The Ti*k*Z-Extensions Package

Manual for version 0.6 (8)

https://github.com/Qrrbrbirlbel/tikz-extensions

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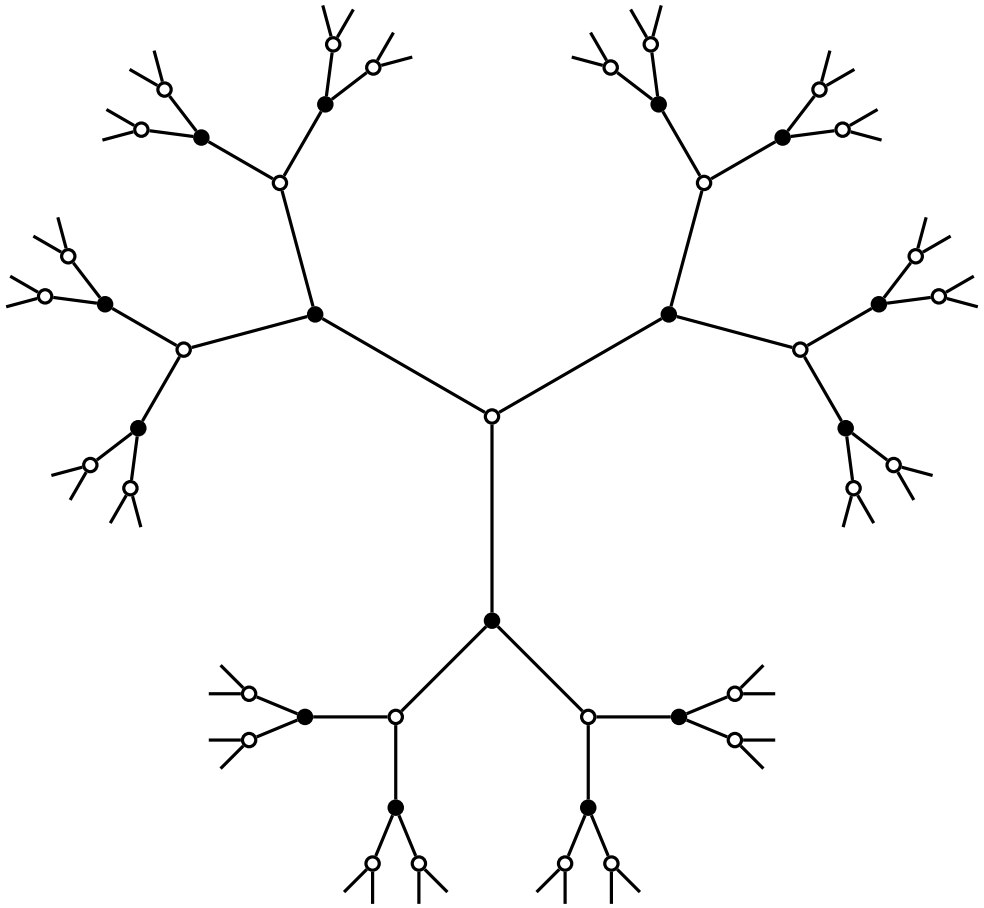
Part II
Ti*k*Z Libraries

These libraries only work with Ti*k*Z.



18 Mirror, Mirror on the Wall

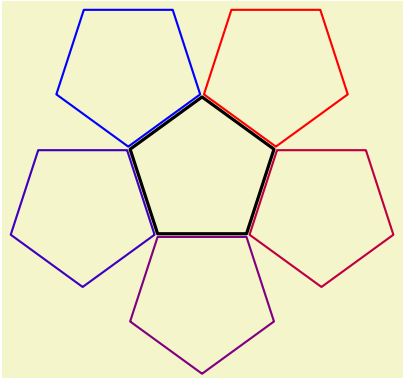
Ti*k*Z Library ext.transformations.mirror

```
\usetikzlibrary{ext.transformations.mirror} % LaTeX and plain TeX
\usetikzlibrary[ext.transformations.mirror] % ConTeXt
```

This library adds more transformations to Ti*k*Z.

