chapter numbers would need to be specified at the start of each chapter or before each chapter is loaded.

Chapter 2

Preliminary pages

The preliminary pages consist of half-title page, series page (if the book is in a series), title page, copyright page, contents, preface, and, if required, dedication, acknowledgments and list of symbols. We will normally prepare the first four of these ourselves and obtain the appropriate cataloguing information to appear on the copyright page, so authors need not worry about the exact format of these pages. The `\maketitle` command can be used to produce a title page provided that `\title` and `\author` are defined in the preamble. The `\author` command should include the author(s) names and, separated by `\\[2pc]`, the author's address. If the address is too long to fit nicely in one line it should be split using `\\`.

Authors are responsible for the pages containing the contents list, preface and any dedication or acknowledgment. This information should go in a separate file (perhaps called `prelims.tex`). The preliminary pages are numbered using lower case roman numerals but the first four are normally unnumbered. Thus the commands `\pagenumbering{roman}` and `\setcounter{page}{5}` have to be given before starting the contents list. The entries for the contents list are generated automatically from the chapters, sections and subsections if the `\tableofcontents` command is given at the start of the file. The contents list will include part titles and authors, chapter titles, section and subsection headings; subsubsection headings are not normally included. The `.toc` file produced by the `\tableofcontents` command may need to be slightly edited, e.g. to avoid bold symbols, before the final version is produced. Page numbers will be automatically included; they may well change during production of the book, so the contents list need not be produced until the rest of the book is complete.

The preface should appear on a separate page. The preface and similar sections such as dedication and acknowledgments are treated as

unnumbered chapters and specified by the command `\chapter*{title}`, where `title` is the name of the section, e.g. Preface, Acknowledgments or Dedication. A preface should contain personal details about how the book came to be written, a description of the plan of the book, and acknowledgments if a separate section is not used. An *introduction* that is an integral part of the actual subject matter of the book should not be included in the preliminary pages but rather as the first chapter of the book. The preface should end with the commands:

```
\bigskip
\begin{flushright}
{\bf Author's name}\\
Date preface written
\end{flushright}
\newpage
```

Acknowledgments can be included in the preface, or can be written in a separate section if desired. If acknowledgments are to appear in a separate section, type the command `\chapter*{Acknowledgment}` and follow this with the text of the acknowledgment.

After the preliminary pages have been completed the page numbering has to be changed from small roman numerals to arabic numbers and the page number reset so that the first page of the body of the text is page 1. This is done with the commands `\pagenumbering{arabic}` and `\setcounter{page}{1}` which should appear in the master file before the first chapter of the main body of the book.

Chapter 3

The text

3.1 The main body of text

3.1.1 Parts

Some books may be subdivided into distinct parts perhaps by different authors. Each part is then further subdivided into chapters and sections as normal. A part heading always occurs on a right-hand page and so is always an odd-numbered page. It is always followed by a blank page. The part heading should be included in the file for the chapter following it. In the IOP style files there are two commands which can be used for part headings depending on whether or not an author and his address are given. The command `\part*{#1}` is used for a part heading without an author's name with #1 the title of the part. If the author's name is given but no address then the appropriate command is `\part[#1]{#2}{#3}` where [#1] is an optional argument to provide a non-standard table of contents entry, #2 is the part title and #3 the authors name. If the part heading is also to include the authors address then the alternative command `\Part[#1]{#2}{#3}{#4}` is used. The parameters #1, #2 and #3 are as for `\part` with #4 the author's address.

The title appears in bold capitals and the author's name and address in italic. Examples of the code for parts are

```
\Part{The structure of the atom}{P Smith}{Department of Physics,  
University of Cambridge}
```

and

```
\part*{Two-body systems}
```

3.1.2 Chapters

Each chapter should normally be in a separate file. If necessary the chapter number and page number can be set with `\setcounter{chapter}{<no>}` and `\setcounter{page}{<no>}` respectively. The heading at the start of the chapter is typeset by using the `\chapter[#1]{#2}` command, where `[#1]` is an optional short title to be used as a running head if the main heading is too long and `#2` is the full title of the chapter. The full version of the title is used in the table of contents and the shortened form only in the running head. The chapter titles should be typed with an initial capital letter only and the rest in lower case. Unnumbered chapters such as Preface, Acknowledgment, References are set using the alternative form `\chapter*{#1}{#2}`. In this style all unnumbered chapters will have an entry in the table of contents and an alternative shortened form can also be supplied for the running head.

3.1.2.1 Multiauthor books

Where each chapter of a book is written by a different author then the name of the author has to appear at the start of each chapter. This is accomplished by using the command `\Chapter[#1]{#2}{#3}` where `#1` is optional short title, `#2` the chapter title as before, and `#3` is the author name(s) and address if necessary. If the author's address is given it follows after the author's name separated by a `\\`. Only an abbreviated address or the name of the institution where the author works should be given; full addresses may be presented in a list of contributors at the end of the book if necessary. An example of a chapter heading with an author name and address is:

```
\Chapter[Quantum mechanics]{An introduction to the theory
of quantum mechanics}{I M Boringham\\University of Ware}
```

For an unnumbered section heading with an author the alternative `*` form of `\Chapter` is used, e.g.

```
\Chapter*{Foreword}{A Einstein}
```

3.1.3 Sections and subsections

The `\section[#1]{#2}` command is used at the start of each section. It will automatically generate the correct section number. The section heading, `#2`, should be typed with an initial capital then lowercase letters. The section heading is used as the running head on odd-numbered pages; if the full title is too long to be used then a short form is added in square brackets before the full title.

There are `\subsection{#1}` and `\subsubsection{#1}` commands to produce subsection and subsubsection headings. These are similar to `\section`, although there is no optional parameter for the running head. Do not put a full stop at the end of sections, subsections or subsubsections headings. The headings of subsections and subsubsections should always have an initial capital followed by lowercase letters, rather than capitals throughout.

Chapter and section headings can be given a label using the command `\label{label}` and this can be referred to in the text using `\ref{label}`. We have also defined `\cref{label}` which produces `chapter~\ref{label}` and `\sref{label}` which produces `section~\ref{label}`. There are also versions with an initial capital (`\Cref` and `\Sref`) which give initial capitals to chapter and section and which should only be used at the start of a section.

For an unnumbered section, for instance a reference section if the references are to appear at the end of each chapter, an asterisk is added immediately after the control sequence, e.g. `\section*{references}`.

3.1.4 Some matters of style

The main elements of IOP house style are presented in the booklet *Notes for Authors* (available from the Commissioning Editor). Some points to note, however, are the following.

- (i) It is IOP house style to use ‘-ize’ spellings (diagonalize, renormalization, minimization, etc). Some common exceptions are compromise, exercise and televise. Note however that ‘-yse’ spellings are used: e.g. analyse and catalyse.
- (ii) English spellings are generally preferred (centre, colour, flavour, behaviour, neighbour, tunnelling, artefact, focused, focusing, fibre, etc). We write of a computer program on disk; otherwise, we use ‘programme’ and ‘disc’.
- (iii) Acronyms are typeset in smaller than normal; for example, in normal text alternating current (AC) is set by the command `\scap{AC}`. The `\scap{#1}` command works slightly differently in the two styles but the actual differences produced are slight.

