

The HEP-MATH-FONT package*

Extended Greek and sans-serif math

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2021/09/01

Abstract

The HEP-MATH-FONT package adjust the math fonts to be italic sans-serif if the document is sans-serif. Additionally Greek letters are redefined to be always italic and upright in math and text mode, respectively. Some math font macros are adjusted to give more consistently the naively expected results.

The package is loaded using `\usepackage{hep-math-font}`.

warning If the document `\familydefault` font is switched to the sansserif `\sfdefault` font the math font is adjusted accordingly using fonts compatible to latin modern (LM) and computer modern (CM). In order to be able to easily switch large chunks of math from serif to sans-serif documents the meaning of `\mathrm` and `\mathsf` is adjusted so that the first generates upright sans-serif math and the second serif math. This is is neither the literal meaning of the macros nor the best behaviour if a single large document is written in sans-serif. However, it simplifies working in an environment where one copies pieces of math between serif and sans-serif documents *e.g.* publications *vs.* talks and funding applications.

Using the FIXMATH [1] and TEXTALPHA [2] packages Greek letter are adjusted so that they are always italic and upright in math and text mode, respectively. Greek letters can be written by using their unicode characters.

symbols The `symbols=<family>` sets the family of the symbol fonts. `symbols=ams` loads the two \mathcal{AMS} fonts [3] and the BM bold fonts. The default `symbols=true` replaces additionally the blackboard font with the DSFONT [4]. `symbols=minion` switches the symbol fonts to the Adobe MinionPro companion font from the MNSYMBOL package [5]. `symbols=false` deactivates loading any additional symbol fonts, effectively restricting the package to only switch the math font according to the sans-serif property of the main text.

1 Macros

`\text` The `\mathrm{\langle math \rangle}` macro and the `\text{\langle text \rangle}` macro from AMSTEXT [6] are

`\mathrm` *This document corresponds to HEP-MATH-FONT v1.0.
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adjusted to produce upright Greek letters, *i.e.* ($\text{Ab}\Gamma\delta\mathbf{Ab}\Gamma\delta$), by adjusting the code from the ALPHABETA [7] package.

- `\mathbf` Bold math, via `\mathbf` is improved with the BM package [8], *i.e.* ($\text{Ab}\Gamma\delta\mathbf{Ab}\Gamma\delta$). Macros switching to `bfseries` such as `\section{\text{}}` are ensured to also typeset math in bold.
- `\mathsf` The math sans-serif alphabet is redefined to be italic sans-serif if the main text is serif and italic serif if the main text is sans-serif, *i.e.* ($\text{Ab}\Gamma\delta\mathbf{Ab}\Gamma\delta$). Ensuring that the distinction between these fonts is also kept if the (sans-)serif option of the document is switched.
- `\mathscr` The `\mathcal` font *i.e.* ($\mathcal{A}\mathcal{B}\mathcal{C}\mathcal{D}$) is accompanied by the `\mathscr` font *i.e.* ($\mathscr{A}\mathscr{B}\mathscr{C}\mathscr{D}$).
- `\mathbb` The `\mathbb` font is improved by the DOUBLESTROKE package [4] and adjusted depending on the (sans-)serif option of the document *i.e.* ($\mathbb{A}\mathbb{h}\mathbb{1}$).
- `\mathtt` The `\mathtt` macro switches to LM typewriter font *i.e.* ($\mathbf{Ab}\Gamma\mathbf{Ab}\Gamma$).
- `\mathfrak` Finally, the `\mathfrak` font is also available *i.e.* ($\mathfrak{A}\mathfrak{B}\mathfrak{1}\mathfrak{2}$).

Details about the font handling in $\text{T}_{\text{E}}\text{X}$ can be found in reference [9].