As explained in section 20, there are two approaches to setting a mirror transformation. As with the commands in PGF, we'll be using a lowercase `m` for the reflection matrix and an uppercase `M` for the built-in approach.

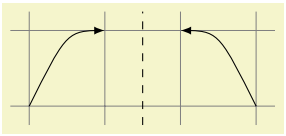
18.1 Using the reflection matrix



```
\usetikzlibrary {shapes.geometric,ext.transformations.mirror}
\begin{tikzpicture}[line join=round, thick, reg poly/.style={
  shape=regular polygon, regular polygon sides={#1}}]
\node[reg poly=5, minimum size=+2cm, draw, very thick] (a) {};
\foreach \i[evaluate={\col=(\i-1)/.04}] in {1,...,5}
  \node [ext/mirror=(a.corner \i)--(a.side \i), transform shape,
         reg poly=5, minimum size=+2cm, draw=red!\col!blue] {};
\end{tikzpicture}
```

/tikz/ext/xmirror=⟨*value or coordinate*⟩ (default `0pt`)

Sets up a transformation that mirrors along a horizontal line that goes through point (⟨*value*⟩, 0) or ⟨*coordinate*⟩.



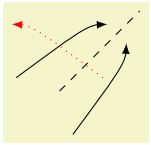
```
\usetikzlibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-0.25, -.25) grid (3.25, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (1.5, -.25) coordinate (m) -- (1.5, 1.25);
\draw[ext/xmirror=(m),-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

/tikz/ext/ymirror=⟨*value or coordinate*⟩ (default 0pt)

Sets up a transformation that mirrors along a vertical line that goes through point $(0, \langle value \rangle)$ or ⟨*coordinate*⟩.

/tikz/ext/mirror x=⟨*coordinate*⟩ (default (0,0))

Similar to xmirror, this however uses the xyz coordinate system instead of the canvas system.



```
\usetikzlibrary {ext.transformations.mirror}
\begin{tikzpicture}[x=.5cm, y=(45:1cm)]

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (1.5, -.25) coordinate (m) -- (1.5, 1.25);

\draw[ ext/xmirror=(m), -latex, red, dotted] (0,0) .. controls (.5,1) .. (1,1);
\draw[ext/mirror x=(m), -latex]              (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

/tikz/ext/mirror y=⟨*coordinate*⟩ (default (0,0))

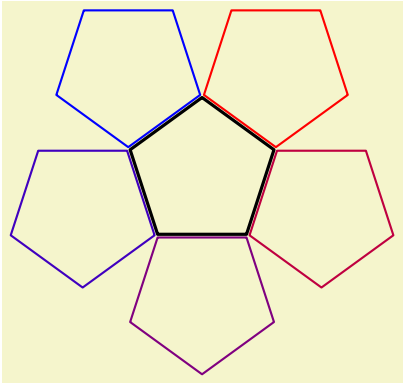
Similar to ymirror, this however uses the xyz coordinate system instead of the canvas system.

/tikz/ext/mirror=⟨*point A*⟩--⟨*point B*⟩ (no default)

Sets up a transformation that mirrors along a line that goes through ⟨*point A*⟩ and ⟨*point B*⟩.

When only ⟨*point A*⟩ is given that line goes through ⟨*point A*⟩ and the origin.

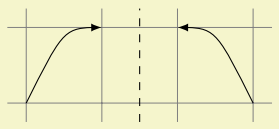
18.2 Using built-in transformations



```
\usetikzlibrary {shapes.geometric,ext.transformations.mirror}
\begin{tikzpicture}[line join=round, thick, reg poly/.style={
  shape=regular polygon, regular polygon sides={#1}}]
\node[reg poly=5, minimum size=+2cm, draw, very thick] (a) {};
\foreach \i[evaluate={\col=(\i-1)/.04}] in {1,...,5}
  \node [ext/Mirror=(a.corner \i)--(a.side \i), transform shape,
         reg poly=5, minimum size=+2cm, draw=red!\col!blue] {};
\end{tikzpicture}
```

/tikz/ext/xMirror=⟨*value or coordinate*⟩ (default 0pt)

Sets up a transformation that mirrors along a horizontal line that goes through point (⟨*value*⟩, 0) or ⟨*coordinate*⟩.



