

The miller package

Harald Harders (h.harders@tu-bs.de)
Björn Pedersen (bjoern.pedersen@frm2.tum.de)

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Abstract

Typeset miller indices, e.g., $\langle 1\bar{2}0 \rangle$, used in material science with an easy syntax. Minus signs are printed as bar above the corresponding number.

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1 The user interface

To use this package place

```
\usepackage{miller}
```

in the preamble of your document.

`\hkl` The `\hkl` macro can be used in different ways. Its argument is surrounded by the parentheses that you want to appear in the document. If the argument contains spaces, they are taken as delimiters between the different components of the hkl vector. If no spaces are given, each component has exactly one digit (plus eventually a preceding minus sign). The usage is shown with some examples.

Specify one direction in space:

```
\hkl[1 12 3], \hkl[-1 0 -12], \hkl[1 11 -2 0]\\  
\hkl[123], \hkl[-10-2], \hkl[11-20]
```

$$[1\ 12\ 3], [\bar{1}\ 0\ \bar{1}\bar{2}], [1\ 11\ \bar{2}\ 0]$$

$$[1\ 2\ 3], [\bar{1}\ 0\ \bar{2}], [1\ 1\ \bar{2}\ 0]$$

Specify all equal directions in space:

```
\hk1<1 12 3>, \hk1<-1 0 -12>, \hk1<1 11 -2 0>\\
\hk1<123>, \hk1<-10-2>, \hk1<11-20>
```

$$\langle 1\ 12\ 3 \rangle, \langle \bar{1}\ 0\ \bar{1}\bar{2} \rangle, \langle 1\ 11\ \bar{2}\ 0 \rangle$$

$$\langle 1\ 2\ 3 \rangle, \langle \bar{1}\ 0\ \bar{2} \rangle, \langle 1\ 1\ \bar{2}\ 0 \rangle$$

Specify one plane in space:

```
\hk1(1 12 3), \hk1(-1 0 -12), \hk1(1 11 -2 0)\\
\hk1(123), \hk1(-10-2), \hk1(11-20)
```

$$(1\ 12\ 3), (\bar{1}\ 0\ \bar{1}\bar{2}), (1\ 11\ \bar{2}\ 0)$$

$$(1\ 2\ 3), (\bar{1}\ 0\ \bar{2}), (1\ 1\ \bar{2}\ 0)$$

Specify all equal planes in space:

```
\hk1{1 12 3}, \hk1{-1 0 -12}, \hk1{1 11 -2 0}\\
\hk1{123}, \hk1{-10-2}, \hk1{11-20}
```

$$\{1\ 12\ 3\}, \{\bar{1}\ 0\ \bar{1}\bar{2}\}, \{1\ 11\ \bar{2}\ 0\}$$

$$\{1\ 2\ 3\}, \{\bar{1}\ 0\ \bar{2}\}, \{1\ 1\ \bar{2}\ 0\}$$

The first version (with spaces) allows indices with more than one digit, while the second one is shorter in the source code.

The symbol used for the bar is changeable by redefining the `\millerminus` command, e.g.,

```
\usepackage{ushort}
\ushortCreate:\overline{oshort}
\renewcommand\millerminus{\oshort}
```

The space between numbers can be changed, e.g.,

```
\hk1<123>\\
\renewcommand\millerskip{\;} \hk1<123>\\
\renewcommand\millerskip{,\} \hk1<123>\\
\renewcommand\millerskip{ } \hk1<123>
```

$$\langle 1\ 2\ 3 \rangle$$

$$\langle 1\ 2\ 3 \rangle$$

$$\langle 1, 2, 3 \rangle$$

$$\langle 123 \rangle$$

2 The implementation

Heading of the package:

```
1 <package>\ProvidesPackage{miller}
2 <version>\ProvidesFile{miller-v.tex}
3 <package|version> [2004/09/20 v1.2 print miller indices]
4 {*package}
```