In `iopbk.sty` `\scap` changes to `\scriptsize` characters, rather than using the small caps font as obtained with the `\sc` command, and so can be combined with commands such as `\bf` and `\em` to obtain bold and emphasized small capitals, e.g. **RF** and *2D* which are obtained by `{\scap\bf RF}` and `{\scap\it 2D}` respectively. If small capitals occur in the title of the book `\scap\bf` will produce characters too small for the rest of the title and `\large\bf` should be used instead.

Note also that the acronyms to appear in small capitals should be typed in capitals. Using L^AT_EX's normal `\sc` command the acronym would need to be typed in lower case, and bold and italic versions would not be available.

In `iopnbk.sty` the definition of `\scap` is more general so will give better results in non-standard sizes and will take the type style of the surrounding text. In addition `{\scap HF}` will give bold small caps within a bold heading or italic small caps within italic text.

- (iv) Compound words beginning 'non-' or 'self-' are hyphenated (non-existent, self-consistent, etc).
- (v) The words table, figure, equation and reference should be written in full and **not** contracted to Tab., fig., eq. and ref. Also chapter, section, appendix, figure, table should not be written with initial capitals unless they start a sentence.
- (vi) The contractions 'i.e.' and 'e.g.' should appear roman, **not** italic, and when followed by a space it should be a control space (`_`).
- (vii) Data *are* ... (**not** data is ...).
- (viii) Text of computer programs or input should be set verbatim in typewriter font using the `\begin{verbatim} ... \end{verbatim}` commands for displayed material or `\verb"<text>"` for in-line material (note the double quotes surrounding the text may be replaced by any matching pair of characters except `*`).

While we recommend authors to follow these guidelines, there may be some cases where they are not appropriate (for example books aimed specifically at the North American market); in these cases authors should discuss their proposed style changes with the Commissioning Editor.

3.2 Appendices

If desired, appendices can be added to the end of the book, with material that is considered necessary to the understanding of the subject matter, but not sufficiently important to be an integral part of the text.

Appendices are treated like chapters but with letters to distinguish between them rather than numbers, e.g. Appendix A, B, C etc not Appendix 1, 2, 3. To signify the start of the appendices `\appendix` is used, it resets the chapter number so that `\chapter{#1}`, `\section{#1}`, `\subsection{#1}` will now produce the equivalent parts for an appendix, with the appendix letter instead of the chapter number. The typical code for the start of an appendix would be:

```
\appendix
\chapter{The title of appendix A}
\section{Section heading if required}
```

The appendix letter can be set at the start of the file, using the command `\setcounter{chapter}{#1}`. The `#1` parameter is the number corresponding to the appendix letter, e.g. 1 gives A, 2 gives B, etc.

Chapter 4

Mathematics

4.1 Two-line constructions

The great advantage of \TeX and \LaTeX over other text processing systems is their ability to handle mathematics to almost any degree of complexity. \LaTeX gives the author considerable freedom in encoding mathematics; however, in order to produce output that is of book quality, authors should exercise some restraint on the constructions used.

For instance, displayed equations should generally be restricted to a height of two lines, e.g. constructions such as

$$P = \frac{\frac{a}{b} + \frac{c}{d} + \frac{b}{c}}{(a^2 + b^2)(c^2 + d^2)}$$

should not be used. Instead, they should be converted to the equivalent two-line forms

$$P = \frac{a/b + c/d + b/c}{(a^2 + b^2)(c^2 + d^2)}$$

or

$$P = \left(\frac{a}{b} + \frac{c}{d} + \frac{b}{c} \right) [(a^2 + b^2)(c^2 + d^2)]^{-1}.$$

For simple fractions in the text the solidus $/$, as in $\lambda/2\pi$, should be used instead of \frac or \over , care being taken to use parentheses where necessary to avoid ambiguity, for example to distinguish between $1/(n-1)$ and $1/n-1$. Exceptions to this are the proper fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{3}{4}$, etc which are better left in this form. In displayed equations horizontal lines are preferable to solidi provided the equation is kept within a height of two lines. A two-line solidus should not be used; the construction $(\dots)^{-1}$ should be used instead. The command $\text{\case{\#1}{\#2}}$ will give a text style

fraction in a displayed equation and should be used where fractions such as $\frac{1}{2}$ are the only two-line entities within a display.

4.2 Roman and italic in mathematics

In mathematics mode L^AT_EX automatically sets variables in an italic font. In most cases authors should accept this italicization. However, there are some cases where it is necessary to use a roman font; for instance, we use a roman *d* for a differential *d*, a roman *e* for an exponential *e* and a roman *i* for the square root of -1 . To accommodate this and to simplify the typing of equations we have modified the L^AT_EX definitions `\d` and `\i` and added a macro `\e`. `\d` now gives a roman *d* for use in equations, e.g. dx/dy is obtained by typing `\d x/\d y`, and the macro for a dot under has been redefined to be `\du`. `\e` gives a roman *e* for use in simple exponentials such as e^x . The macro `\i` has also been amended and will give a roman *i* (*i*) in maths mode; `\ii` gives a dotless *i* (*i*) in normal text.

Certain other common mathematical functions, such as *cos*, *sin*, *det* and *ker*, should appear in roman type. L^AT_EX provides macros for these functions (in the cases above, `\cos`, `\sin`, `\det` and `\ker` respectively). The author should take care to use these macros. We have also added similar macros `\Tr`, `\tr` and `\Or` which give, respectively, roman *Tr*, *tr* and *O* (to designate terms ‘of order of’). Subscripts and superscripts should be in roman type if they are labels rather than variables or characters that take values. For example in the equation

$$\epsilon_m = -g\mu_n Bm$$

m, the *z* component of the nuclear spin, is italic because it can have different values whereas *n* is roman because it is a label meaning nuclear (μ_n is the nuclear magneton).

In the new font selection scheme `\rm` and `\bf` should not be used with mathematics. `\mathrm` should be used to obtain roman, particularly in subscripted or superscripted positions. `\text{#1}` is the equivalent of using `\mbox{#1}` and can also be used for normal size roman in maths. `\bold{#1}` is used instead of `{\bf #1}` to obtain upright bold in maths. In `iopbk.sty` `\mathrm` has been defined to be `\rm`, `\text{#1}` to be `\mbox{#1}` and `\bold{#1}` to be `{\bf #1}`, to allow files produced using `iopnbk.sty` to be run with `iopbk.sty`.

4.3 Alignment of mathematics

IOP books house style is to centre mathematical expressions, as L^AT_EX does by default. When splitting equations over more than one line, the L^AT_EX

environments `eqnarray` or `eqnarray*` can be used. However, if an equation is so long that it occupies two or more lines, some thought should be given to the correct place at which to break the equation. The author is the best judge of how to break an equation, since break positions may depend on subtleties of the mathematics involved, but there are two rules that can be stated.

- (i) Displayed equations should always be broken *before* binary operators and relations, i.e. if we break at a ‘+’ sign we begin the second line with a ‘+’ rather than end the first line with a ‘+’. Furthermore, when an equation is broken before a binary operation the second line should start at least two quads to the right of where the innermost subformula containing the binary operation begins on the first line. (See example 1 below.) A clear discussion of these problems is found in (Knuth, pp 195–7).
- (ii) If an equation *must* be split in the middle of a term (for example, between the two bracketed expressions in the term $[(a+b)(c+d)]$) then a multiplication sign should be inserted at the beginning of the second line. (See example 2 below.)

