The `miller` package

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Abstract

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

Contents

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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 parantheses 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 preceeding 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]
```

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

Specify all equal directions in space:

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

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

Specify one plane in space:

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

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

Specify all equal planes in space:

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

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

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.,

```
\hkl<123>\\
\renewcommand\millerskip{\;}\hkl<123>\\
\renewcommand\millerskip{,\,}\hkl<123>\\
\renewcommand\millerskip{}\hkl<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:

```
⟨package⟩\ProvidesPackage{miller}
⟨version⟩\ProvidesFile{miller-v.tex}
⟨package | version⟩  [2004/09/20 v1.2 print miller indices]
⟨*package⟩
```

Define command for space between numbers.

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

Define the command for the minus.

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

Check for space in argument.

```
\def\@millerno#1 #2\@empty{%
  \xdef\miller@secondarg{#2}%
  \ifx\@empty\miller@secondarg
    \@@@millerno#1#2\@empty\@empty\@empty
  \else
    \@@millerno#1 #2\@empty
  \fi
}%
```

Parse for minus sign.

```
\def\@checkminus#1#2\@empty{%
  \ifx-#1%
    \begingroup
    \edef\@tempa{#2}%
    \edef\@tempb{}%
    \ifx\@tempa\@tempb
      \PackageError{miller}{%
        \string\hkl\space command contains a single minus}{No entry of
        the \string\hkl\space command may consist only of a minus.}%
      #1%
    \else
      \millerminus{\vphantom{b}#2}%
    \fi
    \endgroup
  \else
    #1#2%
  \fi
}
```

Parse the argument (with spaces).

```
\def\@@millerno#1 #2{%
  \ifx\@empty#2%
    \let\next\relax
  \else%
    \let\next\@@millerno
  \fi%
```

```
  \@checkminus#1\@empty
  \ifx\@empty#2\else\millerskip\fi
  \next #2%
}
```

Parse the argument (without spaces).

```
\def\@@@millerno#1#2#3{%
  \ifx-#1
    \millerminus{\vphantom{b}#2}%
    \def\miller@nextarg{#3}%
    \ifx\@empty#3%
      \let\next\relax
      \@tempswafalse
      \ifx-#2 \@tempswatrue\fi
      \ifx\@empty#2 \@tempswatrue\fi
      \if@tempswa
        \PackageError{miller}{%
          Last character of \string\hkl\space command is a minus}{The
          last character may not be a minus.}%
      \fi
    \else%
      \let\next\@@@millerno
      \millerskip
    \fi%
  \else
    #1%
    \def\miller@nextarg{#2#3}%
    \ifx\@empty#2%
      \let\next\relax
      \ifx-#1
        \PackageError{miller}{%
          Last character of \string\hkl\space command is a minus}{The
          last character may not be a minus.}%
      \fi
    \else%
      \let\next\@@@millerno
      \millerskip
    \fi%
  \fi
  \expandafter\next\miller@nextarg
}
```

Commands for the different types.

```
\def\hkleckig[#1]{\ensuremath{[\@millerno#1 \@empty]}}
\def\hklrund(#1){\ensuremath{(\@millerno#1 \@empty)}}
\def\hklspitz<#1>{\ensuremath{\langle\@millerno#1 \@empty\rangle}}
\def\hklgeschweift#1{\ensuremath{\{\@millerno#1 \@empty\}}}
```

`\hkl` The command itself.

```
\DeclareRobustCommand*\hkl{%
```

```
\@ifnextchar[{\hkleckig}{%
  \@ifnextchar({\hklrund}{%
    \@ifnextchar<{\hklspitz}{\hklgeschweift}}}}
⟨/package⟩
```

Change History

1.0

General: Added support to arguments with space and numbers with more than one digit (HH, BP). 1

Changed `\millerminus` from `\bar` to `\overline` due to numbers with more than one digit (HH, BP). 1

1.1

General: Add a documentation (HH). 1

Bugfix: Detect isolated minus sign in argument with spaces (HH). 1

Bugfix: In some cases, arguments without space have been parsed incorrectly (HH). 1

1.2

`\hkl`: Make `\hkl` robust 4

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Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.