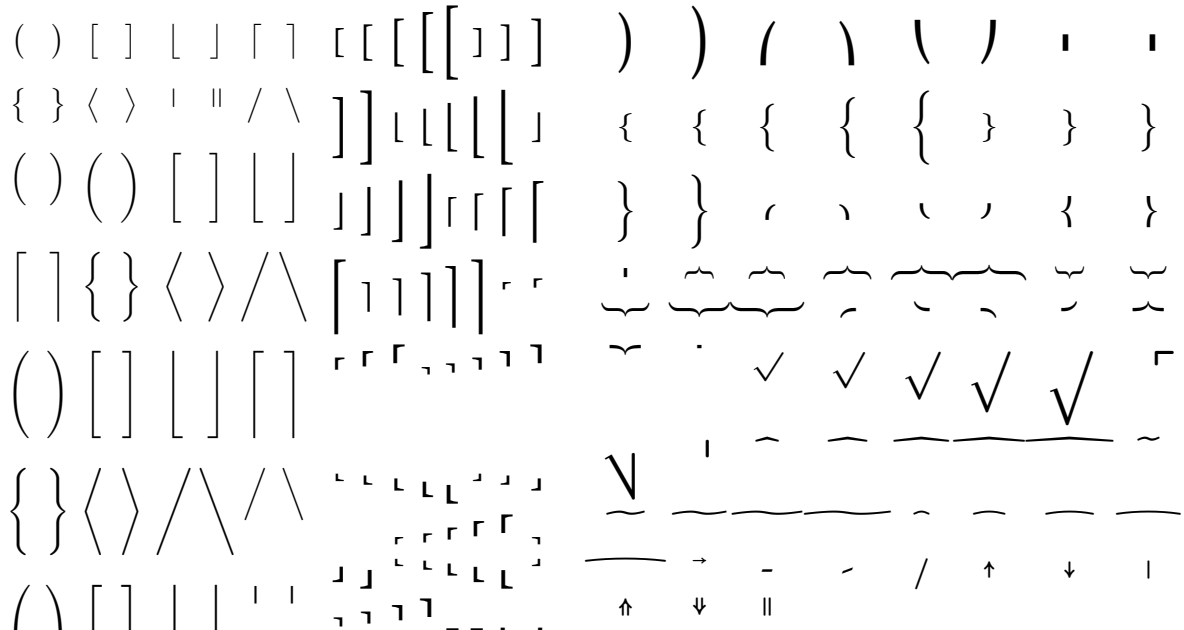
2 Math alphabet allocation

Of the 16 available math alphabets, $\text{T}_{\text{E}}\text{X}$ loads four by default

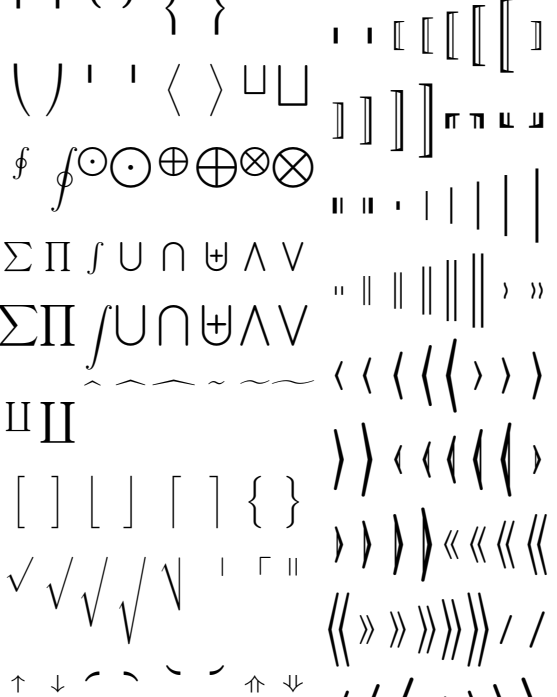
- 0) **OT1** Text (latin, upper case greek, numerals, text symbols)
- 1) **OML** Math Italic (latin, greek, numerals, text symbols)
- 2) **OMS** Symbol (`\mathcal`, operators)
- 3) **OMX** Math Extension (big operators, delimiters)

The text font 0) of CM is `cmr10 \OT1/cmr/m/n/10`, which is replaced by LM to be `rm-lmr10 \OT1/lmr/m/n/10`, the `sansserif` option uses `rm-lmss10 \OT1/lmss/m/n/10`. The italic math font 1) of CM is `cmmi10 \OML/cmm/m/it/10`, and is replaced by LM to be `lmmi10 \OML/lmm/m/it/10`, the `sansserif` options uses `cmssmi10 \OML/cmssrm/m/it/10` from the `SANSMATHFONTS` package [10]. The symbol font 2) of CM is `cmsy10 \OMS/cmsy/m/n/10`, and is replaced by LM to be `lmsy10 \OMS/lmsy/m/n/10`, the `sansserif` options uses `cmsssy10 \OMS/cmsssy/m/n/10` from the `SANSMATHFONTS` package [10]. The extension font 3) of CM is `cmex10 \OMX/cmex/m/n/5`, and is replaced by the `EXSCALE` package [11] to be `cmex10 \OMX/cmex/m/n/10`, the `sansserif` option loads `cmssex10 \OMX/cmssex/m/n/10`. The `AMSSYMB` (`AMSFONTS`) packages [12] load two more symbol fonts