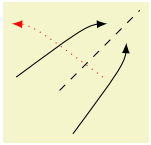
```
\usetikzlibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-0.25, -.25) grid (3.25, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (1.5, -.25) coordinate (m) -- (1.5, 1.25);
\draw[ext/xMirror=(m),-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

/tikz/ext/yMirror=⟨*value or coordinate*⟩ (default 0pt)

Sets up a transformation that mirrors along a vertical line that goes through point (0, ⟨*value*⟩) or ⟨*coordinate*⟩.

/tikz/ext/Mirror x=⟨*coordinate*⟩ (default (0,0))

Similar to xMirror, this however uses the xyz coordinate system instead of the canvas system.



```
\usetikzlibrary {ext.transformations.mirror}
\begin{tikzpicture}[x=.5cm, y=(45:1cm)]

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (1.5, -.25) coordinate (m) -- (1.5, 1.25);

\draw[ ext/xMirror=(m), -latex, red, dotted] (0,0) .. controls (.5,1) .. (1,1);
\draw[ext/Mirror x=(m), -latex]              (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

/tikz/ext/Mirror y=⟨*coordinate*⟩ (default (0,0))

Similar to yMirror, this however uses the xyz coordinate system instead of the canvas system.

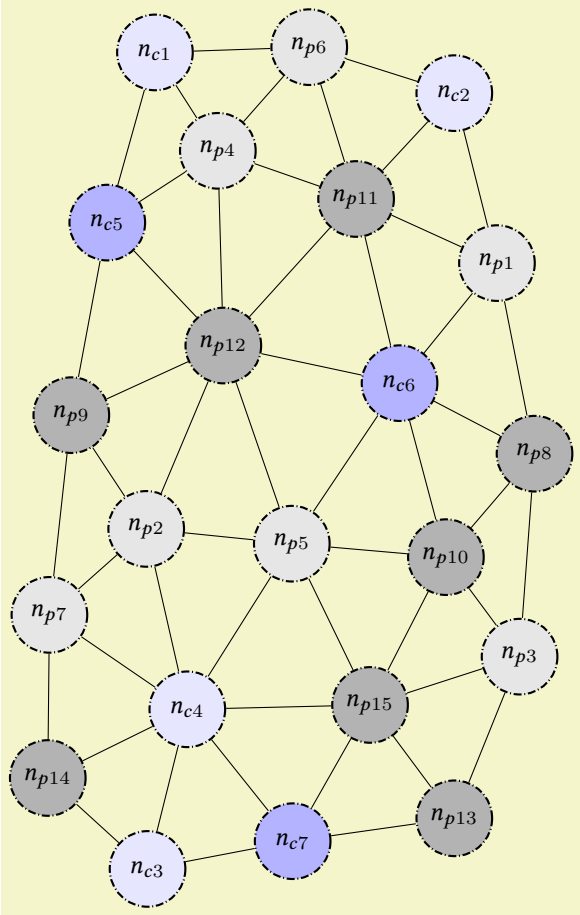
/tikz/ext/Mirror=⟨*point A*⟩--⟨*point B*⟩ (no default)

Sets up a transformation that mirrors along a line that goes through ⟨*point A*⟩ and ⟨*point B*⟩.

When only ⟨*point A*⟩ is given that line goes through ⟨*point A*⟩ and the origin.