Example 1. (From Knuth (1986), p 195.) The equation

$$\sigma(2^{34}-1, 2^{35}, 1) = -3 + (2^{34}-1)/2^{35} + 2^{35}/(2^{34}-1) + 7/2^{35}(2^{34}-1) - \sigma(2^{35}, 2^{34}-1, 1).$$

is too long and must be split. In an equation like this, good break points might be immediately before the equals sign, immediately before any of the ‘+’ signs or immediately before the penultimate ‘−’ sign. Bad break points would be immediately before all other ‘−’ signs (because they are within a subformula rather than linking two parts of a formula) and the ‘/’ signs.

Following Knuth, we choose to break just before ‘+7’. One way of doing this is to type

```
\begin{eqnarray*}
\sigma(2^{34}-1, 2^{35}, 1)
&=& -3 + (2^{34}-1)/2^{35} + 2^{35}/(2^{34}-1) \\
&& + 7/2^{35}(2^{34}-1) - \sigma(2^{35}, 2^{34}-1, 1) .
\end{eqnarray*}
```

which yields

$$\begin{aligned} \sigma(2^{34}-1, 2^{35}, 1) = & -3 + (2^{34}-1)/2^{35} + 2^{35}/(2^{34}-1) \\ & + 7/2^{35}(2^{34}-1) - \sigma(2^{35}, 2^{34}-1, 1). \end{aligned}$$

Example 2. The equation

$$T_{nk \rightarrow n'k'} \propto (a+b)^2 \left| \sum_{\alpha'\nu'\alpha\nu} C_{\alpha'\nu'}^{n'\star}(k) C_{\alpha\nu}^n(k) \sum_l \exp ik(R_l + \tau_{\nu\nu'}) E_{\alpha\alpha'}^{l\nu\nu'} \epsilon(R_l + \tau_{\nu\nu'}) \right|^2$$

should be broken thus:

$$T_{nk \rightarrow n'k'} \propto (a+b)^2 \left| \sum_{\alpha'\nu'\alpha\nu} C_{\alpha'\nu'}^{n'\star}(k) C_{\alpha\nu}^n(k) \right. \\ \left. \times \sum_l \exp[ik(R_l + \tau_{\nu\nu'})] E_{\alpha\alpha'}^{l\nu\nu'} \epsilon(R_l + \tau_{\nu\nu'}) \right|^2$$

which is obtained by the code

```
\begin{eqnarray*}
T_{\{nk\}\rightarrow\{n'k'\}}\propto&
(a+b)^2\Big\vert\sum_{\{\alpha'\nu'\}\{\alpha\nu\}}
C_{\{\alpha'\nu'\}}^{\{n'\star\}}(k)C_{\{\alpha\nu\}}^{\{n\}}(k)\backslash\backslash
&\times\sum_l\exp[i\,k(R_l+\tau_{\{\nu\nu'\}})]
E_{\{\alpha\alpha'\}}^{l\{\nu\nu'\}}\epsilon(R_l+\tau_{\{\nu\nu'\}})
\Big\vert^2
\end{eqnarray*}
```

For series of short equations occurring consecutively several options are available.

- (i) If all equations fit on one line and the equations are not referred to separately in the text, then they should be set on a single line with a `\qquad` separating each separate equation, e.g.

$$h_{00} = h_{00}^* \quad h_{0i} = h_{0i}^* + a_{0,i} + a_{i,0} \quad h_{ij} = h_{ij}^* + a_{i,j} + a_{j,i}. \quad (4.1)$$

- (ii) If the equations will not fit on one line but do not need individual numbers then they should be set on the minimum number of lines with `\qquad` separating entries (or if each individual equation is of similar length aligning the starts of the equations), e.g.

$$g_{\mu\nu} = \eta_{\mu\nu} + h_{\mu\nu} \quad |h_{\mu\nu}| \ll 1 \\ \eta_{00} = 1 \quad \eta_{i0} = 0 \quad \eta_{0j} = 0 \quad \eta_{ij} = -\delta_{ij}.$$

- (iii) If individual equations are referred to separately (i.e. they have separate equation numbers) then, if they have similar length left-hand sides, they should be aligned (either left or at the equals sign) using the `eqnarray` environment.

4.4 Bold characters, vectors and matrices

In mathematics we use a bold italic font to signify vectors and a bold sans serif font for matrices rather than the upright bold font normally used with L^AT_EX.

4.4.1 Vectors

To set vectors we use the bold maths italic font `cmmib` (bold italic). To use this family for alphabetic characters within mathematics we have defined the macro `\bi{#1}` (bold italic). Therefore to set $ax + by \cdot z$ the code to be typed is `$a\bi{x} + b\bi{y} \cdot \bi{z}$`. The braces around `y` and `z` are, of course optional. For non-alphabetic characters we have added a series of extra definitions to obtain all the bold greek sloping characters, a bold partial sign, a bold curly ℓ and bold dotless i and j . These are obtained by adding a ‘b’ to the start of the non-bold definition, thus `\balpha` gives a bold alpha α , `\bpartial` gives a bold partial (∂), `\bell` a bold ℓ (ℓ) and `\bimath` gives a bold dotless i (\imath). The exception is bold eta, which requires the command `\bfeta` (to avoid redefining beta). In addition `\bGamma` to `\bOmega` have been programmed to give upright bold greek capitals (from the `cmbx` font family) rather than the sloping bold greek capitals which require `\bitGamma` to `\bitOmega` (we recommend using the upright bold greeks in preference to the sloping ones).

With most versions of L^AT_EX the fonts `cmmib` and `cmbisy` are only provided at 10pt, 11pt (scaled magstephalf) and 12pt so a scaled version of this font has to be used to obtain smaller sizes (e.g. subscripts and superscripts). This may cause problems with some printer drivers and a font substitution file may be needed to obtain a printout. We have therefore defined the subscript sizes for these fonts to be normal-sized characters in the `iopbk` style. Additional small sizes are, however, provided with the AMS fonts and `iopnbk.sty` allows these smaller fonts to be used.

4.4.2 Matrices

Matrices are set in a similar fashion to vectors but using the font `cmssbx`, a bold sans serif font. A macro `\bss{#1}` is used to call the font within maths mode and a typical matrix equation might be $\mathbf{J} = \mathbf{CBC}^T$ obtained from the code `$\bss{J}=\bss{CBC}^{\mathrm{T}}$`.

As with `cmmib` and `cmbisy`, the font `cmssbx` is often available only at 10, 11 and 12pt sizes and we have set the subscript size to be the same as the normal sized characters in `iopbk.sty`.

4.4.3 Other bold characters

Bold script (calligraphic) characters are available from the font `cmbisy`. They are obtained in an analogous way to ordinary calligraphic characters; instead of `\cal{ABC}` to obtain \mathcal{ABC} you type `\bcal{ABC}` which gives $\boldsymbol{\mathcal{ABC}}$. Other defined characters from this font family are `\bnabla` for bold nabla ∇ and `\bdot` for a raised bold dot to be used in dot products.

The blackboard bold (open face) alphabet occurs in the font `msbm` which is part of the AMSFonts package. To obtain blackboard bold the AMSFonts must be loaded using the alternative style file `iopnbk.sty`, and then within mathematics, type `\Bbb{ABC}` to obtain blackboard bold.

4.5 Miscellaneous points

Exponential expressions, especially those containing subscripts or superscripts, are clearer if the notation $\exp(\dots)$ is used, except for simple examples. For instance $\exp[i(kx - \omega t)]$ and $\exp(z^2)$ are preferred to $e^{i(kx - \omega t)}$ and e^{z^2} , but e^2 is acceptable.

