

$$\Psi = \int e^{i/\hbar \int \left(\frac{R}{16\pi G} - \frac{1}{4} F^2 + \bar{\psi} i \not{D} \psi - \lambda \phi \bar{\psi} \psi + |D\phi|^2 - V(\phi) \right)}$$

path integral Feynmann
 spacetime-relativity Einstein
 strong/weak/e.m. interactions Maxwell Yang-Mills
 $\phi - \psi$ interaction Yukawa
 imaginary unit
 Schrödinger wave function
 Euler exponential
 Planck quantum
 Newton gravitation
 Dirac relativistic wave function
 Kobayashi-Maskawa CKM matrix
 Higgs Boson

The LiteSolution Class

HANGZHOU DIANZI UNIVERSITY



1 User Manual For The LiteSolution Class

CHAPTER

1.1 Introduction

This is the document for the LiteSolution class, which is designed for typesetting solutions of problems in exams, textbooks, etc.

Welcome to feedback bugs or ideas via email xiamyphys@hdu.edu.cn or GitHub.

1.1.1 Installing LiteSolution and loading it

Simply download `litesolution.cls` file from GitHub or CTAN and save it under your working directory. However, I strongly suggest to use terminal to install and update all packages to the latest version

```
sudo tlmgr update --self --all
```

To learn more, please refer to How do I update my T_EX distribution?

1.1.2 Compatibility

The test environments are macOS + MacT_EX 2024 / Overleaf / Ubuntu 22.04.2 + T_EX Live 2024 and they all work fine for pdfL_AT_EX and X_YL_AT_EX compilers. Windows and Unix platforms compatibility unknown.

1.2 Global Options of this Class

```
\documentclass[<options>]{litesolution}
```

1.2.1 The **answer** option

The `hideanswer` mode can hide contents in `solution` environment and `ans` command.

1.2.2 The **math** option

The `mtpro2`, `newtx` and `newtxsf` modes can format the font of formulas in the document. Please check if `mtpro2` font has been installed on your computer correctly before using `mtpro2` mode.

1.3 Related packages

Package `notebeamer` provides macros for inputting slides on note papers quickly.

Package `fadingimage` provides macros for inputting full width picture at the edges of pages quickly.

1.4 Cover Configurations

1.4.1 The cover page configurations

```

\title{<content>}           \subtitle{<content>}
\bioinfo{<content>}         \cover[<pattern>]{<image>}
\coverhead[<angle>]{<image>} \coverhead* [<angle>]{<content>}

\begin{document}           \maketitle[<color>]

\title{\sffamily The \pkg{LiteSolution} Class}
\subtitle{\sffamily\scshape Hangzhou Dianzi University}
\bioinfo{Mingyu Hsia (\mailto{xiamyphys@hdu.edu.cn})}
\quad\quad\quad\today\quad\quad\quad Version 2.2a}
\cover[checkerboard]{schrodinger} \coverhead[5]{universe}

\begin{document}           \maketitle[Midnightblue]

```

1.4.2 The chapter head configurations

```
\chapterimage {<insert image macro>}
```

This command can assign the format of the image at every chapters begin and you can adjust the format of the image with the **fadingimage** package.

1.5 Preset Commands

1.5.1 The **ans** command

```
\ans {<contents>}
```

This command can underline the answer, and if mode **noans** is enabled, the answer will be hidden.

1.5.2 The **solute** command

```
\solute {<number>}           \solute* {<contents>}
```

This command can create a fixable answer box when the mode **noans** is enabled.

1.5.3 Other preset commands

```

\def\i{\mathrm i}           \def\e{\mathrm e}           \def\T{\mathsf T}
\let\leq\leqslant           \let\geq\geqslant           \let\vec\vv

```

1.6 Preset **amsthm** Environments

1.6.1 The **problem** environment

```
\begin{problem}[Keywords]\leavevmode
\begin{tasks}(2)
  \task Choice A \task[\true] Choice B
  \task Choice C \task Choice D
\end{tasks}
\end{problem}
```

■ **PROBLEM 1.1** (Keywords).

- | | |
|-------------|-------------|
| A. Choice A | ✔ Choice B |
| C. Choice C | D. Choice D |

1.6.2 The **solution** and **note** environment

```
\begin{solution}
  B is correct.
\end{solution}
```

✔ **SOLUTION.** B is correct.

```
\begin{note}
  We note that.
\end{note}
```

❗ **NOTE.** We note that.

