wicked

$$:\underbracket{\overline{\Psi}_\alpha (x) \gamma^\mu_{\alpha\beta} \overbracket{A_\mu (x) \underbracket{\Psi_\beta (x) \overline{\Psi}}{}_\eta (y) \gamma^\nu_{\eta\rho} (y) A}{}_\nu \Psi}{}_\rho (y):$$

```
$ :
wick(id: #1, overline(Psi))_alpha (x)
gamma^mu_(alpha beta)
wick(pos: #top, A)_mu (x)
wick(Psi)_beta (x)
wick(overline(Psi))_eta (y)
gamma^nu_(eta rho) (y)
wick(pos: #top, A)_nu
wick(id: #1, Psi)_rho (y)
: $
```

This small Typst package handles the typesetting of Wick contractions $\overbracket{\phi^\dagger \phi}$. We shall not fall into the same typographical limitations that stopped the italian physicist Gian Carlo Wick from using this notation in his papers.

> *"Houriet and Kind's symbol is a line connecting the two factors like a string attached at both ends. It is very convenient for handwriting, but has been abandoned here for typographical reasons."*
>
> — Gian Carlo Wick [PhysRev.80.268]

Basic usage

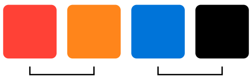
In the examples which follow we must suppose that the following preamble has been used.

```
#import "@preview/wicked:0.1.1": wick

// Only used to make the examples shorter
#set box(width: 20pt, height: 20pt, radius: 2pt)
```

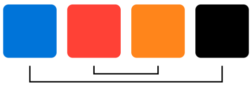
The whole package functionality is contained within the `wick` function. By calling `wick(..)` on some content you place a *contraction point*. Every second contraction point you place, gets contracted with the previous one.

```
$
#wick(box(fill: red))
#wick(box(fill: orange))
#wick(box(fill: blue))
#wick(box(fill: black))
$
```



By default every contraction point is given an `id` equal to the integer `0`. Since only contraction points with the same `id` get contracted together, by specifying different `id`s is possible to get multiple overlapping contractions.

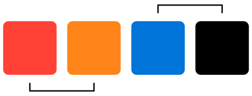
```
$
#wick(id: 1, box(fill: blue))
#wick(box(fill: red))
#wick(box(fill: orange))
#wick(id: 1, box(fill: black))
$
```



The `id` is not required to be an integer; for example `strings` are another reasonable choice. That being said, integer `id`s have a special behavior. Did you notice how the outer contraction in the last example automatically moved further away? When `id` is of type `int`, the distance of the contraction line, which is otherwise specified by the parameter `dist`, is instead computed as `dist * (1 + id / 2.0)`.

The `pos` parameter of the `wick` function allows the user to specify whether the contraction should be drawn above `pos: top` or below `pos: bottom` the equation. The default is to contract below.

```
$
#wick(pos: bottom, box(fill: red))
#wick(pos: bottom, box(fill: orange))
#wick(pos: top, box(fill: blue))
#wick(pos: top, box(fill: black))
$
```

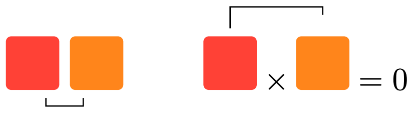


Only contraction points with the same value of pos can be contracted together, just like for id. Other then these two, there are no other constraints of which contraction points can be actually contracted.

Point specific styling

At the moment, the only point specific styling options are dx and dy, which shift the contraction point location.

```
$
#wick(box(fill: red), dx: 5pt)
#wick(box(fill: orange), dx: -5pt)
#h(30pt)
#wick(pos: top, box(fill: red)) times
#wick(pos: top, dy: 5pt, box(fill: orange)) = 0
$
```

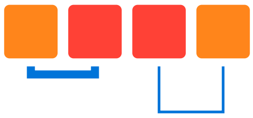


A negative/positive dx moves the point left/right, while a negative/positive dy brings the point closer/further.

Shared styling options

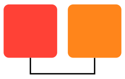
There are some styling options that regard the contraction as a whole. In this scenario both the first and the second contraction point can specify the styling option, and we say that the option is *shared*. The default value of every shared styling option is auto. If the two contraction points set different values for the same shared option, the one specified by the second contraction point wins. If no value is specified a default is used.

```
$
#wick(box(fill: orange), stroke: blue + 3pt)
#wick(box(fill: red))
#wick(box(fill: red), dist: 20pt, stroke: 3pt)
#wick(box(fill: orange), stroke: blue)
$
```



Setting the `offset` parameter, it's possible to specify the clearance between the contracted elements of the equation and the start of the contraction line.

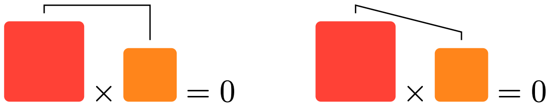
```
$
#wick(box(fill: red))
#wick(box(fill: orange), offset: 0pt)
$
```



Since `dist` is the total vertical distance between the contracted element and the horizontal contraction line (up to the effect of the before mentioned special rule for integer `id`s), setting `offset` to a value bigger than `dist` should be avoided in normal circumstances.

A boolean option called `flat` allows to specify whether the contraction line should be kept horizontal or not.

```
#wick(pos: top, box(width: 30pt, height: 30pt, fill: red)) times
#wick(pos: top, box(fill: orange)) = 0
#h(30pt)
#wick(pos: top, box(width: 30pt, height: 30pt, fill: red)) times
#wick(pos: top, flat: false, box(fill: orange)) = 0
```



Argument	**Positional**	**Type**	**Default**	**Shared**
`id`	no	`any`	`0`	-
`pos`	no	`alignment`	`bottom`	-
`dx`	no	`length`	`0pt`	no
`dy`	no	`length`	`0pt`	no
`dist`	no	`length`	`auto` is `0.5em`	yes
`offset`	no	`length`	`auto` is `0.25em`	yes
`stroke`	no	`stroke`	`auto` is `0.5pt`	yes
`flat`	no	`bool`	`auto` is `true`	yes
`body`	yes	`content`	-	no

Table 1: Input arguments of the `wick` function