It is important to distinguish between $\ln = \log_e$ and $\lg = \log_{10}$. We recommend braces, brackets and parentheses should be used in the order: $\{[()]\}$, but, whatever order they are used in, they should be consistent throughout the book. The same ordering of brackets should be used within each different size occurring. However, this ordering is to be ignored if the brackets have a special meaning (e.g. if they denote an average or a function). Decimal fractions should always be preceded by a zero: for example 0.123 **not** .123. For long numbers commas are not inserted but instead a thick space (`\;`) is added after every third character away from the position of the decimal point unless this leaves a single separated character: e.g. 60 000, 0.123 456 78 but 4321 and 0.7325 (`\;` has been redefined to allow it to be used in both text and maths mode).

No punctuation should be used in displayed mathematics apart from full stops if the equation comes at the end of a sentence. If more than one equation appears on the same line, they should be separated by a `\qquad` of space rather than by a comma or semicolon.

The symbols ‘ $>$ ’ and ‘ $<$ ’ should be used in the sense of ‘greater than’ and ‘less than’. If an angle bracket is required (for instance in a bra or ket vector) do not use these symbols; instead, use `\rangle` and `\langle`.

Theorems, and other theorem-like structures such as lemmas, corollaries, definitions, exercises and examples, should be set using the `\newtheorem` declaration to define environments for the particular theorem-like structures in your document. There are two arguments to `\newtheorem`, the first is the name of the environment and the second the text to be printed when the environment is called. There is also an optional argument to specify numbering by chapter or section. For more details see Lamport (1986) pp 58–9. To indicate the end of a theorem a small square is often used; to obtain one at the end of the line type `\hfill\Box`.

4.6 Equation numbering

Displayed equations that are referred to in the text should be numbered with the number on the right-hand side. Sequential numbering by chapter should be used: (1.1), (1.2), etc. When referring to an equation in the text, either put the equation number in parentheses without the word ‘equation’, e.g. ‘as in (1.2)’, or spell out the word equation in full, e.g. ‘if equation (1.2) is factorized’; do not use abbreviations such as eqn or eq. ‘Equation’ should always be used if an equation number starts a sentence. L^AT_EX generates equation numbers automatically by using the `equation` or `eqnarray` environments. Cross referencing can be used for equations numbers by adding a label to the equation, e.g. `\label{eq:HF}` and referring to it in the text by `(\ref{eq:HF})`, or `\eref{eq:HF}` (which automatically surrounds the number with parentheses), see (4.1). Where an equation number starts a sentence `\Eref{#1}` will produce Equation~(No) where No is the number corresponding to label #1.

Chapter 5

Figures and tables

5.1 Figures

We do not yet have the facilities for handling figures electronically so authors should send the normal fair copies of their figures (as bromides or dark ink or printing on white or transparent paper) along with their manuscript. Figures are numbered serially within each chapter and referred to in the text by number (figure 2.1, etc **not** Fig. 2.1). Each figure should have a brief caption describing it and, if necessary, interpreting the various lines and symbols on the figure. As much lettering as possible should be removed from the figure and included in the caption. L^AT_EX provides several macros for use in describing symbols and lines in figures and we have provided some additional definitions (symbols for a filled triangle, a filled inverted triangle and a filled diamond are only available in `iopnbk.sty`):

<code>\opencirc</code>	produces	○
<code>\opensqr</code>	produces	□
<code>\opentri</code>	produces	△
<code>\opentridown</code>	produces	▽
<code>\opendiamond</code>	produces	◇
<code>\fullcirc</code>	produces	●
<code>\fullsqr</code>	produces	■
<code>\dotted</code>	produces
<code>\dashed</code>	produces	- - - -
<code>\broken</code>	produces	- - -
<code>\longbroken</code>	produces	- - - -
<code>\chain</code>	produces	- - . -
<code>\dashddot</code>	produces	- - . . -
<code>\full</code>	produces	——

If a figure has parts, these should be labelled (a), (b), (c) etc. In the text use ($\$a\$$) or `\pt(a)` to obtain (a), etc.

Figures will normally be reduced photographically and pasted into spaces left for them. The amount of space the reduced version of a figure will occupy will of course depend on its complexity, but will usually be in the range 10–15 picas (pc) (~ 1.5 – 2.5 in or 4–7 cm). The figure reductions chosen should be such that the lettering on the figures is of a similar size, or slightly smaller than, the text. If authors are contracted to produce camera-ready copy they should size their figures appropriately otherwise a standard space (e.g. 2in) can be left and this will be corrected later by the IOP editors.

To set the figure captions the `\figure` environment is used. Between the `\begin{figure}` and `\end{figure}` commands the space for the figure is specified using `\vspace{#1}` and the figure caption with `\caption{#1}`. The space required is the final size of the figure itself (i.e. when it is reduced); allowance is made in the definition for the extra space separating the figure from any preceding text and from the figure caption. The argument of `\caption` is just the words of the caption, the label (e.g. **Figure 3.1.**) is automatically set in the correct style. The default positions for a figure are [htbp] so, if possible, the figure will be inserted at the position it is called at, if this is not possible it will be placed at the top of a page, the bottom of a page or lastly on a page by itself. An optional argument can be added in square brackets after `\begin{figure}` to allow the position of a figure on the page to be varied; the available options are [h] for putting the figure in the text where the environment appears. [b] inserts the figure at the bottom of the current page, [p] makes the figure occupy a full page, [t] inserts the figure at the top of the current or a subsequent page, or any combination of them. It is normally unnecessary to change the default, [htbp], but it may be useful to change from the default to improve the page layout when everything is completed.

As an example, the command

```
\begin{figure}
\vspace{5pc}
\caption{This is a short figure caption.}
\end{figure}
```

gives a caption with space for a figure occupying five picas.

The figure-making commands should be used when the figure is first mentioned in the text. Within text, figures should be referred to as figure 2.1 etc., not fig. 2.1. Cross referencing to figures can be made by giving the figure environment a label, e.g. `\label{fig:test}` and referring to it in the text using `\ref{fig:test}`. To save typing `\fref{#1}`

Figure 5.1. This is a short figure caption.

has also been defined to give `figure~\ref{#1}` and `\Fref{#1}` to give `Figure~\ref{#1}`.

If a figure will only fit on a page landscape, i.e. when rotated 90° , the command `\figblank` (which increments the page number and leaves a blank page) should be included at the appropriate place in the file. The caption should then be set from a separate file to the rest of the book with the page dimensions adjusted so that the normal page depth is the page width and the normal page width the page depth.

5.2 Tables

Tables should be used only to improve conciseness or where the information cannot be given satisfactorily in other ways, such as histograms or graphs. Tables are often best arranged with more columns than rows, as in the examples given. Tables are numbered serially within each chapter and referred to in the text by number (table 3.1, etc, **not** tab. 3.1). Each table should have an explanatory caption which should be as concise as possible. If a table is divided into parts these should be labelled (a), (b), (c), etc but there should be only one caption for the whole table, not separate ones for each part.

L^AT_EX uses the table environment to set tables, the table caption precedes the table and is set with the command `\caption{#1}` which has the text of the table caption as its argument. As with figures the default position of tables is [htbp] and this can be changed if necessary by adding the specific placement instruction after `\begin{table}`. The numbering of the captions is done automatically and cross references to tables in the text can be done provided a `\label` is given within the table environment. Tables with a label `tab` can be referred to in the text using `table~\ref{tab}`, `\tref{tab}` or `\Tref{tab}`. `\tref` sets ‘table’ with the number tied to it and `\Tref` ‘Table’ and the number. `\Tref` should only be used at the start of sentences.