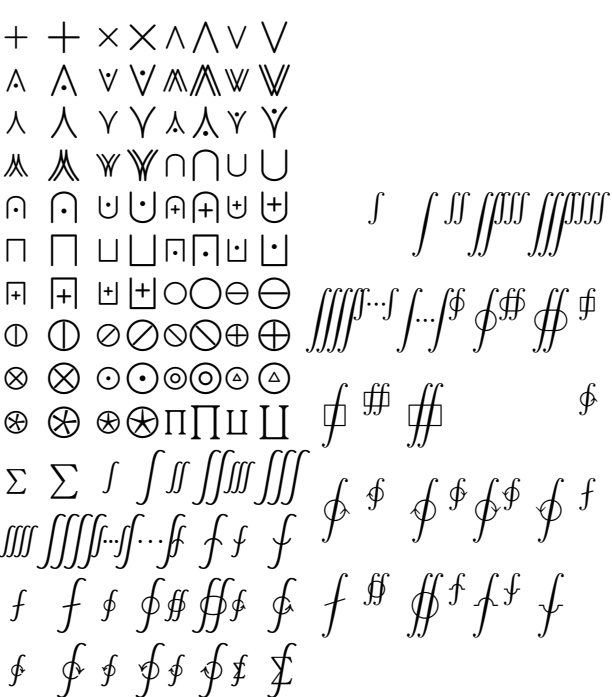
- 4) **msam10** `\U/msa/m/n/10` AMS symbol font A (special math operators)
- 5) **msbm10** `\U/msb/m/n/10` AMS symbol font B (`\mathbb`, negated operators)



