Tikz-Feynman Examples

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1 Outputs

1.1 Document with Examples

This document, compiled from `main-general.tex`, contains multiple examples of Feynman diagrams (particularly relevant for QCD). Each example is defined in a different `.tex` file in the `/inputs` directory, and included below.

For convenience, the `external` tikz library is used to export the outputs as individual `.pdf` files into the `/outputs` directory. An advantage of this library is that the `.tex` files are only compiled when changed, speeding up the compilation. To override this, uncomment the following line.

```
\tikzset{external/force remake}
```

You should do this once after changing any of the configuration files, to ensure the changes take effect. Due to the externalisation, this file is useful to change the style of multiple figures at once.

Because the externalisation creates many files besides the `.pdf`, the `/outputs` directory contains a short script — `clear.sh` — to eliminate them.

1.2 Standalone

The `main-standalone.tex` can be used to generate a single `.pdf` from one of the examples. This is useful to create images that change step by step.

The `.pdf` border can be adjusted by changing the first lines of `main-standalone.tex`.

```
\documentclass[
border={-10pt 0pt -6pt 0pt} % left bottom right top
]{standalone}
```

Adjust in a case by case basis.

2 Configuration Files

2.1 Packages

Simply includes the necessary `tikz` libraries necessary to draw the following examples.

2.2 Fonts

In `config-fonts.tex` the font for the document can be changed. Here, two options are suggested, including `kpfonts` (a seriffed font which is slightly more distinctive than the LaTeX default 'Computer Modern') and `cmbright` (a sans-serif font fully compatible math mode). Make sure to only uncomment one of these lines.

The `\mathscr` commands were also defined, as an alternative to `\mathcal`.

2.3 Tikz-Feynman

In `config-feynman.tex`, the default styles were customised in different ways:

- the momentum arrows are now shorter and coloured red,
- the `ghost` style uses both round dots and arrows (to distinguish 'ghosts' from 'antighosts'),
- the `blob` style is larger and coloured blue.

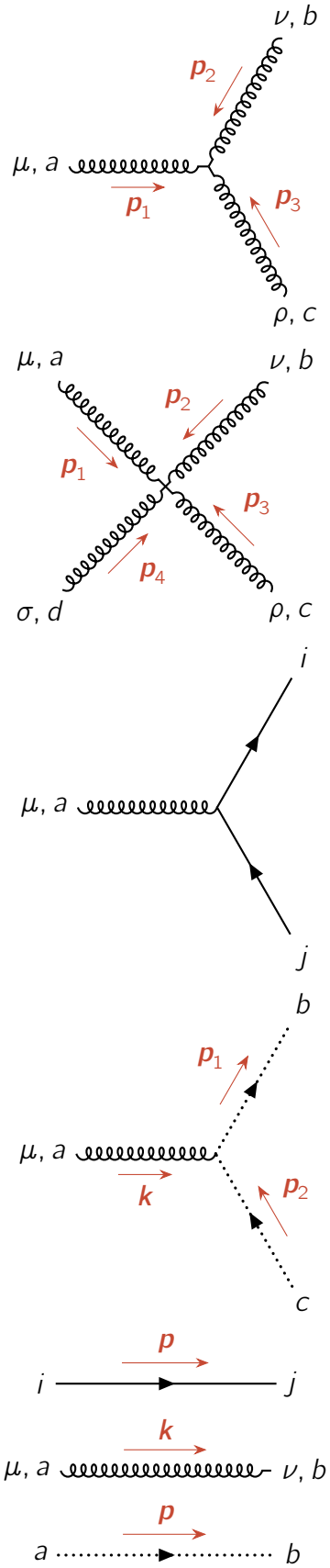
Other changes are possible, for example setting all photons to have a well defined colour, by adding the lines

```
\tikzfeynmanset{
photon/.append style = {yellow},
}
```