Part III
PGF Libraries

These libraries (should) work with both PGF and Ti*k*Z.




```
\usetikzlibrary {graphs,graphdrawing,ext.misc} \usegdlibrary {force}
\tikzset{
  mynode/.style={
    circle, minimum size=10mm, draw, densely dashdotted, thick,
    decide color/.expand once=#1},
  decide color/.style 2 args={
    /utils/TeX/if=c#1
      {/utils/TeX/ifnum={#2<5}{bluelight}{bluedark}}
      {/utils/TeX/ifnum={#2<8}{light}{dark}}},
  light/.style={fill=gray!20},  bluelight/.style={fill=blue!10},
  dark/.style ={fill=gray!60},  bluedark/.style ={fill=blue!30}}
\tikz\graph[
  spring electrical layout, vertical=c2 to p13,
  node distance=1.5cm, typeset=$n_{\tikzgraphnodetext}$,
  nodes={mynode=\tikzgraphnodetext}] {
  % outer ring
  c2 -- {p1, p11, p6};
    p1 -- {p8, c6, p11};
      p8 -- {p3, p10, c6};
       p3 -- {p13, p15, p10};
         p13 -- {p15, c7};
           c7  -- {c3, c4, p15};
           c3  -- {p14, c4};
           p14 -- {p7, c4};
         p7 -- {p9, p2, c4};
       p9 -- {c5, p12, p2};
     c5 -- {c1, p4, p12};
   c1 -- {p6, p4};
  p6 -- {p11, p4};
  % inner ring
  p11 -- {c6, p12, p4};
  p5 -- {c6 -- {p10, p12}, p10 -- p15, p15 -- c4, c4 -- p2, p2 -- p12, p12 -- p4};
};
```

20 Transformations: Mirroring

PGF Library ext.transformations.mirror

```
\usepgflibrary{ext.transformations.mirror}  % LaTeX and plain TeX
\usepgflibrary[ext.transformations.mirror]  % ConTeXt
```

This library adds mirror transformations to PGF.

Two approaches to mirror transformation exist:

1. Using the reflection matrix (see left column).

   This depends on `\pgfpointnormalised` which involves the sine and the cosine functions of PGFmath.

2. Using built-in transformations (see right column).

   This depends on `\pgfmathanglebetweenpoints` which involves the arctangent (`atan2`) function of PGFmath.

Which one is better? I don't know. Choose one you're comfortable with.

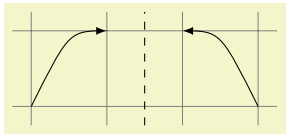
20.1 Using the reflection matrix

The following commands use the reflection matrix that sets the transformation matrix following

$$A = \frac{1}{||\vec{l}||^2} \begin{bmatrix} l_x^2 - l_y^2 & 2l_x l_y \\ 2l_x l_y & l_y^2 - l_x^2 \end{bmatrix}.$$

`\pgfexttransformxmirror{`⟨*value*⟩`}`

Sets up a transformation that mirrors along a vertical line that goes through point (⟨*value*⟩, 0).



```
\usepgflibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-.25, -.25) grid (3.25, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (1.5, -.25) -- (1.5, 1.25);
\pgfexttransformxmirror{1.5}

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

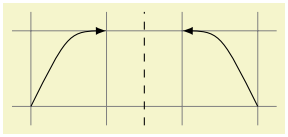
20.2 Using built-in transformations

The following commands use a combination of shifting, rotating, −1 scaling, rotating back and shifting back to reach the mirror transformation.

The commands are named the same as on the left side, only the `m` in `mirror` is capitalized.

`\pgfexttransformxMirror{`⟨*value*⟩`}`

Sets up a transformation that mirrors along a vertical line that goes through point (⟨*value*⟩, 0).



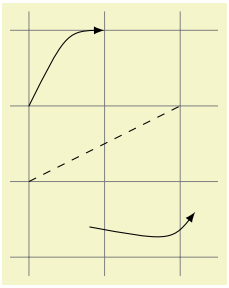
```
\usepgflibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-.25, -.25) grid (3.25, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (1.5, -.25) -- (1.5, 1.25);
\pgfexttransformxMirror{1.5}

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

`\pgfexttransformymymirror{⟨value⟩}`

Sets up a transformation that mirrors along a horizontal line that goes through point $(0, \langle value \rangle)$.

`\pgfexttransformmmirror{⟨point A⟩}{⟨point B⟩}`

Sets up a transformation that mirrors along the line that goes through ⟨*point A*⟩ and ⟨*point B*⟩.