Tables themselves are normally set using the L^AT_EX tabular environment, see Lamport (1986) for full details. IOP house style for tables is simple: there is a bold rule at the top and bottom of the table, with a

medium rule to separate the headings from the entries. There should be no vertical rules in the table. We hope that authors will follow the instructions below for setting tables to the IOP style but, in books, authors may use their own format if they prefer provided the result is pleasing to the eye and it is followed consistently throughout.

5.2.1 IOP table style

The IOP table style uses the `tabular` environment within the `center` environment with columns normally aligned left. The bold rules at the top and bottom of the table are set with the `\br` command (which does not need a `\\` following it). The medium rule separating the heading from the entries is set with `\mr` or `\hline`. To avoid the rules sticking out at either end of the table add `@{}` before the first and after the last descriptors, e.g. `{@{}l111l@{}}`.

Table 5.1 demonstrates the IOP table style and the code needed to generate it is given below. Note that columns are aligned on the decimal point.

Table 5.1. A simple example produced using the alignment commands described in section 5.2. The default alignment for all columns is left alignment.

E_0 (eV)	θ_e (deg)	λ	χ (deg)	η_1	η_2	η_3
139.7	60	0.74	-21.9	-0.208	0.472	146
75.3	75	0.75	-15.2	—	—	—
45.0	90	0.60	-8.12	-0.29	0.41	75
23.57	60	0.53	-4.23	-0.22	0.17	15

Three commands have been defined to help align columns on the decimal point. `\0` has been defined to be a phantom digit. If placed at the start of an entry in a left-aligned column it will move the entry to the right by the width of a digit (all numbers 0–9 have the same width). It can also be used at the end of entries in right-aligned columns to move entries one digit to the left. `\0` has been used in columns one and four. `\phm` has been defined as a phantom minus sign and is used to aid alignment in columns where most entries have minus signs but some do not. In left-aligned columns it is inserted at the start of the entries without minus sign and produces a space the width of a minus sign. `\phm` has been used in the headings of columns four and five and before the dash in column five. For columns with only a few minus signs an alternative `\m` is used instead of the minus sign to overlap the minus sign to the left of the column.

The full code for table 5.1 is (note that `\protect` has to be used before the cross-reference in the caption):

```
\begin{table}
\caption{A simple example produced using the alignment commands
described in \protect\sref{tabsec}. The default
alignment for all columns is left alignment.}
\label{ex1}
\begin{center}
\begin{tabular}{@{}llllllll@{}}
\br
$E_0$ (eV)& $\theta_{\text{e}}$ (deg)& $\lambda$& $\phi$& $\chi$ (deg)
& $\eta_1$& $\eta_2$& $\eta_3$\\
\mr
139.7 & 60& 0.74& -21.9& -0.208& 0.472& 146\\
075.3 & 75& 0.75& -15.2& \phi---& ---& \\
045.0 & 90& 0.60& -8.12& -0.29& 0.41& 075\\
023.57& 60& 0.53& -4.23& -0.22& 0.17& 015\\
\br
\end{tabular}
\end{center}
\end{table}
```

Headings which span more than one column should be set using `\multicolumn{#1}{c}{#3}` where `#1` is the number of columns to be spanned and `#3` is the heading. A simplified alternative version is `\centre{#1}{#2}` where `#1` is the number of columns to be spanned and `#2` the heading. There should be a rule spanning the same columns below the heading, it is produced with `\cline{n-m}` where `n` is the number of the first spanned column and `m` that of the last spanned column. `\cline` should not be part of a row but follow immediately after a `\\`. An alternative way of producing a spanned rule is to include `\crule{#1}` within the row following the centred heading, with `#1` the number of columns the rule is to span. To reduce the space between the centred heading and rule `\ns` can be added after the `\\` of the row containing the centred heading, see the code for table 5.2.

If a table contains notes they should appear beneath the table set to the width of the page and not at the foot of the page. The tabular environment for a table with footnotes must be placed within a `\notedtable{#1}` command to save the table width for use in the notes. The appropriate symbols should be included in the body of the table and the table notes are placed after the closing brace of `\notedtable` but before the `\end{center}` and `\end{table}` commands. The normal symbols to use for notes to tables are either the footnote symbols: †, ‡, § or || or, if there are a lot of notes, superscripted lower case roman letters, i.e. ^a. The table notes are set with

the command `\tabnote{#1}` where `#1` is the note, including its symbol. There should be a `\tabnote` command for each table note. Table 5.2 is an example of a table containing notes.

Table 5.2. A table with headings spanning two columns and containing footnotes. To improve the visual effect a negative skip has been put in between the first and second lines of the headings.

Nucleus	Thickness (mg cm ⁻²)	Composition	Separation energies	
			γ , n (MeV)	γ , 2n (MeV)
¹⁸¹ Ta	19.3 \pm 0.1 ^a	Natural	7.6	14.2
²⁰⁸ Pb	3.8 \pm 0.8 ^b	99% enriched	7.4	14.1
²⁰⁹ Bi	2.86 \pm 0.01 ^b	Natural	7.5	14.4

^a Self-supporting.

^b Deposited over Al backing.

This table is obtained by using the following code.

```
\begin{table}
\caption{A table with headings ... .}\label{tnote}
\begin{center}
\notetable{\begin{tabular}{@{}l1111l@{}}
\br
&&\centre{2}{Separation energies}\\
\ns
&Thickness&\crule{2}\\
Nucleus&(mg cm$^{-2}$)&Composition&$\gamma$, n
(MeV)&$\gamma$, 2n (MeV)\\
\mr
$^{181}$Ta&19.3\pm 0.1^{\text a}&Natural&7.6&14.2\\
$^{208}$Pb&3.8\pm 0.8^{\text b}&99\%\ enriched&7.4&14.1\\
$^{209}$Bi&2.86\pm 0.01^{\text b}&Natural&7.5&14.4\\
\br
\end{tabular}}
\tabnote{$^{\text a}$ Self-supporting.}
\tabnote{$^{\text b}$ Deposited over Al backing.}
\end{center}
\end{table}
```

If a table is approximately of page width it can be made to fill the full page width by using the `tabular*` environment. Where a table is still too wide to fit on a page it may be possible to reorganize it to fit in (for instance

change rows into columns and vice versa). If a large table has to be set landscape then it should be set separately and the command `\tabblank` inserted at the appropriate place to increment the table number and to leave a blank page. For very narrow tables it may sometimes be necessary to space out the table so that any notes can be set satisfactorily (they are set to the width of the table). To do this simply replace ampersands by double ampersands (or triple ones) to increase the spacing between columns.

It can often be difficult to decide on the correct alignment of columns and unfortunately there are no hard and fast rules. Useful guidelines, however, are:

- (i) align decimal points where possible (Knuth 1986, pp 241, 242);
- (ii) columns of numbers without decimal points should align right as if they had decimal points;
- (iii) dashes in tables (use an em rule, ---) should align with the first complete column on the left-hand side or the entries immediately above them;
- (iv) column headings should normally be aligned left;
- (v) minus signs (and other mathematical signs such as +, <, etc) should be ignored for alignment purposes (i.e. in a column of numbers, some with minus signs, the minuses should stick out to the left);
- (vi) if there is a small column heading over a wide column with an uneven left-hand edge, the heading may look better if aligned with the left-hand side of the first entry in that column;
- (vii) column headings spanning two or more minor headings should be centred.