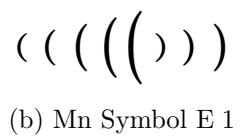
(c) Mn Symbol E 2



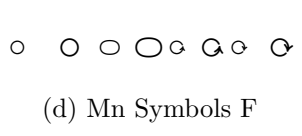
(a) Computer modern



(e) Extended set of integrals



(b) Mn Symbol E 1



(d) Mn Symbols F

Figure 2: Math extension fonts

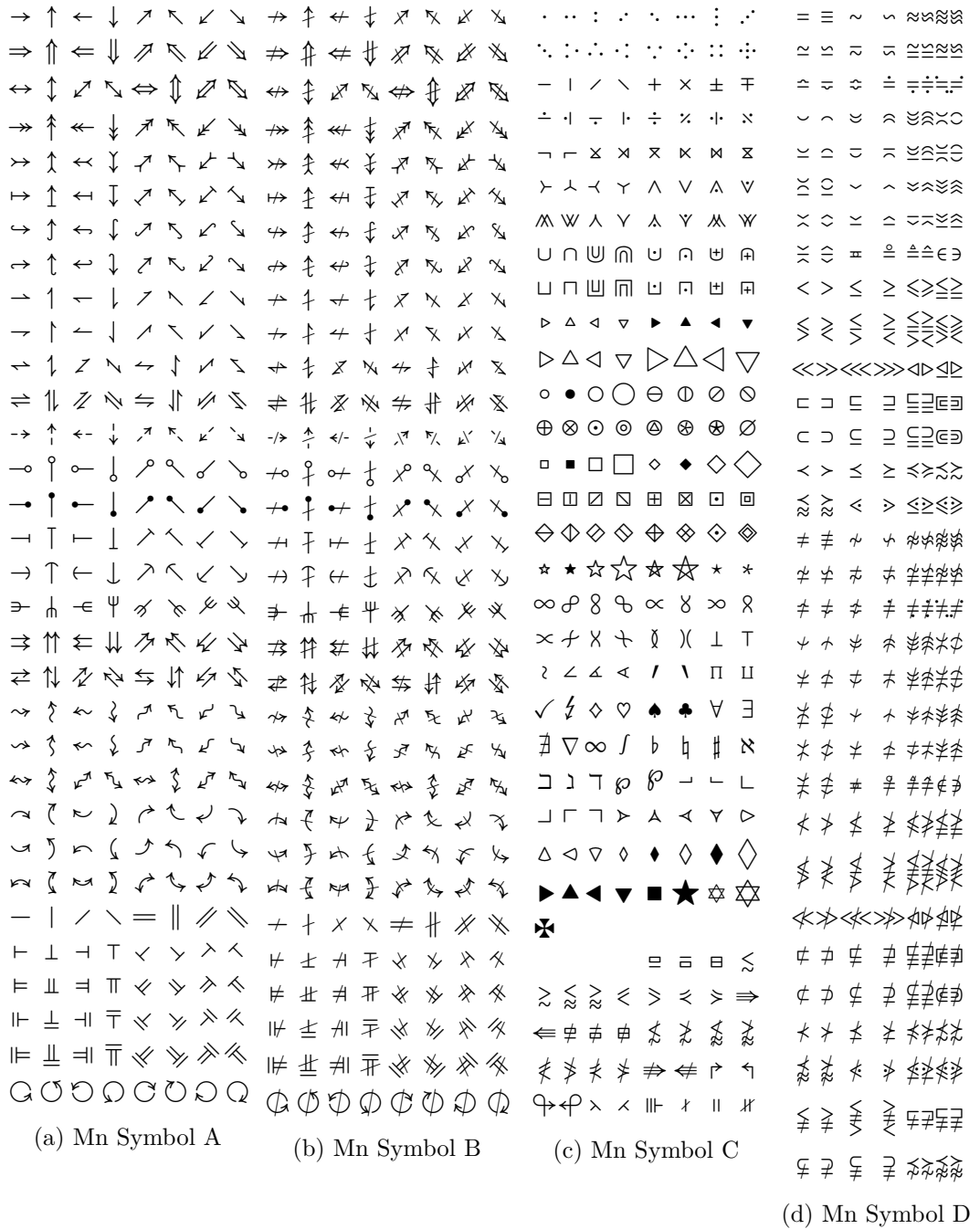


Figure 3: Minion symbol fonts

The `sansserif` option replaces them with `ssmsam10 \U/ssmsa/m/n/10` and `ssmsbm10 \U/ssmsb/m/n/10` from the `SANSMATHFONTS` package [10], respectively. The `BM` package [8] loads the bold version for the fonts 0) to 2).

Other math alphabets are only loaded on demand, *e.g.* `\mathsf` uses a sans-serif font and `\mathbf` without the `BM` package uses a bold font. The `\mathscr` macro uses the script font from the `MATHRSFS` package [13]

9) `rsfs10 \U/rsfs/m/n/10` Math script font (capital letters)

The `\mathbb` macro loads the double stroke font from the `DSFONT` package [4], this can be prevented with the `symbols=ams` option.

10) `dsrom10 \U/dsrom/m/n/10` Double stroke font

The `\mathfrak` macro loads the fractur font from the `AMSSYMB` package [12]

11) `eufm10 \U/euf/m/n/10` Math fraktur (Basic Latin)

The `HEP-MATH-FONT` package uses nine of the available 16 math alphabets. This number can be reduced by three using `\newcommand{\bmmx}{0}` from the `BM` package [8] and brought down to the default of four with the option `symbols=false`.

The `symbols=minion` options replaces the fonts 2) to 5) with corresponding fonts from the `MNSYMBOL` package [5]. Additionally, two more symbol alphabets are allocated, the `BM` package [8] loads one more font and now `\mathcal` triggers the use of one additional alphabet. Hence, the `minion` option uses three to four more math alphabets than a usual setup.

References

- [1] W. Schmidt. ‘The `fixmath` package for $\LaTeX 2_{\epsilon}$: Make maths comply with ISO 31-0:1992 to ISO 31-13:1992’ (2000). CTAN: `fixmath`.
- [2] G. Milde. ‘The `textalpha` package: LICR macros and encoding definition files for Greek’ (2010). CTAN: `greek-fontenc`.
- [3] *American Mathematical Society*. ‘The `amsfonts` package: \TeX fonts from the American Mathematical Society’ (1995). CTAN: `amsfonts`. URL: ams.org/tex/amsfonts.
- [4] O. Kummer. ‘The `doublestroke` font: Typeset mathematical double stroke symbols’ (1995). CTAN: `doublestroke`.
- [5] A. Blumensath. ‘The `MnSymbol` package: Mathematical symbol font for Adobe MinionPro’ (2005). CTAN: `MnSymbol`.
- [6] *\LaTeX Team*. ‘The `amstext` package: Typeset text fragments in mathematics’ (1995). CTAN: `amstext`. URL: ams.org/tex/amslatex.
- [7] G. Milde. ‘The `alphabeta` package: LICR macros and encoding definition files for Greek’ (2013). CTAN: `greek-fontenc`.
- [8] *\LaTeX Team*. ‘The `bm` package: Access bold symbols in maths mode’ (1993). CTAN: `bm`.

- [9] *L^AT_EX Team*. ‘L^AT_EX 2_ε font selection: Documentation of L^AT_EX font commands’ (1995). CTAN: `fntguide`.
- [10] A. Barton. ‘The `sansmathfonts` package: Correct placement of accents in sans-serif maths’ (2013). CTAN: `sansmathfonts`.
- [11] F. Mittelbach and R. Schöpf. ‘The `exscale` package: Implements scaling of the “cmex” fonts’ (1993). CTAN: `exscale`.
- [12] *American Mathematical Society*. ‘The `amssymb` package’ (1995). CTAN: `amsfonts`.
- [13] J. Knappen. ‘The `mathrsfs` package: Support for using RSFS fonts in maths’ (1995). CTAN: `mathrsfs`.