The **miller** package

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**Abstract**
Typeset miller indices, e.g., \{120\}, 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 \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]
Specify all equal directions in space:
\begin{itemize}
\item \langle1 12 3\rangle, \langle-1 0 -12\rangle, \langle1 11 -2 0\rangle
\item \langle123\rangle, \langle-10-2\rangle, \langle11-20\rangle
\end{itemize}

Specify one plane in space:
\begin{itemize}
\item \{1 12 3\}, \{1 12 3\}, \{1 11 -2 0\}
\item \{123\}, \{123\}, \{11 -2 0\}
\end{itemize}

Specify all equal planes in space:
\begin{itemize}
\item \{1 12 3\}, \{1 12 3\}, \{1 11 -2 0\}
\item \{123\}, \{123\}, \{11 -2 0\}
\end{itemize}

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 \texttt{\millerminus} command, e.g.,
\begin{verbatim}
\usepackage{ushort}
\ushortCreate: \overline{oshort}
\renewcommand\millerminus{\oshort}
\end{verbatim}

The space between numbers can be changed, e.g.,
\begin{verbatim}
\texttt{\hkl<1 2 3>}\texttt{\hkl<-1 0 -12>}, \texttt{\hkl<1 11 -2 0>}
\texttt{\hkl<123>}, \texttt{\hkl<-10-2>}, \texttt{\hkl<11-20>}
\end{verbatim}

\begin{verbatim}
\texttt{\hkl(1 12 3)}, \texttt{\hkl(-1 0 -12)}, \texttt{\hkl(1 11 -2 0)}\texttt{\hkl(123)}, \texttt{\hkl(-10-2)}, \texttt{\hkl(11-20)}
\end{verbatim}

\begin{verbatim}
\texttt{\{1 12 3\}}, \texttt{\{1 12 3\}}, \texttt{\{1 11 -2 0\}}\texttt{\{123\}}, \texttt{\{123\}}, \texttt{\{11 -2 0\}}
\end{verbatim}
2 The implementation

Heading of the package:
1 \ProvidesPackage{miller}
2 \ProvidesFile{miller-v.tex}
3 \[2004/09/20 v1.2 print miller indices\]
4 \[\star package\]

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 \def\miller@secondarg{#2}%
9 \if\empty\miller@secondarg
10 \@@millerno#1\empty\empty\empty
11 \else
12 \@@millerno#1 #2\empty
13 \fi
14 }%

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

Parse the argument (with spaces).
32 \def\millerno#1 #2{%
33 \if\empty#2%
34 \let\next\relax
35 \else%
36 \let\next\@millerno
37 \fi
\checkminus
\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
    \fi
  \else
    \let\next\@@@millerno
    \millerskip
  \fi%
  \else
    \let\next#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{%
Change History

1.0
General: Added support to arguments with space and numbers with more than one digit (HH, BP). .......................... 1

Changed \millerm@nextarg from \bar to \overline due to numbers with more than one digit (HH, BP). .......................... 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

1.1
General: Add a documentation \hkl: Make \hkl robust .......................... 4

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