1.6.3 Equation test

$$i\hbar \partial_t \psi(\mathbf{x}, t) = -(i\hbar c \boldsymbol{\alpha} \cdot \nabla + \beta mc^2) \psi(\mathbf{x}, t)$$

1.7 Preset packages

This template has preset many packages. The following packages are the common ones

| | | | | | | | |
|------------|------------|------------|-----------|-------------|----------|------------|--------------|
| amsthm | amssymb | bm | booktabs | cancel | caption | circuitikz | datetime |
| derivative | diagbox | esvect | extarrows | fadingimage | fancyhdr | fixdif | fontawesome5 |
| geometry | graphics | graphicx | hyperref | indentfirst | lipsum | mathtools | multicol |
| multirow | nicematrix | notebeamer | paracol | pgfplots | physics2 | qrcode | refstyle |
| setspace | siunitx | tabularx | tasks | wallpaper | xcolor | xeCJK | xfrac |

Appendix Original code for the cover head

```

\documentclass[svgnames,tikz]{standalone}

\usepackage{xcolor}
\usepackage{newtxtext,mtpro2,cancel,physics2,xfrac}
\usephysicsmodule{ab.legacy}
\usetikzlibrary{tikzmark}
\tikzset{every node/.style={align=center,DarkSlateGray!30},
  every path/.style={DarkSlateGray!30,line cap=round}}

\begin{document}\tikz{
  \node [above right] at (0,0) {$\color{DarkSlateGray!30}
    \tikzmarknode a{\Psi}=\displaystyle\tikzmarknode b{\int}
    \tikzmarknode c{\mathrm e}^{\frac{\tikzmarknode d{\mathrm i}}{\tikzmarknode e{\hbar}}
    \int ab(\frac{\tikzmarknode fR}{16\pi \tikzmarknode gG}-\frac{14\tikzmarknode hF^2}{\overline{\psi}\mathrm i\tikzmarknode{i}{\cancel D}\psi-\tikzmarknode j{\lambda}
    \tikzmarknode k{\varphi\overline{\psi}}\psi
    +\abs{D\tikzmarknode l{\varphi}}^2-V(\varphi))}
    \draw ([yshift=-1ex] a.south) coordinate (A) ---+ (0,-.5)
    node [scale=.45,below] {Schr"odinger\\footnotesize wave function};
    \draw ([yshift=1ex] b.north) coordinate (B) ---+ (0,.55)
    node [scale=.45,above] {\footnotesize path integral\\Feynmann};
    \draw ([yshift=-1ex] c.south) coordinate (C) ---+ (0,-.7)
    node [scale=.45,below] {Euler\\footnotesize exponential};
    \draw ([yshift=1ex] d.north) coordinate (D) ---+ (0,.45)
    node [scale=.45,above,xshift=1ex] {\footnotesize imaginary unit};
    \draw ([yshift=-1ex] e.south) coordinate (E) ---+ (0,-.5)
    node [scale=.45,below,xshift=2ex] {Planck\\footnotesize quantum};
    \draw ([yshift=1ex] f.north) coordinate (F) ---+ (0,.7)
    node [scale=.45,above] {\footnotesize spacetime-relativity\\Einstein};
    \draw ([yshift=-1ex] g.south) coordinate (G) ---+ (0,-.5)
    node [scale=.45,below] {Newton\\footnotesize gravitation};
    \draw ([yshift=1ex] h.north) coordinate (H) ---+ (0,.5)
    node [scale=.45,above,xshift=5ex] {\footnotesize strong/weak/e.m. interactions\\
      Maxwell Yang-Mills};
    \draw ([yshift=-1ex] i.south) coordinate (I) ---+ (0,-.6)
    node [scale=.45,below] {Dirac\\footnotesize relativistic wave function};
    \draw ([yshift=-1ex] j.south) coordinate (J) ---+ (0,-.2)
    node [scale=.45,below,xshift=3ex] {Kobayashi-Maskawa\\footnotesize CKM matrix};
    \draw ([yshift=1ex] k.north) coordinate (K) ---+ (0,.5)
    node [scale=.45,above] {\footnotesize $\varphi$ - $\psi$ interaction\\Yukawa};
    \draw ([yshift=-1ex] l.south) coordinate (L) ---+ (0,-.3)
    node [scale=.45,below] {Higgs\\footnotesize Boson};
    \foreach \x in {A,B,...,L}\fill [DarkSlateGray!30] (\x) circle (.025);}
\end{document}

```