# Custom LaTeX Commands

## Size Adaptive Math

| | | |
|---|---|---|
| `\bb{..}` | $(x)$ | parantheses |
| `\bc{..}` | $[x]$ | brackets |
| `\absv{..}` | $\lvert x\rvert$ | absolute value |
| `\absvsq{..}` | $\lvert x\rvert^2$ | absolute value squared |
| `\comm{..}{..}` | $[x, y]$ | commutator |
| `\meanv{..}` | $\langle x\rangle$ | mean value |

## Bra Ket Notation

| | | |
|---|---|---|
| `\bra{..}` | $\langle x\rvert$ | bra |
| `\ket{..}` | $\lvert x\rangle$ | ket |
| `\braket{..}{..}` | $\langle x\rvert y\rangle$ | scalar product |
| `\ketbra{..}{..}` | $\lvert x\rangle\langle y\rvert$ | ket-bra operator |
| `\braketop(3 arguments)` | $\langle x\rvert y\rvert z\rangle$ | matrix element |
| `\smallbraketop(3 arguments)` | $\langle x\rvert y\rvert z\rangle$ | small matrix element |

## Special functions

| | | |
|---|---|---|
| `\deltaf{..}` | $\delta(x)$ | delta function |
| `\thetaf{..}` | $\theta(x)$ | theta function |
| `\expf{..}` | $\exp(x)$ | exponential function |
| `\ef{..}` | $\mathrm{e}^x$ | exponential function |
| `\Re{..}` | $\mathrm{Re}(x)$ | real part |
| `\Im{..}` | $\mathrm{Im}(x)$ | imaginary part |

## Named states

| | |
|---|---|
| `\ketPsi` | $\lvert\Psi\rangle$ |

| | | |
|---|---|---|
| `\ketpsi` | $\|\psi\rangle$ | |
| `\ketphi` | $\|\varphi\rangle$ | |
| `\ketup` | $\|\uparrow\rangle$ | spin up |
| `\ketdo` | $\|\downarrow\rangle$ | spin down |
| `\ketzero` | $\|0\rangle$ | |
| `\ketone` | $\|1\rangle$ | |
| `\ketg` | $\|g\rangle$ | ground state |
| `\kete` | $\|e\rangle$ | excited state |
| `\vac` | $\|\mathrm{vac}\rangle$ | vacuum |

## Vectors

| | |
|---|---|
| `\vecr` | $\mathbf{r}$ |
| `\vecrone` | $\mathbf{r_1}$ |
| `\vecrtwo` | $\mathbf{r_2}$ |
| `\vecrn` | $\mathbf{r_N}$ |
| `\vecri` | $\mathbf{r_i}$ |
| `\vecrj` | $\mathbf{r_j}$ |
| `\vecx` | $\mathbf{x}$ |
| `\vecy` | $\mathbf{y}$ |
| `\vecz` | $\mathbf{z}$ |
| `\vecxi` | $\mathbf{x_i}$ |
| `\vecxj` | $\mathbf{x_j}$ |
| `\veck` | $\mathbf{k}$ |
| `\vecq` | $\mathbf{q}$ |
| `\vecp` | $\mathbf{p}$ |

## Differentiation

| | | |
|---|---|---|
| `\partiald{..}` | $\frac{\partial}{\partial x}$ | partial differentiation |

| | | |
|---|---|---|
| `\laplace` | $\nabla^2$ | laplace operator |

## Integration

| | | |
|---|---|---|
| `\integral{..}` | $\int \mathrm{d}x$ | integral |
| `\integralb(3 arguments)` | $\int_x^y \mathrm{d}z$ | integral with boundaries |
| `\integralf{..}{..}` | $\int \frac{\mathrm{d}x}{y}$ | integral with fraction |
| `\intvol` | $\int \mathrm{d}^3 r$ | integral over r space |
| `\intvolp` | $\int \mathrm{d}^3 r'$ | integral over r' space |
| `\intvold` | $\int \mathrm{d}^3 r \int \mathrm{d}^3 r'$ | double integral over space |
| `\intk` | $\int \mathrm{d}^3 k$ | integral over k space |
| `\intkp` | $\int \mathrm{d}^3 k'$ | integral over k' space |
| `\intkn` | $\int \frac{\mathrm{d}^3 k}{(2\pi)^3}$ | normalized integral over k space |
| `\intkpn` | $\int \frac{\mathrm{d}^3 k'}{(2\pi)^3}$ | normalized integral over k' space |

## Special symbols

| | | |
|---|---|---|
| `\hc` | h.c. | hermitian conjugate |
| `\hamil` | $\hat{\mathrm{H}}$ | Hamilton operator |
| `\hastobe` | $\stackrel{!}{=}$ | has to be |
| `\eqhat` | $\mathrel{\widehat{=}}$ | corresponds to, is equivalent |
| `\id` | $\mathbb{1}$ | identity matrix |

## Second quantization

| | | |
|---|---|---|
| `\aop` | $a$ | annihilation operator |
| `\aopd` | $a^\dagger$ | creation operator |
| `\bop` | $b$ | annihilation operator |
| `\bopd` | $b^\dagger$ | creation operator |
| `\cop` | $c$ | annihilation operator |
| `\copd` | $c^\dagger$ | creation operator |

| | | |
|---|---|---|
| `\nop` | $n$ | number operator |
| `\psiop` | $\hat{\psi}$ | field operator |
| `\psiopd` | $\hat{\psi}^\dagger$ | |
| `\PsiOp` | $\hat{\Psi}$ | |
| `\PsiOpd` | $\hat{\Psi}^\dagger$ | |

## Differences

| | |
|---|---|
| `\Dx` | $\Delta x$ |
| `\Dy` | $\Delta y$ |
| `\Dz` | $\Delta z$ |
| `\Dt` | $\Delta t$ |

## Figures

`\igopt{..}{..}`

`\ig{..}{..}`

`\figopt(4 arguments)`

`\fig(3 arguments)`

`\doublefigopt(8 arguments)`

`\doublefig(7 arguments)`

`\figref{..}`