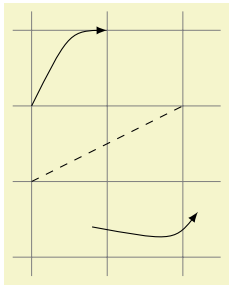
```
\usepgflibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-.25, -2.25) grid (2.5, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (0, -1) -- (2, 0);
\pgfexttransformmmirror{\pgfpointxy{0}{-1}}
                       {\pgfpointxy{2}{ 0}}

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

`\pgfexttransformmyMirror{⟨value⟩}`

Sets up a transformation that mirrors along a horizontal line that goes through point $(0, \langle value \rangle)$.

`\pgfexttransformmMirror{⟨point A⟩}{⟨point B⟩}`

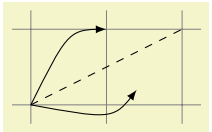
Sets up a transformation that mirrors along the line that goes through ⟨*point A*⟩ and ⟨*point B*⟩.



```
\usepgflibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-.25, -2.25) grid (2.5, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (0, -1) -- (2, 0);
\pgfexttransformMirror{\pgfpointxy{0}{-1}}
                      {\pgfpointxy{2}{ 0}}

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

`\pgfextqtransformmmirror{⟨point A⟩}`

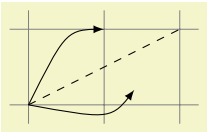
Sets up a transformation that mirrors along the line that goes through the origin and ⟨*point A*⟩.



```
\usepgflibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-.25, -.25) grid (2.25, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (0, 0) -- (2, 1);
\pgfextqtransformmmirror{\pgfpointxy{2}{1}}

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

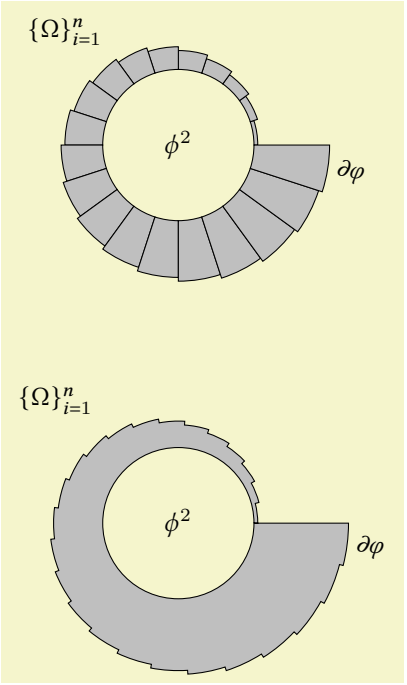
`\pgfextqtransformMirror{⟨point A⟩}`

Sets up a transformation that mirrors along the line that goes through the origin and ⟨*point A*⟩.



```
\usepgflibrary {ext.transformations.mirror}
\begin{tikzpicture}
\draw[help lines] (-.25, -.25) grid (2.25, 1.25);
\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);

\draw[dashed] (0, 0) -- (2, 1);
\pgfextqtransformMirror{\pgfpointxy{2}{1}}

\draw[-latex] (0,0) .. controls (.5,1) .. (1,1);
\end{tikzpicture}
```

Part IV
Utilities




```
\usetikzlibrary {ext.misc}
\begin{tikzpicture}[
  declare function={bigR(\n)=smallR+.05*\n;},
  declare constant={smallR=1; segments=20;},
  full arc=segments]
\foreach \iN[evaluate={\endRadius=bigR(\iN+1);}, use int=0 to segments-1]
  \filldraw[fill=gray!50] (\iN R:\endRadius)
    arc [radius=\endRadius, start angle=\iN R, delta angle=+1R] -- (\iN R+1R:smallR)
    arc [radius=smallR,       end angle=\iN R, delta angle=-1R] -- cycle;

\node                                              {$\phi^2$};
\node at (north west:{sqrt 2 * bigR(segments/2)})  {$\{\Omega\}_{i=1}^n$};
\node[rotate=-.5R, right] at (-.5R: bigR segments) {$\partial \varphi$};

