

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

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

## CHAPTER

# Introduction to the **LiteSolution** Class

## 1.1 Preface

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@gmail.com](mailto:xiamyphys@gmail.com) 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 the **solution** environment and **ans** command, and make the effect of **emph** weaker.

### 1.2.2 The **math** option

The **mtpro2**, **newtx** and **newtxsf** modes can format the font of formulas in the document. Please check if mtp<sub>ro2</sub> font has been installed on your computer correctly before using **mtpro2** mode.

## 1.3 Derivative Works

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.

# 2 Settings & Usages of this Class

CHAPTER

## 2.1 Cover Configurations

### 2.1.1 The cover page configurations

```
\coverset{
  title           = \sffamily The \pkg{LiteSolution} Class,
  subtitle        = \sffamily\scshape Hangzhou Dianzi University,
  bioinfo         = Mingyu XIA (\mailto{xiamyphys@gmail.com})\quad\quad
                  Version 2.4a,
  covercolor      = DarkSeaGreen,
  coverhead       = universe,
  coverhead.rotate = 3,
  cover           = schrodinger,
  cover.pattern   = sixpointed stars
}
```

### 2.1.2 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.

## 2.2 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	enumitem	esvect
extarrows	fadingimage	fancyhdr	fixdif	fontawesome5	geometry
graphicx	hyperref	indentfirst	lipsum	magicwatermark	mathtools
mhchem	multicol	multirow	nicematrix	notebeamer	paracol
pgfplots	physics2	qrcode	refstyle	setspace	siunitx
subcaption	tabularx	soul	tasks	ulem	xcolor
xeCJK	xeCJKfntef	xfrac			

## 2.3 Preset Commands

### 2.3.1 The `ans` command

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

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

### 2.3.2 The `solute` command

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

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

### 2.3.3 The `emph` command

```
\emph {<content>}           \emph* {<content>}
```

The Quick Brown Fox Jumps Over the Lazy Dog: non-hideanswer mode

The Quick Brown Fox Jumps Over the Lazy Dog: hideanswer mode

### 2.3.4 Other preset commands

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

## 2.4 Preset `amsthm` Environments

### 2.4.1 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 2.1** (Keywords).

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

### 2.4.2 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.

## 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) {$\color{DarkSlateGray!30}
    \tikzmarknode a{\Psi}=\displaystyle\tikzmarknode b{\int}
    \tikzmarknode c{\mathrm e}^{\{
      \sfrac{\tikzmarknode d{\mathrm i}}{\tikzmarknode e{\hbar}}
      \int\ab{\frac{\tikzmarknode fR}{16\pi\tikzmarknode gG}-\frac{14\tikzmarknode hF^2}{
        +\overline{\psi}\mathrm i\tikzmarknode i}{\cancel D}\psi-\tikzmarknode j{\lambda}
        \tikzmarknode k{\varphi}\overline{\psi}}\psi
      +\abs{D\tikzmarknode l{\varphi}}^2-V(\varphi)}\}}$};
  \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}

```