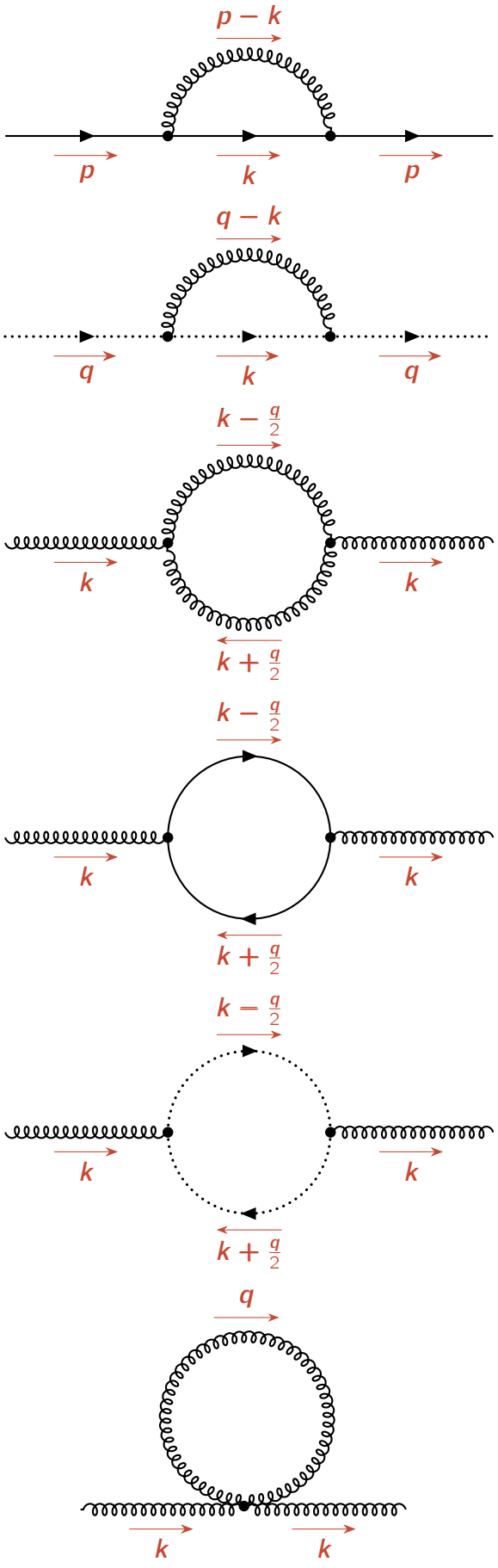
to the end of the file. The different particle styles available in `tikz-feynman` are stated in its documentation.