It may be difficult to satisfy all these points simultaneously but the most important underlying point is to create a table that is easy to read and understand and that has a pleasing appearance to the eye.

Thus, the procedure to typeset a table is:

- (i) start the table environment with `\begin{table}`, type the caption within braces after the `\caption` command, and define the label if required;
- (ii) start the center and tabular environments set each column as left aligned with `\begin{center} \begin{tabular}{@{}l l l l l l@{}}`, with one l for each column, the `@{}` stop the rules overhanging the left and right edges of the table;
- (iii) set the top bold rule with `\br`, do not follow it with `\;`;
- (iv) type the various column headings separated by `&` (each line should end with a `\;`);
- (v) follow the headings with `\mr` without a `\;` following;

- (vi) set the table entries as usual, with different columns being separated by `&` and `\\` at the end of each line;
- (vii) insert the final bold rule using `\br`;
- (viii) complete the table with `\end{tabular}`, `\end{center}` and `\end{table}`.

Units should not normally be given within the body of a table but given in brackets following the column heading; however, they can be included in the caption for long column headings or complicated units.

Where possible, tables should not be broken over pages. If each table is reasonably large then each one can start a new page; however, if there are several consecutive short tables they may appear on the same page.

If a table is not to be typeset but reproduced from artwork obtained from another source (e.g. a previous edition or another book), the normal table environment should be used together with `\caption` to set the caption. `\vspace*{#1}`, where `#1` is the space required to fit the artwork in, is then used to provide the necessary space before the table environment is closed.

Chapter 6

References

6.1 General remarks

Two different styles of referencing are in common use: the Harvard alphabetical system and the Vancouver numerical system. Either may be used. References can be collected together at the end of the book or can be placed at the end of each chapter as a numbered or unnumbered section. If the references are to be placed at the end of the book they should appear in a separate file with the command `\References` or `\Bibliography` at the beginning depending on whether the heading is to be ‘References’ or ‘Bibliography’, or indeed `\chapter*{Title}` if some other title is required for the reference chapter. If the references are to appear at the end of each chapter then they should be included at the end of the appropriate chapter file following a command `\section*{heading}` for an unnumbered section, or `\section{heading}` for a numbered one. In each case introductory text may precede the same of the reference list if desired.

If the Harvard alphabetical system is to be used the command `\begin{thereferences}` must precede the start of the reference list entries (note `\begin{thebibliography}` is reserved for numeric references and `\begin{thereferences}` should only be used for alphabetic references).

The equivalent command for the Vancouver numerical system is `\begin{thebibliography}{#1}`, where `#1` is a number with the same number of digits as the highest referencing number used. Thus for a reference list containing 156 entries, `{156}` (or with any other three-digit number) should be used.

The reference environments remove extra spaces after full stops and adjusts the indentation of turnover lines. When the reference list is completed the command `\end{thereferences}` or `\end{thebibliography}` should be used to end the reference environment as appropriate.

The References should be formatted according to a consistent style and that outlined here is highly recommended; it will save a considerable amount of time in copy editing and correction if the references are prepared in an acceptable style. If authors wish to use a different style for references they should discuss the proposed format with the commissioning staff at the earliest possibility. Brief descriptions of the use of the two referencing systems are given below.

6.2 Harvard system

In the Harvard alphabetical system the name of the author appears in the text together with the year of publication. As appropriate, either the date or the name and date are included within parentheses. Where there are only two authors both names should be given in the text; if there are more than two authors only the first name should appear followed by ‘*et al*’ (which is obtained by typing `\etal`). When two or more references to work by one author or group of authors occur for the same year they should be identified by including a, b, etc after the date (e.g. 1986a). If several references to different pages of the same article occur the appropriate page number may be given in the text, e.g. Kitchen (1982, p 39).

The reference list consists of an alphabetical listing by authors’ names and in date order for each author or group of identical authors. Each individual reference must be typed as a separate paragraph.

There will be two basic types of entries within the reference list: (i) those to journal articles and (ii) those to books, conference proceedings and reports. For both of these types of references font changes are required; in the subsections below we describe these font changes.

6.2.1 References to journal articles

Normal references to journal articles contain three changes of font: the authors and date appear in roman type, the journal title in italic, the volume number in bold and the page numbers in roman again. A typical journal entry would be:

Cisneros A 1971 *Astrophys. Space Sci.* **10** 87

which is obtained by typing

```
\item Cisneros A 1971 {\it Astrophys. Space Sci.} {\bf 10} 87
```

Features to note are the following.

- (i) The authors should be in the form: surname (with only the first letter capitalized) **followed** by the initials with **no** periods after the initials. Authors should be separated by a comma except for the last two which

should be separated by ‘and’ with no comma preceding it. Titles of articles may be included in the reference list, if desired, in which case the title should be in lower case, except for an initial capital, and should follow the date.

- (ii) The journal is in italic and is abbreviated. If a journal has several parts denoted by different letters the part letter should be inserted after the journal in roman type, e.g. *Phys. Rev. A*. An exception to this is *Phys. Lett.* where the part letter is included in the volume number. Several frequently referenced journals have been assigned a control sequence that typesets the journal name, in italic and leaves a space after it. Thus `\NP` expands to *Nucl. Phys.* , and `\JMP` expands to *J. Math. Phys.* . An italic correction is included where necessary. Tables of the available journal abbreviations are given in appendix B.
- (iii) The volume number is bold; the page number is roman. Both the initial and final page numbers should be given where possible. The final page number should be in the shortest possible form and separated from the initial page number by an en rule (–), e.g. 1203–14.
- (iv) Where there are two or more references with identical authors, the authors’ names should not be repeated but should be replaced by `\dash` on the second and following occasions. Thus

```
\item Harrison P G and Willett M J 1988 {\it Nature\}
  {\bf 332} 337--9
\item\dash 1989 {\it J. Chem. Soc. Faraday Trans.} I {\bf 85}
  1907--20
```

6.2.2 References to books, conference proceedings and reports

References to books, proceedings, reports and preprints are similar, but have only two changes of font. The authors and date of publication are in roman, the title of the book is in italic, and the editors, publisher, town of publication and page number are in roman. A typical reference to a conference and a book are

Caplar R 1973 *Proc. Int. Conf. on Nuclear Physics, Munich* vol 1 (Amsterdam: North-Holland) p 517
 Dorman L I 1975 *Variations of Galactic Cosmic Rays* (Moscow: Moscow State University Press) p 103

which would be obtained by typing

```
\item Caplar R 1973 {\it Proc. Int. Conf. on Nuclear Physics,
  Munich} vol~1 (Amsterdam: North-Holland) p~517
\item Dorman L I 1975 {\it Variations of Galactic Cosmic Rays}
  (Moscow: Moscow State University Press) p~103
```

Features to note are the following:

- (i) Book titles are in italic and should be spelt out in full with initial capital letters for all except minor words. For conference proceedings words such as Proceedings, Symposium, International, Conference, Second, etc should be abbreviated to Proc., Symp., Int., Conf., 2nd, respectively, but the rest of the title should be given in full, followed by the town or city where the conference was held. For Laboratory Reports the Laboratory should be spelt out wherever possible, e.g. *Argonne National Laboratory Report*.
- (ii) The volume number as, for example, vol 2, should be followed by the editors, if any, in a form such as ed A J Smith and P R Jones. Use *et al* if there are more than two editors. Next comes the town of publication and publisher, within parentheses and separated by a colon, and finally the page numbers preceded by ‘p’ if only one number is given or ‘pp’ if both the initial and final numbers are given. The page numbers should be tied (with a ~) to the p or pp.

