

The HEP-MATH-FONT package*

Extended Greek and sans-serif math

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Abstract

The HEP-MATH-FONT package aligns the math fonts with the document font family. It switches to italic sans-serif math in sans-serif documents, keeps Greek letters italic in math and upright in text, keeps math digits lining even when the main text uses oldstyle numerals, provides configurable symbol-font sets, and adjusts the usual math alphabets so that `\mathrm`, `\text`, `\mathbf`, `\mathsf`, `\mathscr`, `\mathbb`, `\mathtt`, and `\mathfrak` behave consistently across serif and sans-serif documents.

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 in this case 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, with code following the `ALPHABETA` package [3].

symbols The `symbols=<family>` class option sets the family of the symbol fonts. `symbols=ams` loads the two $\mathcal{AMS}$ fonts [4] and the BM bold fonts. The default `symbols=true` replaces additionally the blackboard font with the `DSFONT` [5]. `symbols=minion` switches the symbol fonts to the Adobe MinionPro companion font from the `MNSYMBOL` package [6]. `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` [7] are adjusted to produce upright Greek letters, i.e. $(\text{Ab}\Gamma\delta\text{Ab}\Gamma\delta)$, by adjusting the code from the `ALPHABETA` [3] package.

\mathbf Bold math, via `\mathbf` is improved with the `BM` package [8], i.e. $(\text{Ab}\Gamma\delta\text{Ab}\Gamma\delta)$. Macros switching to `bfseries` such as `\section{\langle text \rangle}` are ensured to also typeset math in bold.

*This document corresponds to HEP-MATH-FONT v1.5.

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- `\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. (*AbΓδAbΓδ*). Ensuring that the distinction between these fonts is also kept if the (sans-)serif option of the document is switched. Digits are declared as ordinary math symbols from a lining font matching the document family so that oldstyle text numerals do not leak into math. Digits inside `\mathsf` are routed through the lining `\mathsfstext` alphabet.
- `\mathscr` The `\mathcal` font i.e. (*ABCD*) is accompanied by the `\mathscr` font i.e. (*ℳℒℒ*).
- `\mathbb` The `\mathbb` font is improved by the `DOUBLESTROKE` package [5] and adjusted depending on the (sans-)serif option of the document i.e. (*ℤℓ1*).
- `\mathtt` The `\mathtt` macro switches to LM typewriter font i.e. (*AbΓAbΓ*).
- `\mathfrak` Finally, the `\mathfrak` font is also available i.e. (*ℒaBb12*).

Details about the font handling in T_EX can be found in reference [9].

2 Math alphabet allocation

Of the 16 available math alphabets, T_EX loads four by default

- o) **OT1** Text (latin, upper case greek, numerals, text symbols)

The text font o) 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`.

- 1) **OML** Math Italic (latin, greek, numerals, text symbols)

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].

- 2) **OMS** Symbol (`\mathcal`, operators)

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].

- 3) **OMX** Math Extension (big operators, delimiters)

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

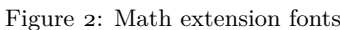
- 4) **msam10** `\U/msa/m/n/10` AMS symbol font A (special math operators)
- 5) **msbm10** `\U/msb/m/n/10` AMS symbol font B (`\mathbb`, negated operators)

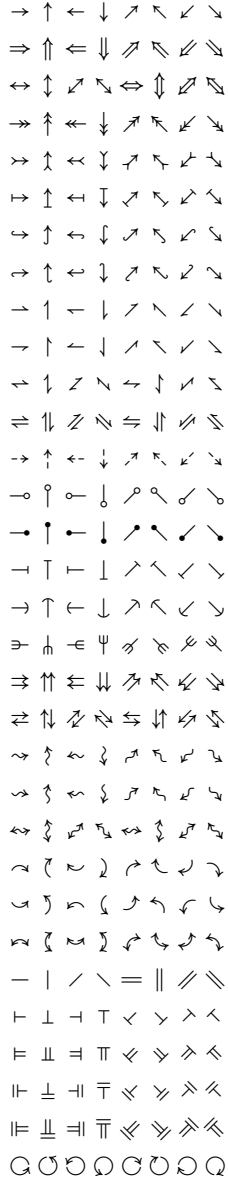
The `sansserif` option replaces them with `ssmsam10 \U/ssmsa/m/n/10` and `ssmsbm10 \U/ssmsb/m/n/10` from the `SANSMATHFONTS` package [10], respectively.

The `BM` package [8] loads the bold version for the fonts o) to 2).

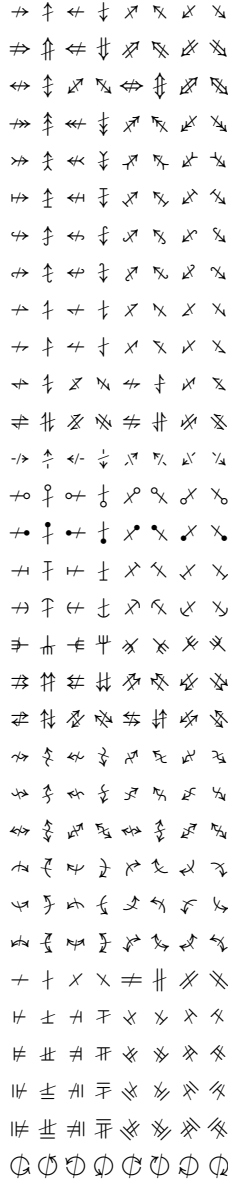
Other math alphabets are only loaded on demand, e.g. `\mathsf` uses a sans-serif font and `\mathbf` without the `BM` package uses a bold font. The `\mathscr` macro uses the script font from the `MATHRSFS` package [13]

Figure 1: Basic math fonts





(a) Mn Symbol A



(b) Mn Symbol B



(c) Mn Symbol C



(d) Mn Symbol D

Figure 3: Minion symbol fonts

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

The `\mathbb` macro loads the double stroke font from the `DSFONT` package [5], 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)

With the default symbol setup in a serif document, the `HEP-MATH-FONT` package reserves eleven of the available 16 math alphabets. This number can be reduced by three using `\newcommand{\bmmax}{0}` from the `BM` package [8]; the option `symbols=false` avoids the additional symbol-font block but keeps the lining digit fonts active.

The `symbols=minion` options replaces the fonts 2) to 5) with corresponding fonts from the `MNSYMBOL` package [6]. 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

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