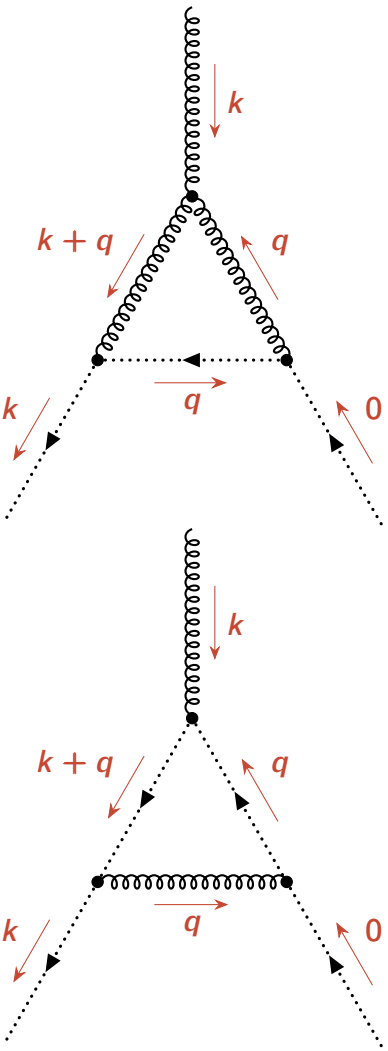
3 Examples

3.1 QCD Feynman Rules

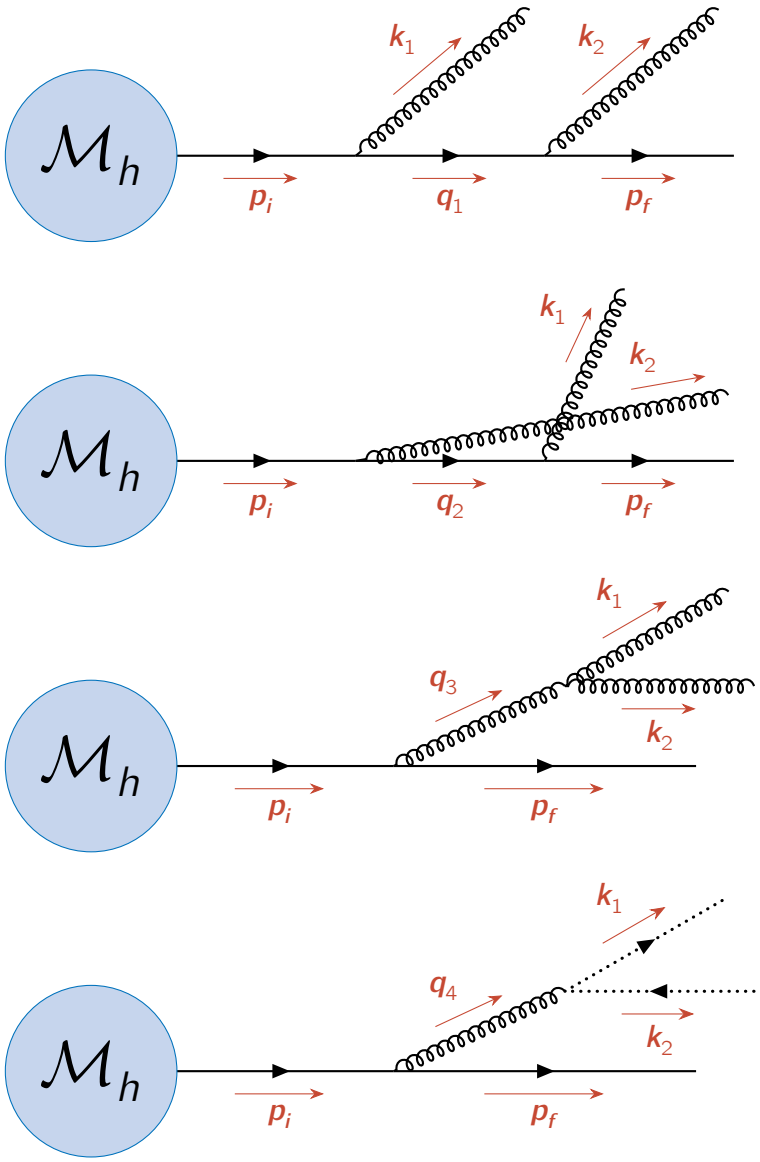


3.2 QCD Loops

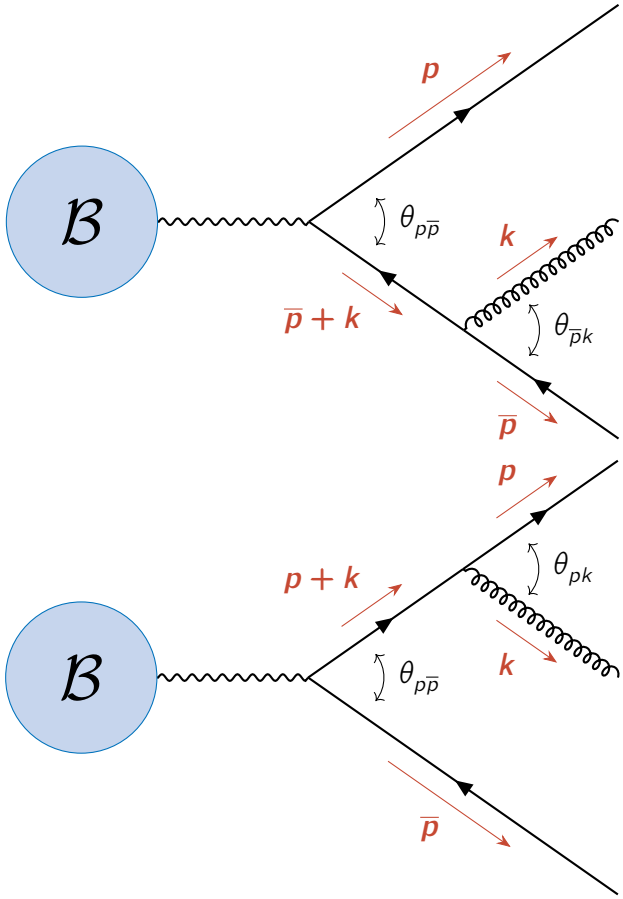

$p-k$
p
k
p
$q-k$
q
k
q
$k-\frac{q}{2}$
k
k
$k+\frac{q}{2}$
$k-\frac{q}{2}$
k
k
$k+\frac{q}{2}$
$k=\frac{q}{2}$
k
k
$k+\frac{q}{2}$
q
k
k