The cross referencing facilities of L^AT_EX are not really useful if Harvard style referencing is being used. This is because the reference list is alphabetical and so additional references can simply be inserted in the list without any renumbering being required and because the form of citation in the text varies according to context.

6.3 Vancouver system

In the Vancouver system references are numbered sequentially throughout the text. The numbers occur within square brackets and one number can be used to designate several references. The reference list is in numerical, not alphabetical, order. The number of the reference appears in square brackets, and each individual reference should to be typed on a separate line. The reference list **must** begin with the command `\begin{thebibliography}{#1}`, where **#1** is any number with the same number of digits as the highest reference number used.

As in the Harvard system, there will be two basic types of entries within the reference list: (i) those to journal articles and (ii) those to books, conference proceedings and reports. For both of these types of references font changes are required; the method is exactly as was described in the previous subsection. In fact, references to journals and books are very similar to those in the Harvard system. There are two major differences. Firstly, the reference number must appear at the start of a reference by using `\bibitem` instead of `\item` at the start of a new reference. Secondly, when two or more separate references with identical authors occur, the author names are spelt out in full, i.e. they are **not** replaced with `\dash`.

A typical numerical reference list might begin

- [1] Dorman L I 1975 *Variations of Galactic Cosmic Rays* (Moscow: Moscow State University Press) p 103
- [2] Caplar R and Kulisic P 1973 *Proc. Int. Conf. on Nuclear Physics, Munich* vol 1 (Amsterdam: North-Holland) p 517
- [3] Cisneros A 1971 *Astrophys. Space Sci.* **10** 87

which would be obtained by typing

```
\bibitem{} Dorman L I 1975 {\it Variations of Galactic Cosmic Rays}
(Moscow: Moscow State University Press) p~103
\bibitem{} Caplar R and Kulisic P 1973 {\it Proc. Int. Conf. on
Nuclear Physics, Munich} vol~1 (Amsterdam: North-Holland) p~517
\bibitem{} Cisneros A 1971 {\it Astrophys. Space Sci.} {\bf 10} 87
```

Separate paragraphs for each reference are not necessary as the `\bibitem{}` command automatically starts a new paragraph. If one number covers more than one reference, and the authors are the same, then separate the references by a semicolon and type the second reference after the first without a paragraph break. For example:

```
\bibitem{} Bertini R 1984 \PL {\bf 136B} 29; 1985 \PL {\bf 158B} 19
```

If the year and journal are also the same these need not be repeated.

If one number covers more than one reference, and the authors are different, then the second reference should appear on a separate line but without a number, this is achieved by replacing the `\bibitem{}` command with `\item[]` or `\nonum`. For example:

```
\bibitem{fesh} Feshbach H 1986 \PL {\bf 168B} 318
\nonum Fano U 1961 \PR {\bf 124} 1866
\bibitem{} Bertini R 1984 \PL {\bf 136B} 29
```

which gives

- [1] Feshbach H 1986 *Phys. Lett.* **168B** 318
Fano U 1961 *Phys. Rev.* **124** 1866
- [2] Bertini R 1984 *Phys. Lett.* **136B** 29

If L^AT_EX cross referencing is being used then the label for the reference is included within the brace following `\bibitem` and `\cite{label}` is used to refer to the reference in the text, e.g. [1]. For more details on cross referencing see Lamport (1986).

6.4 Reference lists

A complete reference list should provide the reader with enough information to locate the article concerned and should consist of: name(s) and initials, date published, title of journal or book, volume number, editors, if any, and, for books, town of publication and publisher in parentheses, and finally the

page numbers. Titles of journal articles may also be included. Up to ten authors may be given in the reference list; where there are more than ten only the first should be given followed by '*et al.*' The terms *op. cit.*, *loc. cit.* and *ibid.* should not be used. Unpublished conferences and reports should generally not be included in the reference list and articles in the course of publication should be entered only if the form of publication is known. References to preprints should give the title of the preprint and/or preprint number (if relevant). A thesis submitted for a higher degree may be included in the reference list if it has not been superseded by a published paper and is available through a library; sufficient information should be given for it to be traced readily.

Chapter 7

Indexing

7.1 Generating an index file

An index can be compiled manually, by highlighting words throughout the text and then inserting page numbers when the final version of the text is ready, or semi-automatically, using the L^AT_EX indexing facilities. A good index is important; so much so that the author of T_EX himself has stated (Knuth 1986) that he does not believe in completely automating the preparation of an index: he puts the final touches to his indexes by hand. The L^AT_EX indexing facilities, however, should prove to be helpful in preparing a good index. If an index file is to be written the command `\makeindex` should be added to the preamble. This causes a `.idx` file to be written containing information written by `\index` commands embedded in the text. The command `\index{physics}` appearing on page 27 causes an entry on the index file of `\indexentry{physics}{27}`. `\index` produces no text and if there has been no `\makeindex` command it does nothing. For more details of index generation see Lamport (1986). Extra work such as sorting, removing repeated main entries and subentries and removing inconsistencies is required to transform the index file into a usable index, this may be done by programs such as MakeIndex or by using an editor on the `.idx` file.

The index environment generates the index as a chapter in double-column format. The final index file should consist of `\items`, `\subitems` and `\subsubitems`, with `\indexspace` inserted each time the initial letter changes. A portion of a typical index file is

```
\begin{index}
\item Fluctuation measurements, 249
\item Flux
\subitem function, 145
\subitem tube, 29--31
```

```
\indexspace  
\item H mode, 186  
\item HBTX, 21  
\end{index}
```

Alternatives are `\1` and `\2` which have been defined to be `\item` and `\subitem` but in addition to make the first letter of a entry into a capital letter. They can be used for entries and subentries respectively.

Chapter 8

Procedures

When starting to write the book it helps, and may save a great deal of work, if a sample chapter were sent to IOP so that an editor can evaluate it. The editor would check adherence to house style and could suggest alterations at an early stage, rather than wait until the whole book is written. It is also possible for authors to meet an editor if there are any queries which could usefully be addressed by such a meeting. Staff at IOP are always willing to advise on production of manuscripts, as the greatest understanding possible between author and editor is very desirable.

Authors should note that it is their responsibility to obtain permission to reproduce any previously published material from the author and publisher of the material. Once the book is complete and has been reviewed and finalized, it will be thoroughly copy-edited. Figure sizes will be checked and lettering can be added to figures if necessary. Any corrections that are required can either be made by an editor here, or the book can be returned to the author for correction. After corrections have been made and the revised version checked, the figures are inserted in their correct positions and the whole book sent to the author for final approval. When it has been approved the book will be printed.

Appendix A

Macros for formatting text and mathematics

Table A.1 lists the basic macros for formatting the text and table A.2 those for simplifying the coding of mathematics.

Table A.1. Macros available in IOP book style files to format text. Parameters within square brackets are optional arguments as are asterisks.