Define command for space between numbers.

```
5 \newcommand*\millerskip{\,}
```

Define the command for the minus.

```
6 \newcommand*\millerminus{\overline}
```

Check for space in argument.

```
7 \def\@millerno#1 #2\@empty{%
8   \xdef\miller@secondarg{#2}%
9   \ifx\@empty\miller@secondarg
10    \@@@millerno#1#2\@empty\@empty\@empty
11  \else
12    \@@millerno#1 #2\@empty
13  \fi
14 }%
```

Parse for minus sign.

```
15 \def\@checkminus#1#2\@empty{%
16   \ifx-#1%
17     \begingroup
18     \edef\@tempa{#2}%
19     \edef\@tempb{}%
20     \ifx\@tempa\@tempb
21       \PackageError{miller}{%
22         \string\hkl space command contains a single minus}{No entry of
23         the \string\hkl space command may consist only of a minus.}%
24       #1%
25     \else
26       \millerminus{\vphantom{b}#2}%
27     \fi
28   \endgroup
29 \else
30   #1#2%
31 \fi
32 }
```

Parse the argument (with spaces).

```
33 \def\@@millerno#1 #2{%
34   \ifx\@empty#2%
35     \let\next\relax
36   \else%
37     \let\next\@@millerno
38   \fi%
```

```

39 \@checkminus#1\@empty
40 \ifx\@empty#2\else\millerskip\fi
41 \next #2%
42 }

```

Parse the argument (without spaces).

```

43 \def\@@@millerno#1#2#3{%
44 \ifx-#1
45 \millerminus{\vphantom{b}#2}%
46 \def\miller@nextarg{#3}%
47 \ifx\@empty#3%
48 \let\next\relax
49 \@tempwafalse
50 \ifx-#2 \@tempwattrue\fi
51 \ifx\@empty#2 \@tempwattrue\fi
52 \if@tempwa
53 \PackageError{miller}{%
54 Last character of \string\hkl\space command is a minus}{The
55 last character may not be a minus.}%
56 \fi
57 \else%
58 \let\next\@@@millerno
59 \millerskip
60 \fi%
61 \else
62 #1%
63 \def\miller@nextarg{#2#3}%
64 \ifx\@empty#2%
65 \let\next\relax
66 \ifx-#1
67 \PackageError{miller}{%
68 Last character of \string\hkl\space command is a minus}{The
69 last character may not be a minus.}%
70 \fi
71 \else%
72 \let\next\@@@millerno
73 \millerskip
74 \fi%
75 \fi
76 \expandafter\next\miller@nextarg
77 }

```

Commands for the different types.

```

78 \def\hkleckig[#1]{\ensuremath{[\@millerno#1 \@empty]}}
79 \def\hkldrund(#1){\ensuremath{(\@millerno#1 \@empty)}}
80 \def\hklsplitz<#1>{\ensuremath{\langle\@millerno#1 \@empty\rangle}}
81 \def\hklgeschweift#1{\ensuremath{\{\@millerno#1 \@empty\}}}

```

\hkl The command itself.

```

82 \DeclareRobustCommand*\hkl{%

```

```

83 \@ifnextchar[{\hkleckig}{%
84 \ifnextchar({\hklrund}{%
85 \ifnextchar<{\hklspitz}{\hklgeschweift}}}}
86 \end{package}

```

Change History

1.0	(HH).	1
General: Added support to arguments with space and numbers with more than one digit (HH, BP).	Bugfix: Detect isolated minus sign in argument with spaces (HH).	1
Changed <code>\millerminus</code> from <code>\bar</code> to <code>\overline</code> due to numbers with more than one digit (HH, BP).	Bugfix: In some cases, arguments without space have been parsed incorrectly (HH).	1
1.1	1.2	
General: Add a documentation	<code>\hkl</code> : Make <code>\hkl</code> robust	4

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