k
k + q
q
q
k
0
k
k + q
q
q
k
0

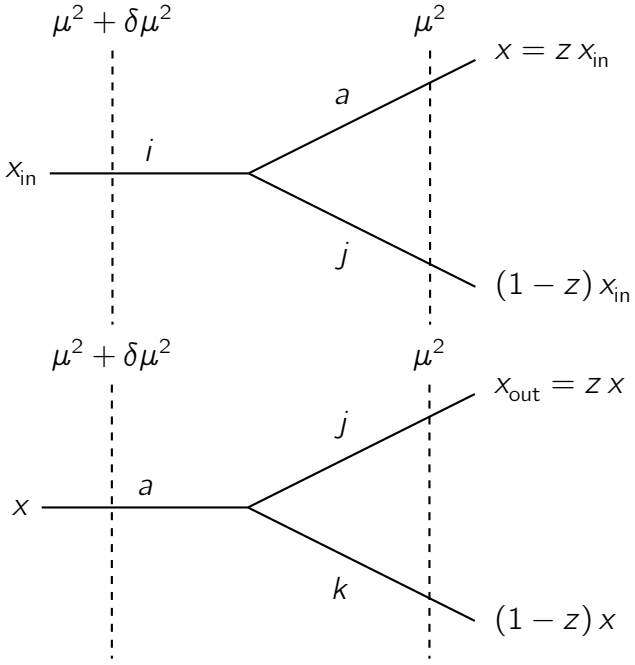
3.3 Double Gluon Emission Diagrams



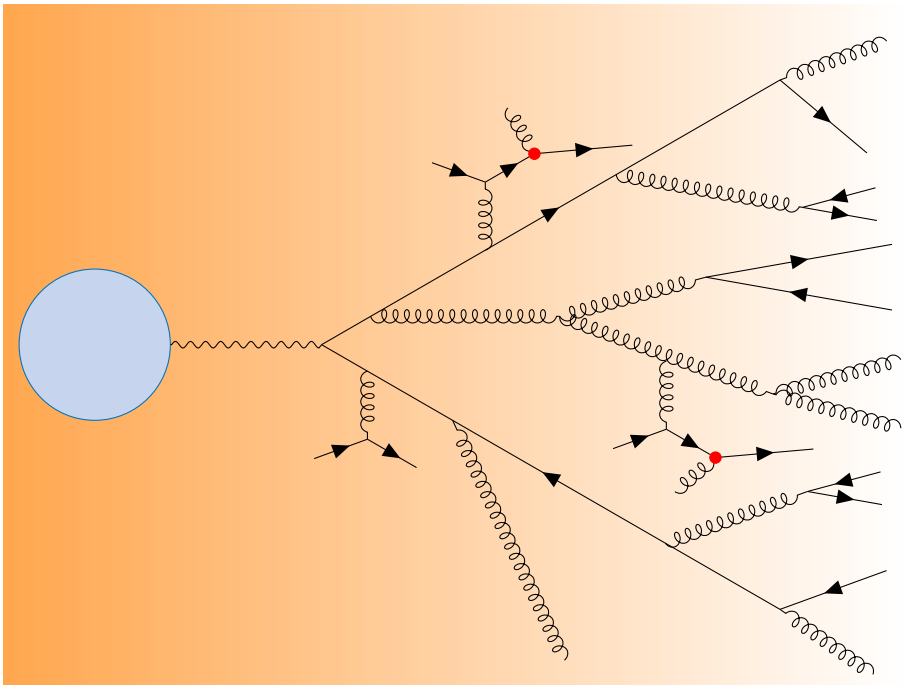
3.4 Quark-Antiquark Antenna



3.5 Factorisation of Parton Splittings



3.6 Medium Parton Shower



3.7 Contour Integral