Macro name	Purpose
<code>\title</code>	Title of book
<code>\author</code>	Author(s)
<code>\maketitle</code>	Generate title page
<code>\tableofcontents</code>	Generate contents list
<code>\makeindex</code>	Make index file
<code>\part*{#1}</code>	Part heading without author's name
<code>\part[#1]{#2}{#3}</code>	Part heading without address
<code>\Part[#1]{#2}{#3}{#4}</code>	Part heading with address
<code>\chapter[#1]{#2}</code>	Chapter or appendix heading
<code>\chapter*{#1}{#2}</code>	Unnumbered chapter heading
<code>\Chapter[#1]{#2}{#3}</code>	Chapter or appendix with author
<code>\Chapter*{#1}{#2}</code>	Unnumbered chapter with author
<code>\section[#1]{#2}</code>	Section heading
<code>\subsection{#1}</code>	Subsection heading
<code>\subsubsection{#1}</code>	Subsubsection heading
<code>\appendix</code>	Start of appendices
<code>\References</code>	References heading (new chapter)
<code>\Bibliography</code>	Bibliography heading (new chapter)

Table A.1. (Continued.)

Macro name	Purpose
<code>\begin{thereferences}</code>	Start Harvard references
<code>\end{thereferences}</code>	End Harvard references
<code>\dash</code>	Rule for repeated authors
<code>\begin{thebibliography}{#1}</code>	Start Vancouver references
<code>\end{thebibliography}</code>	End Vancouver references
<code>\nonum</code>	Unnumbered reference
<code>\index</code>	Entry to be written in index file
<code>\1</code>	Entry in index with initial capital
<code>\2</code>	Subentry in index
<code>\begin{theindex}</code>	Start of index
<code>\end{theindex}</code>	End of index
<code>\etal</code>	<i>et al</i> for text and reference lists
<code>\caption{#1}</code>	Figure and table caption
<code>\figblank</code>	Blank page for landscape figure
<code>\tabblank</code>	Blank page for landscape table
<code>\centre{#1}{#2}</code>	Heading centred over several columns
<code>\crule{#1}</code>	Rule centred over several columns
<code>\br, \mr</code>	Bold and medium rules for tables
<code>\ns</code>	Small negative space for use in table
<code>\bs, \ms</code>	Medium and small interline spaces
<code>\tabnote{#1}</code>	Table note
<code>\0</code>	Space of a digit (for table alignment)
<code>\m</code>	In tables, left overhanging minus sign
<code>\phm</code>	In tables, phantom minus sign
<code>\pt{#1}</code>	To get letter within (...) italic
<code>\cite{#1}</code>	Cross referenced citation
<code>\ref{#1}</code>	Cross reference
<code>\cref{#1}, \Cref{#1}</code>	Chapter cross references
<code>\sref{#1}, \Sref{#1}</code>	Section cross references
<code>\eref{#1}, \Eref{#1}</code>	Equation cross references
<code>\fref{#1}, \Fref{#1}</code>	Figure cross references
<code>\tref{#1}, \Tref{#1}</code>	Table cross references
<code>\ii</code>	Dotless i: <code>\i</code> (redefined <code>\i</code>)
<code>\du</code>	Dot under (redefined <code>\d</code>)
<code>\scap{#1}</code>	Small capitals

Table A.2. Macros available in the IOP book style files to help format mathematics.

Macro name	Purpose
<code>\bi{#1}</code>	Bold italic for vectors
<code>\bss{#1}</code>	Bold sans serif for matrices
<code>\bcal{#1}</code>	Bold calligraphic alphabet
<code>\Bbb{#1}</code>	Black board bold (only with AMS fonts)
<code>\bGamma...\bOmega</code>	Bold upright greek capitals
<code>\bitGamma...\bitOmega</code>	Bold italic greek capitals
<code>\balpha...\bvarphi</code>	Bold greek lower case
<code>\bfeta</code>	Bold lower case eta (not <code>\beta</code> !)
<code>\bell</code>	Bold ℓ
<code>\bpartial</code>	Bold partial
<code>\bimath</code>	Bold dotless i
<code>\bjmath</code>	Bold dotless j
<code>\bnabla</code>	Bold nabla
<code>\bdot</code>	Bold raised dot (for dot products)
<code>\d</code>	A roman d for the differential d
<code>\e</code>	A roman e for the exponential e
<code>\i</code>	A roman i for the square root of -1
<code>\case{#1}{#2}</code>	A text style fraction in displayed maths
<code>\ms</code>	Small space to open out lines displays
<code>\Or</code>	Roman capital O (for terms of order of)
<code>\Tr</code>	Roman Tr (for Traces)
<code>\tr</code>	Roman tr (for traces)
<code>\rshad</code>	Right shadow bracket
<code>\lshad</code>	Left shadow bracket
<code>\dsty</code>	Displaystyle
<code>\tsty</code>	Text style
<code>\ssty</code>	Script style
<code>\sssty</code>	Scriptscript style
<code>\mathrm</code>	Roman characters in maths
<code>\text{#1}</code>	Roman text in maths
<code>\bold{#1}</code>	Bold upright characters in maths

Appendix B

Macros for journal abbreviations

Table B.1. Abbreviations for the IOP journals.

Macro name	Short form of journal title	Years relevant
\CQG	Class. Quantum Grav.	
\IP	Inverse Problems	
\JPA	J. Phys. A: Math. Gen.	
\JPB	J. Phys. B: At. Mol. Phys.	1968–1987
\jpb	J. Phys. B: At. Mol. Opt. Phys.	1988 and onwards
\JPC	J. Phys. C: Solid State Phys.	1968–1988
\JPCM	J. Phys: Condens. Matter	1989 and onwards
\JPD	J. Phys. D: Appl. Phys.	
\JPE	J. Phys. E: Sci. Instrum.	1968–1989
\JPF	J. Phys. F: Met. Phys.	
\JPG	J. Phys. G: Nucl. Phys.	1975–1988
\jpg	J. Phys. G: Nucl. Part. Phys.	1989 and onwards
\MST	Meas. Sci. Technol.	1990 and onwards
\NET	Network	
\NL	Nonlinearity	
\NT	Nanotechnology	
\PAO	Pure and Applied Optics	
\PMB	Phys. Med. Biol.	
\PSST	Plasma Sources Sci. Technol.	
\QO	Quantum Opt.	
\RPP	Rep. Prog. Phys.	
\SST	Semicond. Sci. Technol.	
\SUST	Supercond. Sci. Technol.	
\WRM	Waves in Random Media	

Table B.2. Abbreviations for some more common non-IOP journals.

Macro name	Short form of journal
\AC	Acta Crystallogr.
\AM	Acta Metall.
\AP	Ann. Phys., Lpz
\APNY	Ann. Phys., NY
\APP	Ann. Phys., Paris
\CJP	Can. J. Phys.
\JAP	J. Appl. Phys.
\JCP	J. Chem. Phys.
\JJAP	Japan. J. Appl. Phys.
\JMMM	J. Magn. Magn. Mater.
\JMP	J. Math. Phys.
\JOSA	J. Opt. Soc. Am.
\JP	J. Physique
\JPhCh	J. Phys. Chem.
\JPSJ	J. Phys. Soc. Japan
\JQSRT	J. Quant. Spectrosc. Radiat. Transfer
\NC	Nuovo Cimento
\NIM	Nucl. Instrum. Methods
\NP	Nucl. Phys.
\PF	Phys. Fluids
\PL	Phys. Lett.
\PR	Phys. Rev.
\PRL	Phys. Rev. Lett.
\PRS	Proc. R. Soc.
\PS	Phys. Scr.
\PSS	Phys. Status Solidi
\PTRS	Phil. Trans. R. Soc.
\RMP	Rev. Mod. Phys.
\RSI	Rev. Sci. Instrum.
\SSC	Solid State Commun.
\SPJ	Sov. Phys.-JETP
\ZP	Z. Phys.

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