\tikzset{yshift=-5cm, declare constant={segments=25;}, full arc=segments}
\filldraw[fill=gray!50] (right:smallR)
  \foreach \iN[evaluate={\endRadius=bigR(\iN+1);}, use int=0 to segments-1] {
    -- (\iN R:\endRadius) arc[radius=\endRadius, start angle=\iN R, delta angle=1R]}
    -- (right:smallR)     arc[radius=smallR,     start angle=0,     delta angle=-360];

\node                                              {$\phi^2$};
\node at (north west:{sqrt 2 * bigR(segments/2)})  {$\{\Omega\}_{i=1}^n$};
\node[rotate=-.5R, right] at (-.5R: bigR segments) {$\partial \varphi$};
\end{tikzpicture}
```

Part V
Changelog, Index & References

Changelog

Version 0.6 (2024-07-27)

- Added `\tikzextset`, `\tikzextversion` and `\tikzextversionnumber`
- Added six new `auto` placement mechanisms: `ext/above`, `ext/below`, `ext/west`, `ext/east`, `ext/north` and `ext/south`.
- Added `ext/auto offset` for `auto` placement.
- Added `ext/precise auto angle`.
- Added Ti*k*Z library `ext.arrows-plus`.
- Added Ti*k*Z library `ext.topaths.autobend`.
- Made `ext.node-families` and `ext.scalepicture` memoizable.

Version 0.5.1 (2023-04-02)

- Added PGF library `ext.arrows`.
- Bugfix to `ext.pgfkeys-plus`. [21]

Version 0.5 (2023-03-17)

- Added package `pgffor-ext`.
- Added Ti*k*Z library `ext.nodes`.
- Added Ti*k*Z library `ext.layers`.
- Bugfixes to `ext.calendar-plus`.
- Allow the original `rectangle` timer with `ext.paths.timer`.

Version 0.4.2 (2022-10-30)

- Added Ti*k*Z library `ext.scalepicture`.
- Bugfixes to `shapes.uncenteredrectangle`, `paths.ortho`, `positioning-plus` and `pgfcalender-ext`.

Version 0.4.1 (2022-10-23)

- Cleaned up directory structure of documentary.
- Added PGFkeys library `ext.pgfkeys-plus`.
- Added shape `uncentered rectangle` (PGF library `ext.shapes.uncenteredrectangle`).
- Fixed `ext.paths.arcto` – again [20].

Version 0.4 (2022-10-10)

- CTAN version of 0.3.1

Version 0.3.1 (2022-10-09)

- Fixed `ext.paths.ortho` keys `only vertical first` and `only horizontal first`.
- Moved all (except the `to paths`) to namespace `/tikz/ortho`. `/tikz/hvvh` and `/tikz/udlr` are considered deprecated.
- Fixed `\pgfcalendarjulianyeartoweek`.
- Added more calendar tests.
- Added directory structure.

Version 0.3 (2022-09-24)

- Added shape `circle arrow` (PGF library `ext.shapes.circlearrow`).

- Added shape `circle cross split` (PGF library `ext.shapes.circlecrosssplit`).
- Added shape `heatmark` (PGF library `ext.shapes.heatmark`).
- Added shape `rectangle with rounded corners` (PGF library `ext.shapes.rectangleroundedcorners`).
- Added shape `superellipse` (PGF library `ext.shapes.superellipse`).
- Added Ti*k*Z library `ext.node-families.shapes.geometric`.
- Fixed `ext.node-families`' key `size`.
- Renamed internal macros to use custom namespace starting with `\tikzext@`.
- Added some references.

Version 0.2 (2022-08-21)

- Added Ti*k*Z library `ext.positioning-plus`.
- Added Ti*k*Z library `ext.node-families`.

Version 0.1 (2022-08-16)

- Added Ti*k*Z library `ext.calendar-plus`.
- Added Ti*k*Z library `ext.misc`.
- Added Ti*k*Z library `ext.paths.arcto`.
- Added Ti*k*Z library `ext.paths.ortho`.
- Added Ti*k*Z library `ext.paths.timer`.
- Added Ti*k*Z library `ext.patterns.images`.
- Added Ti*k*Z library `ext.topaths.arcthrough`.
- Added Ti*k*Z library `ext.transformations.mirror`.
- Added PGF library `ext.transformations.mirror`.

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