

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

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

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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 \TeX distribution?

1.1.2 Compatibility

The test environments are macOS + Mac \TeX 2024 / Overleaf / Ubuntu 22.04.2 + \TeX Live 2024 and they all work fine for pdf \LaTeX and X \LaTeX 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 2.1d}
\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}

```